Flinders University

Helping those who languish: innovating psychological mental health promotion solutions for people with poor mental wellbeing

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1. Thesis summary

The Australian mental health system is under strain, with advocates calling for reform to counter the growing burden of poor mental health. One suggested area of reform is early intervention, including an increased focus on mental health promotion efforts. To date these efforts have lacked impact, which may be explained by a problem with the theoretical conceptualisation of mental health in our system, and subsequently the solutions we have utilised for early intervention.

Traditionally, mental health is conceptualised as a singular continuum ranging from mental illness or disorder to high wellbeing on both extreme ends. Empirical research contradicts this model, showing that states of mental wellbeing and illness are related but separate, having both common and unique characteristic and drivers. The combined body of prior published works that make up this thesis aim to demonstrate the utility of targeting these mental states of wellbeing via psychological solutions as an overlooked avenue for early intervention.

Study 1 is a narrative review that provides a theoretical justification for expanding our focus on wellbeing, arguing for the systematic integration of dedicated wellbeing measures and interventions into our system, rather than repurposing solutions that were designed to target states of illness. Two observational studies give insight into the compounding effect that including wellbeing assessment has on estimates of poor mental health in the general population (study 2) and university students (study 3). Together the studies' findings point to the merit of targeting people who are languishing, i.e., have low wellbeing, as the group is non-trivial in size.

Through two intervention studies, evidence is contributed showing that scalable intervention formats can be effective in improving mental wellbeing. Study 4 tested technology that relied on the so-called 'experience sampling method' to deliver a low-intensity wellbeing intervention that revolved around building meaning and purpose. In study 5 a train-the-trainer framework was tested to deliver a multi-facetted group-based psychological intervention relying on upskilled peers rather than clinical staff.

Although the content within the first intervention studies proved effective, it targeted certain aspects of wellbeing with specific components rather than relying on a broad range of proven techniques. To determine the state of evidence for different psychological approaches on improving mental wellbeing, a systematic review and meta-analysis was conducted in study 6. The findings from this review, and studies 4 and 5, formed the basis for the final studies centring on designing (study 7) and testing (study 8) a psychological intervention that was purposefully developed to help those who languish or struggle with distress, without the need to rely on scarce clinical resources in the traditional system.

The contextual statement for this thesis provides a backdrop to the papers and combines them in a joint narrative, by placing the studies within the wider context of the Australian mental health system and the evolution of psychological interventions for wellbeing. After discussing the findings from my studies, the contextual statement concludes by discussing the implications of my studies' findings for the mental health system, their limitations, and suggestions for further research.

2. Student Declaration

I certify that this thesis: 1) does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university 2) and the research within will not be submitted for any other future degree or diploma without the permission of Flinders University; and 3) to the best of my knowledge and belief, does not contain any material previously published or written by another person except where due reference is made in the text.

3. Acknowledgements

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I would finally like to acknowledge the contribution of the Australian Government Research Training Program Scholarship, allowing me to complete this PhD by prior published works.

4. Contextual Statement

4.1. An Introduction to This Contextual Statement

The Australian mental health system is under strain, with advocates, academics and stakeholders alike pointing to a system that is struggling to cope (Productivity Commission, 2020; Griffiths et al., 2015). The system does not only fail in meeting the demand for services, to date it has also failed to positively impact on population-level mental health (Australian Institute of Health and Welfare [AIHW], 2022a; Australian Bureau of Statistics [ABS], 2017; State of Victoria, 2021). Despite continuous investment in mental healthcare over the past three decades, no material reduction in the rates of mental illness has been recorded over time in Australia (Harvey et al., 2017; Meadows et al., 2019) and indeed globally (GBD 2019 Mental Disorders Collaborators, 2022). Although progress in the scientific advancement of evidence-based treatment and interventions is continually made, the burden of mental illness in health, economic and social terms, has for some time been modelled to continue to worsen (Bloom et al., 2012; Doran & Kinchin, 2017; Whiteford et al., 2013). Importantly, many models on disease burden preceded recent global circumstances such as the COVID-19 pandemic and therefore excluded the negative impact the pandemic is expected to have, most notably for already vulnerable population groups (Samji et al., 2021; Zhao et al., 2022).

Both the failure to improve rates of mental illness after decades of investment and the inability to manage demand for services have consistently led to calls for reform. Two of the most frequently mentioned target areas for such reform include: (a) improving care provision for people with complex mental health needs, and (b) addressing the social determinants of health, i.e., resolving key societal challenges that influence mental health problems such as access to housing, stable income and employment, domestic violence and abuse, and so on (Alegría, NeMoyer, Bagué, et al., 2018; Allen et al., 2014; Fisher & Baum, 2010; Lund et al., 2018). Despite being of clear relevance to improved mental health care, implementing reform in these two areas is not straightforward. Reform in each area is a highly complex challenge that has proven to be difficult to achieve over time, requiring long-term policy changes combined with intense investment if they are to realistically help drive down prevalence rates of mental illness (Exworthy, 2008; Productivity Commission, 2020).

An additional avenue for reform and innovation stresses the importance of prevention and early intervention – or promotion of good mental health and wellbeing - at a population level (Campion et al., 2012; World Health Organisation [WHO], 2002). In addition to focusing on strengthening services for those with recurring and complex issues, there are opportunities to support a larger segment of the community that is at risk of developing mental dysfunction or is

currently dealing with milder or subclinical problems (Herrmann, 2001; Keyes, 2007). While the notion may be straightforward – i.e., helping individuals at an earlier stage of developing problems will prevent them from needing services, subsequently benefitting cases at the severe end, who may get access to freed-up clinicians and related professional services – current approaches to prevention and promotion to date have failed to lead to significant impact (Baker et al., 2021). This failure to find satisfactory outcomes should not be confused with a lack of theoretical validity for early intervention, but rather points to challenges in our *approach* to its execution. Put differently: simply pouring more resources into early intervention as it stands – and mental health promotion specifically - is unlikely to lead to impact unless a re-conceptualisation of our approach to it takes place.

One such reconceptualisation and the role that psychological interventions can play in its operationalisation, forms the essence of this thesis by prior published works. The combined publications that lie at the heart of this contextual statement follow a common thread, centring around a problem in the way the relationship between states of mental wellbeing and states of mental illness is typically viewed. The studies build on the notion that the traditional bi-directional relationship – the notion that mental wellbeing and mental illness lie on opposites site of the same continuum – has not been extensively validated, despite underpinning our existing system (Keyes, 2005; Mjøsund, 2021; Tudor, 1996). There is a growing body of scientific evidence pointing to the fact that states of mental *wellbeing* and states of mental *illness* are related but distinct areas of our mental *health*: each have their own distinct theoretical paradigms, and each require their own assessment methods and interventions (Iasiello et al., 2020; Iasiello et al., 2023a).

A parallel with physical healthcare can be drawn to bring to life the potential utility of this reconceptualisation to early intervention. Mental healthcare is generally a synonym for the treatment of mental *illness*. In physical healthcare a clearer delineation exists between the treatment and assessment of physical illness (e.g., provision of chemotherapy for cancer) and the promotion and assessment physical *health* or wellbeing (e.g., stimulating physical activity and good sleep) (Breslow, 1999; Butler et al., 2008). A deliberate focus on improving physical wellbeing by targeting health risk and health promotion behaviours has ultimately resulted in improvements in quality of life and reduced risk of morbidity of serious illnesses, for example the impact of smoking cessation and physical activity on cardiovascular and thoracic outcomes (Carnethon, 2009; Jha, 2020). The question that relates to this thesis asks whether a similar approach could be taken for mental health: rather than simply re-purposing psychological solutions designed for clinical mental disorders, do we have an opportunity in testing dedicated solutions for people who languish with poor mental wellbeing, irrespective of the presence of mental illness?

Figure 1.

Visualisation of the flow of this contextual statement, outlining the titles of the individual sections and indicating in which sections the studies of this thesis are covered.

4.1 Introduction

OUR MENTAL HEALTH SYSTEM, ITS ORIGINS AND HOW IT WORKS.

4.2 History of mental healthcare in Australia: How did we end up with the system to date?

4.3 The Australian mental Health system: How is mental healthcare organised?

4.4 Psychological Interventions: Key principles and how they work in changing mental health outcomes

4.5 The investment-prevalence paradox: Does the existing mental health system work?

TARGETING WELLBEING AS A WAY TO REFORM THE SYSTEM

4.6 Reforming mental healthcare to lower the burden of mental illness: What are ways to 'fix' the system?

4.7 Re-balancing the way we provide 'treatment: Focus on promotion as a complementary strategy

4.8 Mental wellbeing: Emphasising positive functioning in mental health

Study 1

4.9 The need to embrace complexity in our mental health system: the case for a s stronger focus on mental wellbeing

THE MAGNITUDE OF THE LANGUISHING PROBLEM

4.10 The languishing cohort: Bang for buck in an invisible group

4.11 Measuring wellbeing: Insights from South Australia

Study 2+3

TESTING NEW WAYS TO HELP THOSE WHO LANGUISH

Study 4+5

4.12 Testing scalable formats to deliver wellbeing interventions

4.13 Mapping the psychological building blocks for improving wellbeing

Study 6

4.14 Design of a personalised group-based wellbeing solution: The Be Well Plan

4.15 Testing the differential effectiveness of The Be Well Plan on wellbeing and distress

Study 7

WHERE TO FROM HERE

4.16 Practical implications of strengthening the case for dedicated mental health promotion efforts

4.17 Limitations, gaps and future directions for research

Study 8

4.18 Conclusion

This contextual statement provides 'the why' for my studies, aiming to describe why this reconceptualisation may have been overlooked in the current mental health system. It furthermore serves to describe the studies that make up this thesis by prior publication, their aims, implications and limitations. Figure 1 provides a visualisation that summarises the flow of the contextual statement, its topics and the locations where the studies that make up the thesis are discussed. The statement will start by providing a background to our mental health system, its origins and how it works (sections 4.2 to 4.5). A brief history of mental healthcare and the role that psychological interventions play in improving mental health outcomes is provided, largely focusing on the Australian context all the while referring to the global context where appropriate[1]. By detailing the Australian mental health system, the backdrop is given for why we may have failed to see a reduction in the prevalence of illness in this country. I describe how we ended up with our existing system, providing context to the view that its historical and current underpinnings have limitations. As the Spanish philosopher George Santayana said: "Those who cannot remember the past are condemned to repeat it" (Santayana, 2021, p. 92). Insights from studying the existing system have been pivotal in shaping the direction of my work so far, allowing me to lay the groundwork for the proposed areas of innovation in this thesis.

The statement will continue by explaining why a stronger focus on mental health promotion by targeting mental wellbeing could be a solution to reforming the system (sections 4.6 to 4.9). In this section, the first study of this thesis (van Agteren & Iasiello, 2020) will be discussed; a narrative review that provides a theoretical justification for expanding our focus on mental wellbeing and advocating for the integration of wellbeing measures and interventions into our wider mental health system. It sets the theoretical scene for demonstrating that the problem of poor mental health is larger than typically assumed based on traditional pathogenic mental health metrics (Bauer et al., 2014; Iasiello et al., 2020). At the same time it lays the foundation for showing that this challenge can feasibly be addressed through scalable solutions. Next, the statement continues by elucidating that the problem of poor mental wellbeing is non-trivial, pointing to the fact that many Australians are currently languishing (sections 4.10 - 4.11). Two observational studies are discussed that show that, together with insights from global studies, the languishing cohort is likely to comprise millions of Australians who are left in a state of suboptimal mental health (van Agteren et al., 2019; van Agteren et al., 2020).

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[1] Mental healthcare systems vary considerably between different countries. As my studies were conducted in Australia and were partly driven by observed gaps within the Australian system, it seemed warranted to frame the contextual statement predominantly around the Australian context, rather than craft a more generic contextual statement focusing on the global context.

The statement continues by focusing its attention on ways to help those who are languishing (section 4.12 to 4.15). Through two intervention studies, I contribute to the evidence that scalable psychological wellbeing intervention formats are available and effective to help improve mental health outcomes (van Agteren, et al., 2021a; van Agteren et al., 2018). One of these studies tests a group-based format that relies on upskilling peers and community members via a train-the-trainer framework. This format is the starting point for the final three studies focused on designing and testing the impact of a wellbeing intervention that has specifically been developed to help those who languish or struggle with distress, following a best-practice intervention development framework (Elredge et al., 2016) and basing its activities on a large systematic review we conducted on wellbeing interventions (Van Agteren, et al., 2021b; Van Agteren et al., 2021c; van Agteren et al., 2021d).

This contextual statement will conclude by discussing the implications that implementation of dedicated wellbeing solutions can have for the Australian mental health system (sections 4.16-4.17). From the findings following this series of studies, it may be concluded that there is potential through complementary wellbeing solutions to positively impact the current burden of mental health on the clinical system. It points to the feasibility of developing complementary capacity in the community more generally, as well as through industry and organisations specifically. It points to the potential that wellbeing programs may have in countering stigma towards working on mental health challenges for the general population and for sub-cohorts that may be less inclined to engage with traditional paradigms (Rapp & Goscha; Schnyder et al., 2017). At the same time, it signals that this could be implemented without the need for large structural and systemic changes, thereby showing promise as one of the levers to positively impact the burden of poor mental health on society. A discussion of limitations and suggestions for future research is provided at the end, allowing us to further advance the insights found in the research from this thesis.

4.2. History of Mental Healthcare in Australia: How Did We End Up with the System to Date?

To understand the approach to and general views on mental healthcare in Australia, it is important to provide a brief historical overview (for a more in-depth scholarly analysis on the history of mental healthcare, see Berrios (2016)). Historically, mental healthcare has been focused on the management of pathology and disorder. Though the definition of disorder or illness is constantly evolving because of scientific and societal norms and customs, it generally refers to agreed-upon conditions or illnesses that affect cognition, emotion and behaviour significantly, leading to dysfunction or disability (Berrios, 2016; Manderscheid et al., 2010; Telles-Correia et al., 2018).

Before the advent of institutional psychiatry, people who struggled with more severe forms of impaired mental capacity, such that it caused problems for their families or the community, were often locked away untreated in jails and makeshift institutions, or faced alienation, persecution, exile and even death (Coleborne & MacKinnon, 2006). Coinciding with the increased influence of modern medicine and its growing area of psychiatry in the 19th century, countries across the Western world started developing dedicated psychiatric institutions or 'asylums" (Chow & Priebe, 2013). The *ideological* intent for these dedicated facilities was to provide a haven for the treatment and management of people with disabling mental illness and disability, with the aim of providing humane and moral treatment (Savy, 2005). This brought the advent of the so-called moral treatment era, where mental healthcare started to slowly shift from a custodial framework to a medical framework (Bottomley, 1984). With it came, at least in Western countries, the slowly shifting view that the mentally ill suffered from a debilitating medical condition, and were not just defected, evil or possessed: a view which is still prevalent in many communities and cultures across the world (Abdullah & Brown, 2011).

Care provision for the mentally ill in the early days of psychiatry between the nineteenth century and the first half of the twentieth century is often portrayed in a dark light. Care during this period mainly consisted of managing patients using physical and experimental treatment practices in institutions away from society for the remainder of their lives (Scull, 2018). In Australia, immediately after their opening, asylums faced resource and care challenges including overcrowding, lack of skilled and caring staff and problematic administration, fuelling poor treatment conditions and neglect of patients (Savy, 2005). Building on early colonial sentiment, treatment in the first half of the twentieth century was also highly influenced by eugenics: the intellectual and social movement focused on the supposed catastrophic social consequences of tainted genes and hereditary traits (Allen, 2011). It not only meant that practises such as sterilisation for the mentally ill were considered acceptable, but also caused both indigenous and immigrant institutionalised individuals to receive an even poorer quality of care (Coleborne & MacKinnon, 2006).

Fundamental shifts and important progress in assessment and treatment started occurring in the twentieth century, which slowly started an increasing awareness to focus on mental health outside traditional institutions and its constituents (Berrios, 2016). For example, the mental health hygiene movement sprung up (Bertolote, 2008), setting out to promote and preserve population mental health, being "concerned with the prevention of mental disease, mental defect, delinquency, and the many milder forms of social maladjustment and inefficiency which are the sources of so much unhappiness and discontent" (Bridges, 1928, p. 1). Or as put by the WHO in the 1950ies: "Mental hygiene refers to all the activities and techniques which encourage and maintain mental

health" (WHO, 1951, p. 4). Despite there thus being records on early efforts to encourage the importance of promoting mental health on a *population* level, mental healthcare remained overwhelmingly reactive and focused on improving treatment conditions for those struggling with diagnosed illness, rather than adopting a concerted effort toward prevention and promotion for the non-clinical population (Min et al., 2013; Toms, 2020).

Innovations in treatment during the first half of the twentieth century were extensive. The period of the world wars fuelled developments in biological, physical and psychosocial treatments. Some of these innovations were harmful or were implemented despite a paucity of robust evidence to support their use. The most notorious examples such as lobotomy would leave a significant mark on the public's perception of mental healthcare (Berrios, 2016; Tierney, 2000). On the other hand, this period laid the foundation for interventions that are used in today's system. There was an increased recognition for accessible services to provide psychosocial support for returned servicemen and women (Pols & Oak, 2007). This ultimately set the stage for the roles of psychologists, social workers and occupational therapists within the wider system. It also brought an increased interest in applying psychotherapeutic treatment or 'talking therapies' outside institutions, early examples being psychiatric therapies by the likes of Freud (Freud, 1905), Adler (Adler, 1924; Oberst & Stewart, 2014) and Frankl (Frankl, 2014; Schulenberg et al., 2008). The increasing sophistication of knowledge culminated in the introduction of diagnostic manuals such as the Diagnostic and Statistical Manual of Mental Disorders (or DSM) and the International Classification of Diseases, which continue to evolve over time to classify mental health problems and steer treatments (Shorter, 2013; Tyrer, 2014).

Until midway of the twentieth century, most people with complex mental disorders, remained inevitably bound to institutions with limited sight of (re-)integrating into community (Gijswijt-Hofstra et al., 2005). The discovery of various psychotropic drugs around the 1950s, most notably the antipsychotic *chlorpromazine,* as well as anxiolytics, the first classes of antidepressants - monoamine oxidase inhibitors and tricyclic antidepressants - and mood stabilisers such as lithium, were the medical breakthroughs that paved the way for widespread change in mental healthcare (Braslow & Marder, 2019; Rybakowski, 2020). The presence of these psychotropic drugs and increasing access to mental health services outside institutions led to increased belief in the possibility of managing mental illness in the community. This complemented the voices that pointed to the problematic conditions in institutions, fuelling the deinstitutionalisation movement (Coleborne & MacKinnon, 2006). In Australia, various national and state-based investigations took place in the second part of the century, whose conclusions pointed to a wavering of the political support for asylums and institutions, heralding large scale reform towards community-based care

and, as such, our current system (Gerrand, 2005; Richmond & Savy, 2005). One of the most crucial investigations for the Australian mental health system was the so-called *Richmond report* in 1983 (Richmond, 1983). This report summarised the findings of a New South Wales inquiry into health services for the psychiatrically ill and developmentally disabled, which argued for more decentralised and integrated models of care, advocating for a reduction of the reliance on institutionalised care and increasing the provision of community-based models of care.

The implications of the reform towards community-based care were enormous for individuals, their families, the community as well as government. Responsibility for patients was largely transferred to their families, who felt they landed in a community-based system without adequate funding, support or infrastructure (Savy, 2005; Whiteford & Buckingham, 2005). Patients and their families had to navigate an increasing diversification of mental health services. This was particularly problematic for patients and families who had to manage complex problems, often finding themselves caught between services (Coleborne & MacKinnon, 2006). While the original Richmond report envisioned the establishment of a tight network of services across all stages of care, ranging from prevention to complex care, closely working together across the individual's journey in the mental health system, this never adequately eventuated, as has been concluded in various official reports on mental healthcare since (Commonwealth of Australia, 2006; Mental Health Council of Australia, 2005).

Leaving the effectiveness of this new system aside, an increasing diversification of services occurred over time, providing individuals with a choice to engage with different forms of therapy and service offerings. It marked a period of greater influence of psychologists and psychological therapy in mental healthcare (Hergenhahn & Henley, 2013; Wahass, 2005). It is the potential role of these psychological approaches in benefiting mental health outcomes that lies at the heart of the current thesis. Psychology did not originate from within the typical psychiatric system, but rather evolved as a subfield of philosophy and therefore brought a different and complementary perspective to treatment, underpinned by principles from for instance ancient Greek and Roman philosophy and later influences from Eastern and humanistic philosophy (Taft, 1982; Taft & Day, 1988). Earlier psychological approaches to mental health were varying and included therapies based on psychodynamic or Freudian, Gestalt and humanistic theories (Hergenhahn & Henley, 2013). In the second half of the twentieth century, these became largely surpassed by behavioural and cognitive therapies which gained mainstream acceptance. Pioneers such as Joseph Wolfe, Albert Bandura, Albert Ellis and Aaron Beck brought in the now widely practiced *cognitive-behavioural* therapies (CBT) to deal with maladaptive thoughts and behavioural patterns (Beck & Dozois, 2011). An

updated history of the advent of cognitive-behavioural therapy in Australia has been published recently (Kyrios et al., 2022) following an earlier outline by Winkler and Krasner (1987).

Whereas in the early days, most psychological therapy adhered to specific schools of thought and theories, the 1980's heralded an era of more integration and eclecticism (Marks, 2017). This period saw a considerable diversification of new psychological therapies. For *more* complex problems such as borderline personality disorder, we saw the emergence of Dialectical Behaviour Therapy (DBT) (Linehan & Wilks, 2015) as well as integrative therapies such as Schema Therapy (Young et al., 2003), that combined CBT interventions with principles from psychodynamic and humanistic or Gestalt approaches, and attachment theory (Kellogg & Young, 2006). Specific cognitive-behavioural treatments were being developed for the so-called *common mental disorders*, being depression, anxiety and substance use disorders (Steel et al., 2014; Vollebergh et al., 2001). More recently, we have also seen the emergence of 'new wave' CBT approaches such as Acceptance and Commitment therapy (ACT) (Hayes et al., 2006) and therapies that centred around principles of mindfulness such as Mindfulness Based Stress Reduction and Mindfulness Based CBT (Chiesa & Serretti, 2010; Hofmann & Gómez, 2017).

During the 1960s, in parallel with the rise of psychology, other professional approaches that play central roles in our current system gained traction, inclusive of social work, occupational therapy, mental health nursing, counselling and case management. Counsellors, who in Australia provide services that focus on providing general life advice and coaching to cope with everyday problems and adversity and their environment, became more readily available in the community (Pelling & Whetham, 2006). Those with complex issues were able to gain access to social workers to help them navigate social services and case managers to develop and manage treatment plans for individuals. (Ashcroft et al., 2019; Lukersmith et al., 2016). Occupational therapists became available to help individuals develop or regain competency in day-to-day activities (Ikiugu et al., 2017). While nurses have played a vital role in care for individuals with mental illness from the start of institutionalisation, the later part of the twentieth century saw the profession develop into a specialised mental health nursing discipline, providing case management, biological and psychosocial support in both inpatient and outpatient settings (Hurley et al., 2022).

4.3. The Australian Mental Health System: How Is Mental Healthcare Organised?

The contextual statement so far has outlined a brief historical perspective that introduced key mental health specialties, which - together with primary care - form the foundation for the mental health system in Australia. Together they play an important role for individuals using services, each bringing their own perspective on what needs to improve within care provision. As mentioned

earlier, despite mental health systems around the Western world sharing many similarities (e.g., the therapies and occupations involved), their structures and funding models can be significantly different, ultimately leading to varying consumer[2] journeys within systems (Gutiérrez-Colosía et al., 2019; Tikkanen et al., 2020). The work that underpins this contextual statement and the articles that make up this thesis were conducted in Australia, and while the content may be of relevance to other systems around the globe, this statement will largely focus on the Australian context, supported with global evidence and insights where appropriate. As the Australian mental health system is eclectic and complex (Perkins, 2016; AIHW, 2022b), it pays to describe what the system looks like, before delving into its limitations that ultimately drive the work presented in this thesis.

Australia's system consists of public and private providers, complemented with diverse service offerings via non-governmental organisations (NGO's), with the majority of funding for mental health services being provided by state and territory governments (60%), followed by contributions by the federal government (35%) and third-party insurance (5%) (AIHW, 2022b). Although the responsibility of mental health service planning and delivery is shared between state and federal governments, and both contribute to its funding, providing mental health services is a state responsibility. States and territories make individual decisions on how to allocate general health funding, meaning that the states differ in how much funding they spend on resourcing mental health services in general, and differ in their emphasis on which types of services they prioritise and fund (Productivity Commission, 2020; AIHW, 2022c).

Generally however, mental health service provision in Australia follows a model where service intensity is increased with symptom severity or diagnostic complexity. This is steered by federal government policy, as for example the "Primary Health Networks" or PHN's – independent services that play a central role in coordinating primary mental health care services, and their interaction with secondary and tertiary services - are required by the Australian government to provide these so-called "stepped care" services (Health, 2019; Perkins, 2016), see figure 2. The Australian system differs from other well-known stepped care models such as the United Kingdom (UK)'s National Health Service (NHS) which incorporates the Improving Access to Psychological Therapies (IAPT) resource (Clark et al., 2009; Wakefield et al., 2021). This is a low intensity psychological public resource, which is an effective system-wide entry option for mild to moderate severity presentations before consumers can access more intensive CBT services.

While the implementation of stepped care varies between services within Australia, their principles are roughly as follows (Department of Health, 2019). At lower intensity (i.e., no symptoms

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[2] In Australia the word consumer, rather than client or patient, is used across the mental health system to refer to individuals engaging with services.

of illness or sub-clinical symptoms) people are expected to pro-actively engage with self-help resources, including books and technology solutions such as websites and mental health apps. The Australian government has made available a number of online evidence-based psychological resources which continue to evolve (Bassilios et al., 2022; Kyrios & Thomas, 2014; Titov et al., 2020). Clinical resources are usually limited if not barred for this subset of people, unless there are other clinically-based reasons for accessing clinical services directly.

Figure 2.

A visualisation of a theoretical stepped care structure in the Australian mental healthcare system.
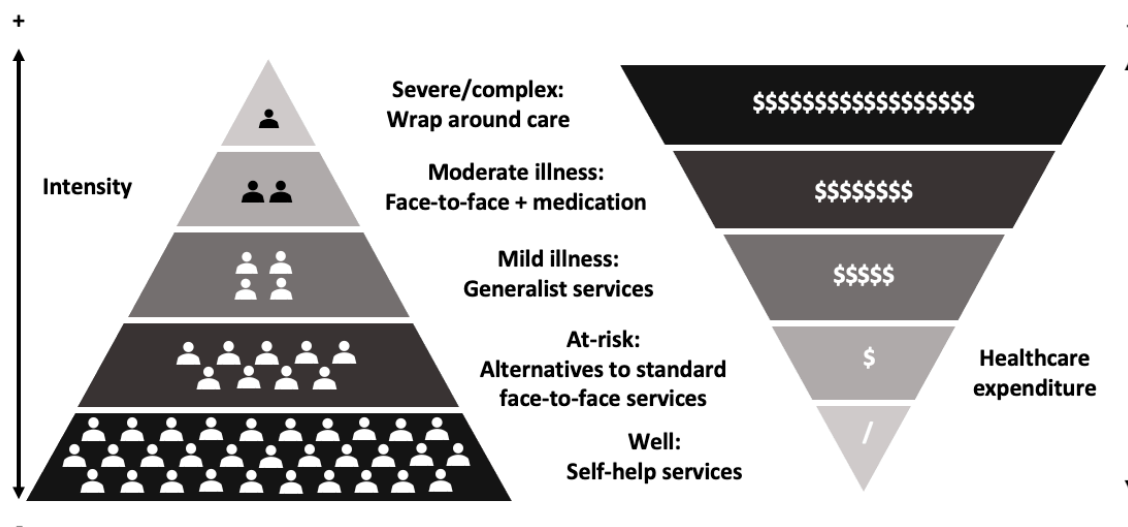
Note: The left pyramid visualises the decreasing volume of individuals per tier of increasing intensity. Generic descriptions per tier are provided in the middle of the figure. The right pyramid visualises the fact that expenditure shows a reverse pyramid, with larger expenditure going to the lower number of individuals needing complex care at the top of the stepped care model. The percentage distribution of service users per step is based on the distributions provided in the Productivity Commission report on mental health (Productivity Commission, 2020). No accurate data on expenditure per step of stepped care is available for Australia. The '$' icons in the right pyramid therefore merely serve to visualise a decreasing expenditure pattern per step and a lack of dedicated funding for services to the non-clinical population (denoted by '/') and should not be seen as an accurate reflection of expenditure per step.

When mild symptoms develop, the individual can gain access to lower cost, generalist, lower intensity services. Clinical support, particularly specialised clinical support, nonetheless remains limited. For example, at lower tiers individuals might be provided access to brief therapy or low intensity cognitive behavioural therapy (LICBT) (Baigent et al., 2020), although these solutions are not widely available nor consistently implemented yet (Dalton et al., 2017). In the case of moderate

complexity or recurrent symptoms, specialist care by clinical or general (i.e., non-clinical but professionally trained) psychologists[3], and psychiatrists where needed to provide access to medication, is recommended. Those with complex presentations with high and/or acute severity ought to be receiving a wraparound service, including access to expert services such as community mental health or inpatient services (Thornicroft & Tansella, 2013). The focus at this top tier is to provide more comprehensive holistic support to support recovery and the safety of both the individuals and the wider community.

From an individual service user's perspective, there are a multitude of pathways one can follow to interact with services, with accessibility of services being dependent on a range of factors such as workforce capacity and area of residence (Meadows et al, 2015). A common pathway for people with less acute presentations is by engaging with local General Practitioners (GPs) in primary care who will work together with an individual to set up a *mental health treatment plan* (Fuller et al., 2009). A mental health treatment plan aims to help guide initial diagnosis and determine the need for referral to professionals most able to provide appropriate services. It is a prerequisite for gaining access to any government rebates for psychological services, e.g., rebates for treatment via the Medicare Benefits Scheme (MBS) (AIHW, 2022b). This process was set up as part of the so-called *Better Access Initiative*[4] which aimed to streamline access to mental health services for individuals, making GPs the principal point of call for initial referrals and access to psychological therapy (Littlefield & Giese, 2008). For example, a mental health treatment plan ensures access to six initial psychology sessions for most suspected mental health problems, which can be extended with another four after checking back in with the GP. The 10 sessions can be accessed within a 12-month period, with further lots of 10 sessions annually. Rebates for – and subsequently access to - sessions were briefly extended to 20 sessions as a result of the COVID pandemic[5]. For some suspected

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[3] Psychological interventions based on cognitive-behavioural principles are the most prevalent within the Australian system. For government-rebated services, general psychologists can only offer focused psychological interventions, while clinical psychologists can also offer assistance in other therapeutic paradigms. Relative to general psychologists, clinical psychology services also receive higher government rebates.

[4] The Better Access Initiative superseded the Better Outcomes Initiative. In the Better Outcomes Initiative, GPs set up mental healthcare plans *and* provided psychological strategies to individuals over a longer period. They required training and follow-up in order to get access to rebates. In the Better Access Initiative, the GP still creates the mental healthcare plans, but generally refers on to specialists like psychologists who provide the therapy, aiming to increase access to these specialist services (Harrison et al, 2012).

[5] The top up of 10 sessions to 20 annual sessions was confirmed until 31 December 2022, which reverted to 10 sessions from 1 January 2023 (Department of Health, 2022)

diagnoses like eating disorders the number of rebated sessions became as high 40, reflecting the higher need for support (Hay, 2020). Depending on complexity of the underlying problems, consumers are referred by GPs to clinical or general psychologists, psychiatrists and other allied health professionals[6] (i.e., social workers and occupational therapists with special mental health training), which can be provided via public services coordinated and/or funded by PHNs or by private services. An example of a well-known Australian service funded by the PHNs is headspace, which provides a range of mental health services for youth up until age 25 (Rickwood et al., 2015).

Service provision for more complex needs and for people who pose an acute risk of harm to self or others, is largely provided by the public system, although private hospitals and services also exist (Productivity Commission, 2020; State of Victoria, 2021). As mentioned before, state and territory governments are largely responsible for planning and delivering public mental health services including hospitals. Consumers at acute risk can present to emergency departments of hospitals that have short-stay mental health wards, for instance after contact with an emergency service was made, irrespective of having a mental healthcare plan. Australia has both official government-run emergency services, as well as an array of helplines run by NGOs that often refer on to emergency or triage numbers (AIHW, 2022b). Depending on complexity of need after the initial acute risk has subsided, individuals can be referred to residential mental health care, to community mental healthcare or will be sent home for treatment with above mentioned health providers (Casey et al., 2021). In the latter case, some NGOs or volunteer services may provide support until ongoing therapeutic contact is established.

In addition to this more traditional system of public and private providers, Australia boasts a wide variety of services offered via ancillary channels. Firstly, some groups are covered via dedicated legislation and service offerings. Two groups include people who have a psychosocial disability and veterans. Individuals who have mental health problems and have a disability, including a psychosocial disability that is the consequence of mental health issues, can gain further funding via the National Disability Insurance Scheme (NDIS) (Boschen et al., 2022). This aims to enable them to access support for services that can help those individuals increase their autonomy, improve inclusion, and social and economic participation (Carey et al., 2018). Veterans who are transitioning into civilian life and are struggling with their mental health, can access dedicated services offered by the Department for Veteran Affairs and services such as Open Arms (AIHW, 2023). Secondly, the role of NGOs is significant in providing access to a wide variety of services. For instance, they are key operators of helplines, ranging from general helplines such as Lifeline, to specialist helplines targeting specific needs, e.g., those for young people, (Mathieu et al., 2021). The role of leading

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[6] Allied health is a term that is used to refer to services provided by non-medical professions.

NGOs such as *Beyond Blue* and *Black Dog* in advocacy is profound, who in addition to providing or coordinating services such as helplines, also conduct or commission research into mental health and service innovation (Parker, 2013; Pirkis et al., 2005). Thirdly, mental health services are increasingly offered by businesses and community organisations. Incentivised by legal reform and a realisation of the negative impact of poor mental health on the bottom line, they have started implementing solutions to safeguard mental health at the workplace, both to combat psychological injury claims and improve employee productivity (Deloitte, 2019). For example, business organisations frequently offer Employee Assistance Programs that provide access to sessions with psychologists or counsellors (Kirk & Brown, 2003). Finally, there are a wide array of alternative approaches offered in the marketplace, ranging from counsellors and psychotherapists to retreats, life coaches, wellness programs and alternative medicine, who despite a varying evidence-base, are highly popular in Australia and around the world (Global Wellness Institute, 2021).

Service provision is still predominantly conducted in-person, although the last decade has seen an increase in technology-assisted solutions, both to support the delivery of in-person services (so-called hybrid solutions such as telehealth) and services completely delivered online. The gradual albeit slow emergence of telehealth after the 2010s, meant that access to services outside of metropolitan areas, or for people who struggled to travel, improved slightly (Wilson & Maeder, 2015). Pioneering work in Australia was conducted by the Australian National University (e.g., MoodGYM (Twomey & O'Reilly, 2017)), Macquarie University (Mindspot (Titov et al., 2017)) and Swinburne (National eTherapy Centre, Anxiety Online) (Klein et al., 2011). This emergence of Telehealth is significant for countries such as Australia, where technology penetration and access to Internet is high, including increasingly among proportions of the population that historically struggled with technology such as older adults (Neves et al., 2018).

The COVID-19 pandemic, which started affecting Australia from February 2020 (Cheng & Williamson, 2020) rapidly advanced utilisation of telehealth (Bestsennyy et al., 2021; Stobart & Duckett, 2022). Where in 2017 only regional and remote Australians were eligible for Medicare rebates on telehealth, the COVID-19 pandemic made it available to anyone in Australia (Duckett, 2021). It quite literally forced therapists to adopt online services due to society-wide social restriction and quarantine policies, ultimately forcing services to both innovate their own care, and to set the stage for making their services accessible to a wider audience after the pandemic crisis ended. Finally, completely online solutions such as web portals and mobile apps have steadily increased in use, after decades of research on their utility. The advancements in technology, largely driven by the smartphone, have made particularly app-based solutions immensely popular, with

leading providers such as Calm and the Headspace app having millions of active users (O'Daffer et al., 2022).

As is visualised in figure 3, all together, this makes up an eclectic offering of services, each with its own remit and area of expertise, in a crowded landscape of providers that individuals have the option to engage with. Although the diversity of options allows personal preferences to play out, the associated complexity makes it ever difficult for consumers to navigate the system and the various options within it (Brophy et al., 2014).

Figure 3.

Simplified visualisation of key services within the Australian mental health landscape that individuals can gain access to.
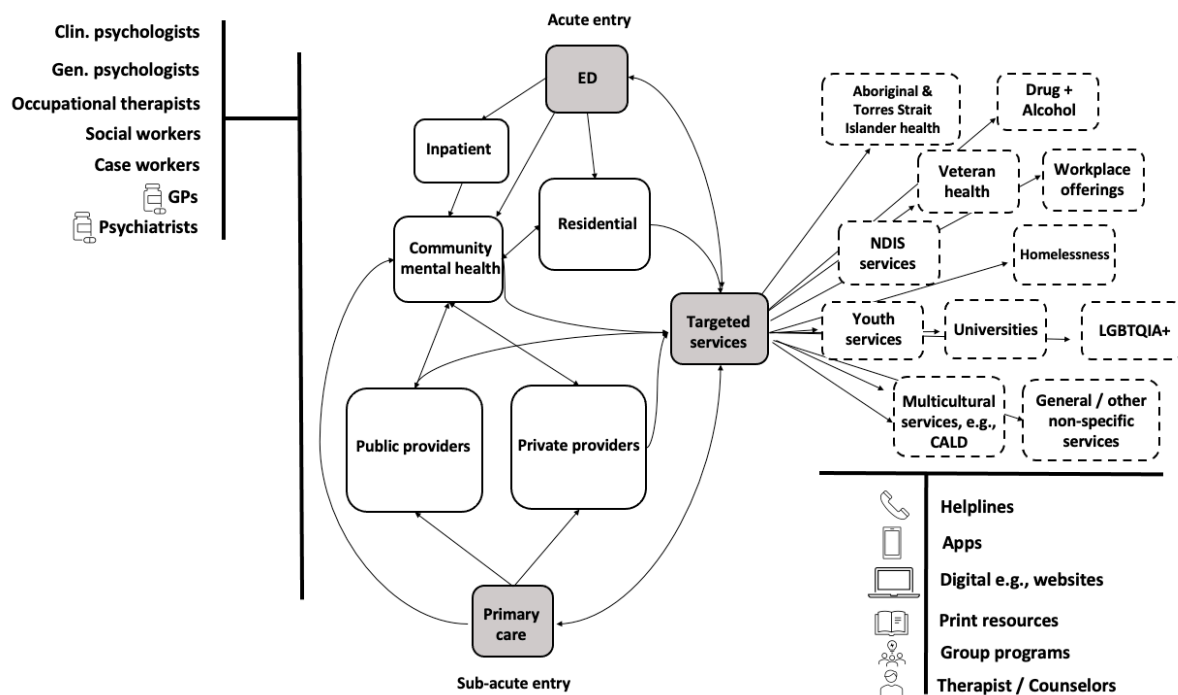
Note: Access to these services and referral pathways differs depending on the location an individual accesses services from. The figure shows three main entry points, being primary care, the emergency department (ED) and targeted services that individuals can directly engage with (the three grey boxes). It also describes the main professionals someone may engage with (upper left) and the main types of service modalities people can receive in the system (lower right). CALD = Culturally and Linguistically Diverse; ED = Emergency Department; LGBTQIA+ = acronym that stands for lesbian, gay, bisexual, transgender, intersex, queer, asexual, plus; NDIS = National Disability Insurance Scheme; GP = general practitioner.

4.4. Psychological Interventions: Key principles and how they work in changing mental health outcomes.

As this thesis is largely concerned with psychological interventions, it is imperative to briefly explore key principles behind how these interventions are aiming to aid individuals seeking help. As they are regarded as having accumulated a considerable evidence-base behind them, psychological interventions play an important role throughout the Australian mental health system. Despite there being differences in opinion on what constitutes having an "evidence-base" regarding efficacy and effectiveness (Salvador-Carulla et al., 2017), at the core of evidence-based decision-making lie the results of scientific studies. Rather than looking at the impact of singular studies, which by themselves may be biased or misleading, the state of evidence on specific approaches is better captured in reviews, which allow the interpretation of many studies and the implications of their results, of which systematic reviews and meta-analyses are one the most comprehensive (Gopalakrishnan & Ganeshkumar, 2013; Higgins et al., 2019). From these reviews we are able to establish that a solid evidence-base exists, pointing to the efficacy of a broad range of therapies such as the aforementioned CBT, ACT, DBT, Interpersonal Psychotherapy and mindfulness/meditation to name a few (Cuijpers et al., 2016; Gloster, Walder, et al., 2020; Masley et al., 2012; Vancampfort et al., 2021). Among this evidence, is the published systematic review and meta-analytic paper that I led (Van Agteren et al, 2021b), which established new insights into how psychological interventions may differentially impact outcomes of mental wellbeing compared to outcomes of distress (see section 4.13, study 6), ultimately influencing the design of our own interventions.

So, what makes psychological interventions work? Each intervention has a specific theoretical underpinning, with individuals being taught specific techniques that match the exact goal of the psychological intervention. These techniques are called 'specific' in that they are purportedly particular to one therapeutic paradigm but not necessarily to another. An example of a specific technique is coaching to improve interpersonal communication with the aim of resolving interpersonal problems associated with depression or anxiety, which lies at the core of interpersonal psychotherapy (Amole et al., 2017). Another example is the use of exposure techniques, which can be used to counter fear by confronting certain feared objects, activities or situations, generally used within CBT (McNally, 2007; Weisman & Rodebaugh, 2018).

At the same time, therapeutic approaches utilise common techniques that are used across psychological interventions, the so-called non-specific elements. Goldfried (2019) outlines (in simplified terms) the most important common techniques:

1. Establish and/or increase expectations that the intervention can change the way someone feels and thinks and develop motivation to engage in the intervention. It is crucial that the individual

trusts the intervention or therapist in being able to help them. The individual builds a sense of self-efficacy in being able to change their mental health.

2. Establish a good therapeutic alliance, which consists of having a good bond between the individual and therapist (or other professional delivering the intervention), as well as agreeing on the goals and methods used to achieve those goals. The individual should feel open and safe to work on their mental health without judgement, which is stimulated by empathy, i.e., an understanding of what affected individuals are feeling. The individual also needs to have their specific expectations met and needs to feel encouraged along the way. This perceived trust also applies to technological interventions.

3. Help develop an understanding of factors that are related to or causing the affected individual's difficulties or problems. In other words, stimulating self-reflection to gain a better awareness and perspective of one's inner being (thoughts, emotions, behaviour, needs, and wants), the impact that others and the environment have on them, and the impact they have on others.

4. Work on developing techniques to help improve or correct unhelpful behaviours, thoughts or feelings that cause mental health problems. At the core of this lies the role of habit formation in shifting behaviours, thoughts and feeling. Some of the common techniques used include homework, journaling, symptom monitoring, goal setting etc.

5. Ensure that individual reflects on their state and monitor their progress. Individual activities do not necessarily lead to substantial change. Ultimately the tangible goal of many psychological therapies is to create positive behavioural change by practicing helpful techniques that individuals can master over a longer period of time.

The goal across psychological interventions or therapies is generally to facilitate longer lasting changes in thinking, feeling and behaving (Cape & Parry, 2013; Kazantzis et al., 2016). As such, most evidence-based therapies tend to be provided over a longer period to achieve these changes, particularly in the case of complex problems. This is the case for both programs as well as more individualised approaches such as psychotherapy. Although briefer intervention modes exist and have been shown to lead to effective results in some cases, their utility is generally limited to individuals with less complex or sub-clinical problems (Cape et al., 2010).

Without delving into the specifics of each intervention type, something that is beyond the scope of this contextual statement, there also exists an established body of literature on different *modalities* that can be used to deliver psychological interventions. One-on-one interventions and group-based formats delivered in-person are the two common ways to deliver psychological interventions with impact, with technology-based approaches emerging more recently either as sole

or adjunct modalities (Emmelkamp et al., 2014). While the impact of *pure* technology-driven solutions is not yet definitively established, the use of e-therapy – i.e., the provision of therapy via a telehealth or other digital solution – is well-supported, with reviews on different disorders showing efficacy (Karyotaki et al., 2021; Philippe et al., 2022). Although there are plenty of challenges to be addressed for technology-driven psychological interventions, including drop-out and engagement (Lipschitz et al., 2022), the utility of technology-driven psychological solutions is no longer disputed.

It is important to note that individuals rarely use psychological interventions in isolation. Individuals are likely to engage in multiple evidence-based activities that are beneficial for their mental health. For example, we – implicitly or explicitly - engage in activities such as physical activity, which are tremendously beneficial for our mental health, forming part of so-called life-style based interventions (Marx et al., 2022). In addition, particularly when symptom severity increases, we are likely to be explicitly engaging with other interventions. For example, it is more likely that combination therapy is received, where medication is provided with psychotherapy; a combination which may lead to a higher efficacy in reducing symptoms for certain individuals or conditions (Cuijpers et al., 2014; de Maat et al., 2007; Leichsenring et al., 2022). Individuals who are eligible for community mental healthcare also gain access to other services such as social workers, occupational therapists and case managers. The efficacy of services by social workers and occupational therapists to impact mental health directly is less extensively researched, but their role in targeting aspects of social determinants maintaining mental illness and supporting individuals with severe symptoms to navigate wider life challenges is vital and is central to models of complex care in Australia (Cook, 2019; Daaleman et al., 2021).

4.5. The Investment-Prevalence Paradox: Does the Existing Mental Health System Work?

Over the past decades, the Australian government has continually invested in the provision of mental health services, aiming to broaden accessibility. For example, since 1992 the recurrent spending per capita on state and territory specialised mental health services in Australia increased from \$126.32 to \$260.49[7] in 2020 (the latest year for which data is available) (Welfare, 2022d). The expenditure by state and federal governments is accompanied by investment by for example insurance companies and private industry offering mental health solutions to its people (PricewaterhouseCoopers, 2014). It is important to note that, in Australia, offerings by workplaces and insurers are provided as an ancillary service. This differs from countries such as the United

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[7] This increase in investment is in constant or real terms, i.e., it is adjusted for inflation allowing for appropriate comparison of expenditure between years.

States (US) where healthcare provision is often dependent on someone's place of employment (Alcalá et al., 2018), making businesses crucial in the provision of mental and general healthcare in such countries. This direct mandate for investment in mental health is lacking for employers in countries such as Australia, for whom investment in mental health services is more a way to offset costs of lost productivity that come from poor mental health of staff (Attridge, 2019; Productivity Commission, 2020).

Decades long investment in improving the access to evidence-based treatments reasonably ought to have resulted in reductions in the prevalence of mental health problems – i.e., the proportion of people who have a mental illness at a specific moment in time. The prevalence is typically estimated in one of two ways. Firstly, we can focus on the number of people who have been formally diagnosed, for example according to standardised criteria such as those given by the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders or the DSM-V (Shorter, 2013). Secondly, we can try to measure outcomes or symptoms that are associated with a specific diagnosis (e.g., hopelessness as a symptom of depression) or those that we wish to avoid (e.g., suicidal behaviour) (Trauer, 2010). These criteria and other methodological considerations such as the measurement approach, the theory it is based on and the measurement timeframe, are important as they greatly influence our estimates of the rates and burden of mental health problems, as will become clearer further in this contextual statement.

The prevalence of mental health problems is typically extrapolated from research, for instance by government or academic research groups, which is not always systematic or consistent. For example, to date there is no consistent ongoing federal government data collection on mental health burden, with the latest national research – the National Study of Mental Health and Wellbeing (NSMHW) in 2020 – only having a 1-year follow-up planned after a decade long hiatus (ABS, 2020-21). When looking across Australian studies, findings tend to show that up to half the population will experience a mental illness at one stage of their life (i.e., the lifetime prevalence) and that at least one in five will experience a mental illness in any given year (i.e., 12-month prevalence) (AIHW, 2022a). Most of these individuals will experience a *common* mental disorder, a term used to group people who experience predominantly symptoms of depression or anxiety (Steel et al., 2014; Vollebergh et al, 2001). More specific and typically more complex disorders, which tend to require more intensive assessment and support, are much less prevalent. For instance, borderline personality disorder, affects around 1-4% of Australians (National Health and Medical Research Council, 2012). Eating disorders, a growing concern particularly in young females, affects 2-6% of Australians, while schizophrenia affects 1-1.5% of Australians (AIHW, 2022a). The related outcome of deaths by suicide occurs in 12.1 per 100,000 people or 0.01%, largely in males. Important to note is

that comorbidity is frequent, with individuals being able to be diagnosed with multiple diagnoses at the same time.

The prevalence of mental health problems over the past decades, globally and in Australia, has not decreased (Enticott et al., 2022; Harvey et al., 2017; Jorm et al., 2017). The latest version of the NSMHW has even recorded a general deterioration, particularly for young people (ABS, 2020-21)[8]. Take for instance the case of people with severe symptoms of common mental disorder, as visualised in Figure 4; the group where the greatest investment of resources tends to go to. Government estimates of severe common mental disorder between 2001 and 2014 (as extrapolated

Figure 4.

Visualisation of the prevalence of common mental disorder between 2001 and 2020 compared to per capita expenditure over time.
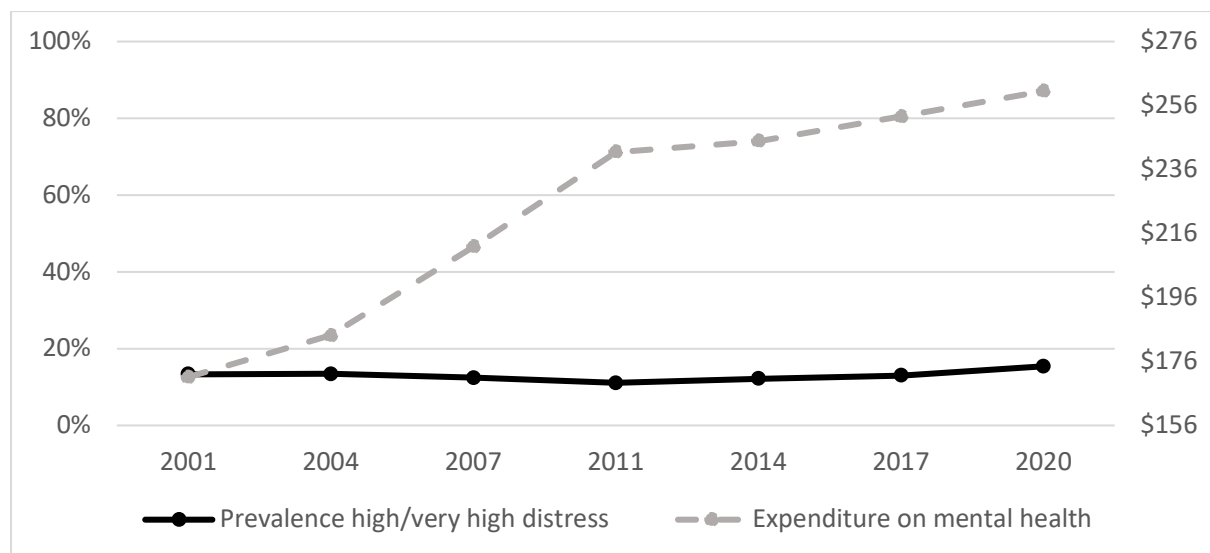
Note: The prevalence of common mental disorder is visualised by the solid black line while per capita expenditure over time is visualised by the grey dashed line. The x-axis displays the time-period, while the left Y-axis shows the prevalence of mental illness, while the y-Axis on the right shows the total per capita government expenditure on mental health, which has been adjusted for inflation over time. Data sources to underpin the graph are mentioned in-text.

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[8] It has to be noted that the study was conducted during the pandemic, which may have affected the findings of the latest instalment.

from *the National Health Survey* and the NSMHW (Harvey et al., 2017; ABS, 2020-21; ABS, 2017-18)) stayed relatively stable between 13.3% in 2001 and 15.4% in 2020 as visualised by the solid black line in Figure 4. At the same time, access to specialist treatment such as psychological therapy improved and expenditure increased by $150 per capita, as visualised by the grey dashed line (AIHW, 2022c): a trend which is expected to continue until 2033 as a result of general population growth, an increase in the service volume per individual, excess health price inflation and a predicted increase in the incidence rate of mental illness (Goss, 2008). This failure to see a change in the prevalence of illness can be found across other countries. Jorm et al. (2017) for example examined the increase in provision of treatment across four different countries and observed no material reduction of illness prevalence[9].

What is important to note is that the prevalence at any time is influenced by a gamut of environmental and social influences. The past decades have seen us develop an increased understanding of major factors that influence people's mental health, ranging from climate change, natural disasters, pandemics, the rise of social media and internet problem behaviours such as gambling (Leung et al, 2022; Naslund et al, 2020; Palinkas & Wong, 2007; Scholes-Balog & Hemphill, 2012). The impact of any investment on the prevalence would be influenced by a change in these environmental factors. While the exact impact of each of these influences is still the subject of debate, e.g., the role of social media (Naslund et al, 2020), it may be that the increase in investment has only been able to keep further deterioration at bay by mitigating the worsening impact of these environmental influences, particularly considering the fact that the increase in expenditure only represents a fraction of the health budget, see section 4.6 below.

Irrespective, the lack of a positive change in the prevalence of mental health problems is a problem as it maintains a significant burden, both in terms of the health burden to individuals as well as the resources it requires from the system and society. To calculate the burden of illness, metrics such as Disability Adjusted Life Years (DALYs) and total years lived with disability is used. Estimates of DALYs for mental illness as a percentage of total DALYs range between 7-13%, while total years lived with disability accounts for over 19-32% of all illness (Rehm & Shield, 2019; Vigo et al., 2016). In Australia, the DALYs attributable to mental health and substance use disorders are 12.1% of the total burden of illness (AIHW, 2021). This health burden comes at substantial costs, with mental health per year costing the government alone AUD $6.7 billion and the wider Australian

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[9] An increase in access does not mean that this access was universal or equitable across all parts of the Australian society, with low socio-economic and regional/rural areas benefitting least from increased access. This inequity has been posited as one of the reasons why a shift in prevalence may not yet have occurred (Meadows et al, 2015).

society up to $220 billion (Productivity Commission, 2020; Health & Welfare, 2022b). This burden of mental health problems is anticipated to continue to grow. By 2030, the WHO models that globally depression alone is expected to be the biggest contributor to burden of disease, which is driven partly by global population growth, and a lack of investment in care in low to middle income countries (Hock et al., 2012; Whiteford et al., 2013). It is expected that mental health costs make up a third of all non-communicable disease by that time (Bloom et al., 2012). This inevitably comes at a cost for the health system, which increasingly deals with mental health presentations. For example, looking at the period between 2008 and 2019, emergency department presentations in Victoria that were *not* mental health related increased by 41% between 2008-2009 and 2019-2020, while those related to mental health increased by 128%, reflecting a significantly higher increase for those related to mental health (State of Victoria, 2021).

Most models that predicted the increased future burden preceded the COVID-19 pandemic and the current global economic and geopolitical climate (Leung et al., 2022; Ozili, 2022). This implies that the anticipated increase in burden may be an underestimation of what is to come. For example, studies indicate that both COVID-19 infection rates and reductions in human mobility due to the now three-year pandemic have driven up the prevalence of depression and anxiety disorders (Santomauro et al., 2021). The impact of the pandemic on mental health is expected to be long-term and potentially generational, with current reports indicating that it has disproportionately affected prospects for young people – a population group already at higher risk of mental illness – and other at-risk population groups such as ethnic minorities (Batterham et al., 2021; Dodd et al., 2021; Fisher et al., 2020; Li et al., 2021; Newby et al., 2020; Rossell et al., 2021). Similarly, 2022 saw an increase in challenges that threaten mental health both at a national and a global scale, including rising inflation, housing crises for renters and mortgage borrowers, energy costs and other cost of living pressures (ABS, 2022a). If previous research is anything to go by, it is not a question of whether there will be an impact on mental health, but of how large an impact it will have and what can be done to help mitigate it (Frasquilho et al., 2015; Goldmann & Galea, 2014; Morganstein & Ursano, 2020; Van Hal, 2015).

4.6. Reforming Mental Healthcare to Lower the Burden of Mental Illness: What Are Ways To 'Fix' the System?

The lack of noticeable improvements in the prevalence and burden of mental health, combined with frustrations about the existing system, particularly with respect to access to care, is consistently leading to calls for changes to the way we provide care (Productivity Commission, 2020; National Mental Health Commission, 2022; Australian Psychological Society, 2022). There is a consistent

narrative for increased investment, arguing that the current expenditure is not sufficient to be able to provide appropriate care for those that need it and, as such, an inability to achieve a true change in the prevalence of mental health problems. Expenditure on mental health as a proportion of total health expenditure is 7.6%, which points to a mismatch relative to the burden of 12.1% of total DALYs in Australia (AIHW, 2022c). Although this mismatch supports a case for increased investment in general, experts also support the need to critically evaluate the *nature* of existing expenditure and any future investment (Jorm et al., 2017; Rosenberg et al., 2020). Successful reform needs to focus on changes that can realistically *reduce* the burden of poor mental health at both the individual and population-level, whilst still being cost-effective (Doran, 2013; Wainberg et al., 2017).

The strongest calls for reform advocate a) for a stronger focus on dealing with drivers of mental health problems such as social determinants of health (Shim & Compton, 2018) and b) for reform focused on the way we provide care in the mental health system for those who are struggling with more complex issues (Jorm & Malhi, 2013; McGorry, 2019; Whiteford & Buckingham, 2005). Most modern position papers on reform for the mental health sector support the pivotal need to address key societal challenges that are directly related to mental illness (Alegría et al., 2018). Humans live in complex social environments, with a plethora of determinants within us, our relationships and our communities influencing the way we feel mentally (Langellier et al., 2019). For example, the negative influence of unemployment or underemployment on mental health is well documented (Virgolino et al., 2022). Unstable housing or being homeless is associated with higher mental health problems (Bassuk et al., 2015; Singh et al., 2019). Violence and domestic abuse cause problems with mental health (Howard et al., 2010). Some of these social determinants affect larger segments of the population, e.g., financial strain (Hassan et al., 2021), while problems in other social determinants, e.g., homelessness, affect smaller vulnerable segments of the community (Pawson et al., 2018).

Although the research on *causality* between social determinants and mental health is still a source of academic debate[10], it is generally accepted that improvement in social determinants will benefit many aspects of our society and therefore need to be considered key priorities for our time. The challenge in addressing some of the social determinants is that they relate to complex and systematic challenges, e.g., homelessness or income inequality (Allegrante & Sleet, 2021; Doran, 2013). Resolving such challenges requires reform of many policies, accompanying political buy-in, significant investment and the engagement of many different stakeholders (WHO, 2010). Other

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[10] On the 8th of December 2022, the National Health and Medical Research Council (NHMRC), Australia's key health research funding body, announced a funding call that specifically looks at how social determinants of health can be used to improve mental health, pointing to a perceived need for more robust research.

determinants relate to our immediate social environment and how it can fail individuals, including trauma that affects multiple generations and problems related to the immediate family situation (Kleber, 2019; Lehrner & Yehuda, 2018). Often interlinked with other poor outcomes related to social determinants of health, these drivers of poor mental health are again complex to address, require significant resourcing and may require the need to improve over generations of time (Marmot et al., 2012; Pollak, 2004).

The second key theme of mental health reform focuses on direct changes to the way we provide care to individuals, with much of the debate centring around better support and service provision for those who are the most severely impaired; people who have not materially benefited from the system's move away from institutionalisation in the 1980s (Groom et al., 2003). A specific group of people getting attention is the so-called 'missing middle', the people who fall between the gap for community mental health care and being suitable for appropriate care at lower intensity tiers (McGorry et al., 2022; Petrie et al., 2021). While the term *missing middle* itself currently lacks consistent characteristics (Looi et al., 2022), it is generally used to point to problems for individuals who need more access to services than are typically covered under the "standard" provisions, e.g., they require a much higher number of sessions that are covered by Australian Medicare rebates. They require support by specialised providers due to their complex symptomatology, but they are not unwell enough to be considered eligible for increased care by community mental health services. In Figure 2, they are the people residing around the second tier of the pyramid. Like targeting the Social Determinants of Health, the call to improve service provision for individuals with more severe mental health problems is justified. The existing system struggles to deliver the needed capacity and resources, leaving patients at risk who are looking to receive appropriate care (Whiteford et al., 2022). For example, the Royal Commission into Victoria's Mental Health System noted that in 2019-2020 there was a 41% gap between the actual consumers of services and the demand for services of which a large proportion includes those at the moderate to severe end (State of Victoria, 2021).

The challenge with this proposed area of reform is that improvements in this part of the system may not lead to large reductions in the burden for the *system* or *at the population level.* Firstly, more investment at the severe end does not stop the flow of *new* patients, which can undo any modest gains that treatment provision for severe mental illness can make. For instance, as was found by a recent Australian study (Skinner et al., 2022), a small 0.8% reduction in prevalence over a 20-year period of healthcare provision to people with severe distress was nullified by an influx of new cases. Secondly, it is unlikely to result in large reductions on the total burden of illness: out of the 3.3% of Australians with severe impairment, a significant group requires support for the remainder of their lives or at best over an extended period of time (Whiteford et al., 2017).

Practically, it may adversely affect the resourcing of other parts of the system and may not lead to cost savings but, instead, a further increased expenditure in the immediate term. This is because most solutions for this select but vulnerable cohort inevitably require specialist services and expert personnel, of which there is a real scarcity in Australia, specifically in rural, remote and outer-metropolitan areas (Dunbar et al., 2007; Rosenberg & Hickie, 2019).

Two often-posited solutions to the expertise-supply issue across the system lie in improving the number of educational spots for specialist professions such as clinical psychology postgraduate programs or bringing in more foreign mental health specialists (Saxena et al., 2007; Shires et al., 2017). An increase in postgraduate clinical places can be expected to have merit, but with it come logistical challenges, for example the need for more placement options and the logistic feasibility of increasing placements in hard-to-reach areas where minority groups reside (Little et al., 2019; Shires et al., 2017). As it stands, there are already capacity issues in offering student placements, which will become a bigger problem unless other changes accompany the proposed increased education rates (Nedeljkovic et al., 2014). Similarly, while more immigration offers a theoretical opportunity, demand for psychological expertise is high across the globe (Kakuma et al., 2011). Australia has had clinical psychologists on their list of skilled occupations for decades and unless the immigration procedure itself is made more attractive, recognition of degrees and accreditation made easier, upskilling options are improved or other incentives are increased (Coates et al.; Tan & Denson, 2019), it is unlikely that this will be a feasible solution to help increase resourcing for complex mental illness.

Other proposed reforms focus on more immediate system-wide solutions that aim to directly improve service provision. For instance, treatment protocols for many mental health problems dictate a more intensive number of sessions than the ten sessions that are currently covered by the Australian Medicare system (Andrews et al., 2018; Forbes et al., 2007; Hay et al., 2014). During the COVID-19 pandemic, the number of sessions that could attract a Medicare rebate was increased to 20 (Duckett, 2021), which ended after 31 December 2022. One of the reasons that was cited for the reversal, was one of the criticisms for increasing the number of sessions in the first place: giving existing patients access to more sessions will effectively reduce the availability of specialists, making it more difficult to be able to find help for new patients, in a system where waitlists are already high particularly outside the inner cities (Productivity Commission, 2021; Thomas et al., 2021).

The reforms targeting the social determinants and finding new ways to help increase service quality and access for people with more serious mental health problems are crucially important. Their implementation however requires serious investment, involvement of multiple stakeholders,

inclusive of those from areas other than mental health, and will be reliant on political fortitude, budgetary constraints and presence of a limited pool of capability and expertise. What the above section aims to illustrate is the fact that achieving any of these reforms is complicated: they are complex challenges which occupy the minds of many of Australia's leading mental health advocates (Ellis et al., 2017; Hickie et al., 2014; McGorry, 2019; Rosenberg & Hickie, 2013). It begs the question as to whether there are reform areas that could be implemented which suffer from less complexity. In other words, are there changes that can be implemented with less reliance on political buy-in, can be implemented within or outside the existing system, can be implemented cost-effectively and can reasonably be expected to impact the mental health of a larger segment of society? The work in this thesis investigates such an area of reform, which in recent decades is increasingly put forward as priority: developing a stronger focus on people with less complex challenges by targeting prevention and mental health promotion, or so-called early intervention efforts.

4.7. Re-Balancing the Way We Provide 'Treatment': Focus on Promotion as a Complementary Strategy

Historically, prevention and promotion efforts have not been an essential focus in mental healthcare (Arango et al., 2018; Herrman, 2001; Jacka et al., 2012). Expenditure for mental health prevention in Australia and globally is negligible, with the system overwhelmingly having a reactive focus on treatment (McDaid et al., 2019). Recent changes in policy however can be noted in Australia, recognising both prevention and promotion as increasingly important policy areas across Australia. For example, the Western Australian Mental Health Commission in its Mental Health Promotion, Mental Illness, Alcohol and Other Drug Prevention Plan 2018-2025, has set out to spend at least 5% of their expenditure on prevention and promotion (Western Australian Mental Health Commission, 2018). Similarly, the Victorian Department of Health, guided by the recommendations by The Royal Commission into Victoria's Mental Health System, is setting up dedicated services and policies focused on prevention and promotion, for example a dedicated Mental Health and Wellbeing Promotion Office (State of Victoria, 2021).

The merit of focusing on early intervention can feasible be hypothesised: invest in promoting good mental health in the general population, before or at the onset of problems, so that a proportion does not end up needing more serious care in the future (Patel et al., 2018; WHO, 2004). If this is done successfully, we could reduce the incidence – that is the onset – of mental illness and as a result, we can see positive flow-on effects on some of the challenges noted above, including the prevalence and burden on the mental health system (Arango et al., 2018). There ought to be less people needing specialist care, thereby leading to less waitlist issues for those that do need care.

People will be able to manage early-stage problems better, meaning that specialist services can focus on more severe problems, rather than for instance dealing with lower severity common mental illness or adjustment disorders. As there is less need for specialist therapy, there could be less reliance on one-on-one treatment and greater reliance on scalable methods, e.g., group-work or technology-enhanced services, which may come with other positive upsides, e.g., combatting loneliness and connectivity in group-work or reducing access issues for those living outside of metropolitan areas (Borek & Abraham, 2018; Burmeister & Marks, 2016). This then theoretically can all come with a potential positive economic return (Le et al., 2021; Mihalopoulos et al., 2019).

Early intervention efforts can broadly be categorised as targeted (or specific) and general efforts. Targeted efforts focus on the prevention of specific conditions, for example the prevention of depression or anxiety disorders. These efforts are the most common in Australia, with many NGO's being dedicated to or having dedicated services for this type of prevention, for example the youth mental health prevention organisation 'batyr' or prevention work done by Beyond Blue and Black Dog (Department of Health and Ageing, 2013; Morgan et al., 2021). The scientific literature covers these targeted programs extensively, ranging from school-based prevention programs to mass media campaigns and internet-based approaches (Carbone, 2021; Mendelson & Eaton, 2018). The general idea is to get people actively engaged in techniques that are helpful in treating symptoms of illness, and by doing so giving people the ability to counter symptoms when they start appearing. The second type of early intervention, generic mental health programs, is much less prevalent. These efforts are not geared towards a specific mental health condition, but rather focus on promoting good mental health in general (Mjøsund, 2021). The focus is distinctly not on targeting symptoms of a specific condition, e.g., low mood or irritability, but to offer techniques that help improve mental health in general. Although there might be overlap in the techniques that are being used, depending on the program, this different focus determines the distinction between targeted prevention efforts (the former) and mental health promotion efforts (the latter).

To date, early intervention initiatives and approaches have struggled with challenges when it comes to having impact (Chanen & Nicol, 2021; Min et al., 2013; Singh et al., 2022) and simply increasing investment into existing approaches to early intervention will not solve the range of challenges identified above. For example, despite identifying 928 individual studies (n=286,429), de Pablo et al. (2021) concluded in their meta-review that the evidence quality for primary prevention of depression studies is insufficient for most interventions to be systematically implemented and that interventions should only be considered for specific at-risk groups. While there are many reasons that underpin a failure to see systematic results in early intervention research, including ethical limitations relating to the early identification of "at risk" individuals (Lawrie et al., 2019), at

least two crucial interrelated problems can be identified: 1) a lack of individual empowerment and appropriate expectations *before* eventual interactions with the mental health system and 2) a *fundamentally problematic theoretical underpinning* of the initiatives to date (Meadows et al., 2019; Provencher & Keyes, 2011)

The first problem is highlighted in a paper that aims to provide an explanation for the investment-prevalence paradox. Meadows et al. (2019) point to the importance of feeling ownership and agency over dealing with mental health problems. In an ideal journey through the stepped-care pyramid, people try out self-help strategies (the bottom layer in the stepped-care pyramid in Figure 2 before or when they start noticing issues with their mental health. Meadows et al. argue that when symptoms intensify despite trying out strategies, individuals may start to lose faith in being able to manage their mental health *themselves*. As a result, some transfer that expected responsibility over to a therapist and/or medication. For example, while providing medication may by itself be effective in managing some symptoms in the short-term, these gains might be offset by the loss in benefit from self-help strategies. There will be patients that are not reliant on or do not feel the need to rely on any self-management for their recovery, who, as Meadows et al. (2019, p. 846) point out, "may transfer expectation of agency for recovery from themselves to the treating practitioner and prescribed treatments".

This by no means suggests that everyone who goes into therapy becomes more passive in their recovery journey. Rather it aims to illustrate the importance of emphasising ownership over and self-determination of managing one's mental health before, during and after therapy; an outcome which is not always achieved when interacting with the mental health system (Fitzsimons & Fuller, 2002; Slade et al., 2014). It is an essential component of many psychological interventions for individuals to become empowered to experience agency over managing their mental health successfully (Jennissen et al., 2022; Williams & Levitt, 2007). This extends beyond formal therapy settings, as personal agency also underpins the important concept of mental health literacy, which is a main aim of psychoeducation, i.e., having the knowledge, understanding and skills to identify and respond to symptoms of mental illness (Jorm, 2000). To bring this back to early intervention specifically: individuals need to be provided with adequate tools to effectively manage the way they feel, as without doing so, faith in managing our mental health by ourselves (i.e., self-help at the lowest tier in our system) fades away (Meadows et al., 2019).

A solution to further building agency in early intervention – and indeed beyond it - may lie in rectifying an important flaw that permeates our system and the solutions we give to people early on in their mental health journey: a conflation of prevention with promotion efforts and ultimately the conflation of mental *illness* with mental *health*. As mentioned earlier, although prevention of mental

illness and promotion of mental health are used interchangeably, both refer to different albeit complementary activities (Herrman, 2001; WHO, 2002). This different focus and the underutilisation of mental health promotion efforts provides a potential explanation for why early intervention activity to date has lacked impact.

An analogy with physical health can help make this argument more apparent. Generally, people understand that working on building good physical "*health*" or '*fitness*', can help in the prevention of *illness*. Good nutrition, being physically active, not being overweight and having good quality regular sleep – behaviours to stimulate *health* – can prevent the development of states of illness such as the development of cancers (Zhang et al., 2020). If you are to develop a cancer, continuing with health promoting behaviours (good nutrition, adequate sleep) is beneficial, but you will need to rely on different treatments to combat the illness, e.g., chemotherapy (Breslow, 1999; Butler et al., 2008; Spring et al., 2019). The symptoms of cancer and effectiveness of its treatment are different to markers of and interventions for general health, which means that one also needs to rely on different assessment methods. In other words, both states of physical illness and states of physical fitness are distinct but related aspects of our overall health status.

A very similar parallel with mental health can be made, underpinning both the premise and the challenge at the core of this contextual statement and the thesis in general. In our efforts to reduce illness, we may have made problematic theoretical assumptions about the nature of our mental health and may have overlooked the important role of promoting mental wellbeing and developing personal agency in managing it. By focusing our system and our research largely on illness and deficits, and in some cases over relying on a transfer of agency to professionals, we have undervalued the importance and potential merit of evidence-based approaches of helping "the self" cultivate states of wellbeing. There is an opportunity for research that focuses on states of *illness* and *wellbeing* conjointly, discovering how both relate to one another, and how one can impact the burden of poor mental health through similar and/or differential approaches. It is in this more elaborate view of mental health - where cultivating states of mental wellbeing plays a vital role - that an opportunity for successful early intervention may lie.

4.8. Mental Wellbeing: Emphasising Positive Functioning in Mental Health

Most contemporary definitions of mental health, such as the definition posited by the WHO, have an emphasis on *positive* functioning. Feeling mentally healthy according to the WHO is:

"…a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (WHO, 2004)

In our contemporary conceptualisations, the goal of achieving good mental health clearly demands more than simply alleviating symptoms of illness (Larsen, 2022). Even though models of care and mental health research focus overwhelmingly on pathology and disorder, various theorists, researchers and practitioners have been focusing on mental *health* more broadly, with the aim to rebalance our view on mental health from a deficit approach to one that aims to capture and integrate states of flourishing.

The search for optimal mental functioning has fascinated humans for thousands of years, with works by ancient Greek philosophers such as Aristotle extensively discussing happiness and related concepts such as "eudaimonia" (i.e., the condition of human flourishing and of living well) (Fowers, 2016). Scientific studies and conceptualisations of mental states of wellbeing followed much later, particularly in the wider context of psychology and mental health as opposed to philosophy. For instance, one of the earliest scholarly works on optimal functioning and mental health was conducted by Marie Jahoda in the 1950's (Jahoda, 1959), coinciding with the early recognition of the merit of mental health hygiene by organisations such as the WHO around that same time. Despite this early recognition, it was not until the 1980's with work by Ed Diener (Diener, 2009) and Carol Ryff (Ryff, 2014) until we saw serious empirical and theoretical attempts to advance research on positive states of mental health or *mental wellbeing*[11]. When we have high wellbeing, we generally feel good (i.e., experience more positive than negative emotions, feel a sense of life satisfaction) and we feel that we can function fully (e.g., are able to self-actualize, and have a sense of purpose), as individuals, but equally as part of communities. In other words, when we experience mental wellbeing, we perceive a sense of enjoyment and fulfilment with our life in its entirety (Disabato et al., 2019; Ryff & Singer, 2008).

A more all-encompassing empirically supported definition of mental wellbeing is provided in the 'What Works for Mental Wellbeing' report, which my colleague Matthew Iasiello and myself conducted for the Australian NGO Beyond Blue (van Agteren & Iasiello, 2023). To create the definition that underpins this report, we used an extensive literature review and interviews to develop the following comprehensive overarching definition of mental wellbeing: "Mental wellbeing is a state where we view ourselves and our life positively. It is a deeply personal experience that can

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[11] While there were earlier streams that looked at wellbeing (e.g., Humanism), those streams did not significantly focus on empirically testing theories of wellbeing itself.

involve meaningful connection with others, having a sense of purpose, and feeling optimistic. Our mental wellbeing goes up and down and is influenced by the way we adapt to the challenges we face. It is impacted by our environment, life experiences, cultural background and our own behaviours. Everybody has a level of mental wellbeing, and we can improve it even when we are experiencing a mental health condition".

This definition does justice to the subjective nature of mental wellbeing, while referencing elements of the most essential academic wellbeing theories, see table 1 for a select overview of *some* academic wellbeing theories and their components. The definition captures Diener's area of subjective wellbeing, which draws on the concept of "hedonic" wellbeing (i.e., the experience of pleasure and enjoyment) (Kahneman et al., 1999). For an in-depth exploration of subjective wellbeing, see Das et al. (2020). The description also covers Carol Ryff's work, who by drawing on Jahoda's early work, pointed to the need to distinguish hedonic wellbeing from *a life worth living* (Ryff, 2014). Her conceptualisation of psychological wellbeing is more akin to Aristotle's eudaimonic wellbeing (Ryff & Singer, 2008). The reference to the environment is important as it indicates that wellbeing supersedes the individual, as humans are inherently social animals living within complex social systems, encapsulating the concept of social wellbeing as coined by sociologist Corey Keyes (1998). By emphasising the fact that wellbeing is multi-facetted and is influenced by a wide range of factors, it can incorporate elements of the most prevailing conceptualisations and theories in wellbeing science (van Agteren & Iasiello, 2023).

The field of wellbeing science - the scientific field that focuses on studying states of wellbeing - gained real momentum in the early 2000s, driven by the advent of positive psychology, a subfield of psychology that deliberately set out to counter the focus on pathology (Gable & Haidt, 2005). The word 'deliberately' is important as until recently, most positive psychology scholars did not study the *overlap* with illness and almost exclusively focussed on 'positive' states (Lomas & Ivtzan, 2016). This concerted siloed approach allowed the field to gain traction, with the focus on positive and strengths facilitating a different angle to service provision in mental health. It ultimately also meant that its research and applications in practice were largely removed from the traditional mental health system, which mainly focuses on deficits and pathology. Although theoretical work on wellbeing science was being conducted within psychology in the 2000's, see for example Deci and Ryan (1995) and Bauer et al. (2008), most traction was gained in other settings and scholarly domains such as education and pedagogy (Rusk & Waters, 2013).

Despite the popularity of sub streams of positive psychology such as positive education (Kern & Taylor, 2021; Kristjánsson, 2012; Waters & Loton, 2019), the scientific rigour of positive psychology research has often attracted criticism (Van Zyl & Rothmann, 2022; Yakushko & Blodgett,

Table 1

Examples of key wellbeing theories and their diverse but partially overlapping components.

Author	Diener (1984)	Ryff (1989)	Keyes (1998)	Ryan and Deci (2000)	Bauer, Mcadams & Pals (2008)	Seligman (2012)
Wellbeing focus	Hedonic wellbeing	Eudaimonic wellbeing	Social wellbeing	Eudaimonic wellbeing	Combination	Combination
Components	• Positive Affect • Negative Affect • Life Satisfaction	• Self-acceptance • Positive relationships with others • Personal growth • Purpose in life • Environmental mastery • Autonomy	• social integration, • social contribution • social coherence • social • actualization • social acceptance	• Autonomy • Competence • Relationships	• Pleasure • Sense of meaning • Psychosocial integration • Personal growth • Meaningful relationships • Personal narratives involving growth	• Positive Emotions • Engagement • Relationships • Meaning • Accomplishment

2021). For example, one criticism suggests that the fast uptake of positive psychology concepts in practice overtook research outputs and associated rigour. For example, many new 'positive' theories, models, concepts and terms have popped up since the start of positive psychology, which have often been criticised as being repacked and rebranded versions of older constructs and theories. An example of a positive psychology model is the PERMA model by Martin Seligman – the theory posits that wellbeing is made up of five key components: Positive Emotions, Engagement, Relationships, Meaning and Accomplishment – which was introduced as novel way to understand wellbeing (Seligman, 2012). The total scores on measurement tools that aim to capture PERMA however show a nearly perfect overlap (correlation r=.98) with measures of Diener's subjective wellbeing, making it more akin to a descriptive model on *how to reach* subjective wellbeing, rather than a novel unifying and parsimonious theory *of* mental wellbeing (Goodman et al., 2018). Similarly, studies on newer wellbeing-related concepts such as "grit" have received criticism for failing in rigour, e.g., grit is very strongly correlated to conscientiousness (Credé et al., 2017). These dynamics and criticisms of positive psychology have contributed to a sense of scepticism regarding the utility of *wellbeing science*[12] within mental healthcare, providing a potential explanation for why it may have been overlooked as a serious solution to help solve our mental health investment-prevalence paradox (McNulty & Fincham, 2012; Wood & Tarrier, 2010).

4.9. The Need to Embrace Complexity in Our Mental Health System: The Case for a Stronger Focus on Mental Wellbeing

Study 1 of this thesis by prior publication is a narrative review published in *Australian Psychologist* (van Agteren & Iasiello, 2020), which provides a theoretical rationale for how a systematic focus on wellbeing *together with* a focus on distress and illness, is one possible avenue to reduce to burden of poor mental health on society. The aim of the article was to bring to the forefront that embracing a more complex and integrated view of mental health has clear benefits for the mental health care, and as such it sets the theoretical scene for the subsequent studies in this thesis. Please note: metrics related to the impact of my studies, both in terms of academic (e.g., citations, field-weighted citation impact) and other (e.g., citations by clinical guidelines, usage by news outlets, social media reports) metrics are not provided within the contextual statement. These metrics can be found in section 5.1 of this PhD.

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[12] Positive psychology is seen as a catch all phrase for anything to do with wellbeing, despite the fact that wellbeing science is a highly inter-disciplinary field of research.

In the review, written together with my colleague Matthew Iasiello, we argued that wellbeing science has remained largely siloed from traditional mental health research and has often preferred simplification over complexity. Both these factors have meant that problematic theoretical assumptions about mental health were never tested, ultimately affecting the impact of mental health promotion efforts. A crucial unfounded assumption is a simple but pervasive one; the assumption that mental health and mental wellbeing operate on the same continuum, or in other words, that mental illness and mental wellbeing are polar opposites. A simple way to visualise this theoretical conceptualisation of mental health can be found in an article by Felicia Huppert (see Figure 5A). In her review on the state of wellbeing science (Huppert, 2014), she advocates for a public health approach to mental health. This public health message on the need to improve the mental health of our entire population is important and is reminiscent of the mental health hygiene movement from the early 1900s which advocated for a stronger focus on population mental health (WHO, 1951, p. 4). Simply put, this model implies that an individual moves along the axis from showing symptoms of mental illness to mental wellbeing. The goal is to shift everyone on the curve to the right, effectively moving the curve on a population level. This conceptualisation of mental health aligns to many parts of our mental health system and is used frequently in policy documents, for example in the latest National Children's Mental Health and Wellbeing Strategy by the Australian National Mental Health Commission (National Mental Health Commission, 2021). It is also congruent with the siloed approach to dealing with pathology and wellbeing; we focus on symptoms of mental illness (e.g., anxiety, ruminations) on the left side of the graph, while we focus on wellbeing (e.g., meaning, self-development, positive relationships) on the right side of the graph. Finally, it implies we can capture the continuum from illness to wellbeing using the same assessment methods.

As we argue in study 1 (van Agteren & Iasiello, 2020), this way of thinking about mental health may be easy to communicate and have good intentions, but it oversimplifies reality and does not reflect scientific evidence. In the review, we refer to a scoping review that Matthew Iasiello, myself and our colleague professor Eimear Muir-Cochrane conducted on this matter, finding 80+ scientific papers (Iasiello et al, 2020) supporting the view that indicators of mental illness and distress (i.e., states of emotional suffering typically characterised by symptoms of depression and anxiety (Drapeau et al., 2012; Payton, 2009) are *related* but *separate* from indicators of mental wellbeing. The simplest way of communicating this distinctness is via so-called dual-factor models, proposed by scholars like Tudor (1996), Keyes (2002) and Greenspoon and Saklofske (2001), see Figure 5B. These models visualise that someone can experience wellbeing (e.g., high sense of meaning, be satisfied with their current life's circumstances, relationships and so forth) while dealing with pathology (e.g., psychosis, borderline personality disorder, obsessive compulsive disorder).

Figure 5 A-C.

Different conceptualisations of the relationship between mental wellbeing and mental illness.
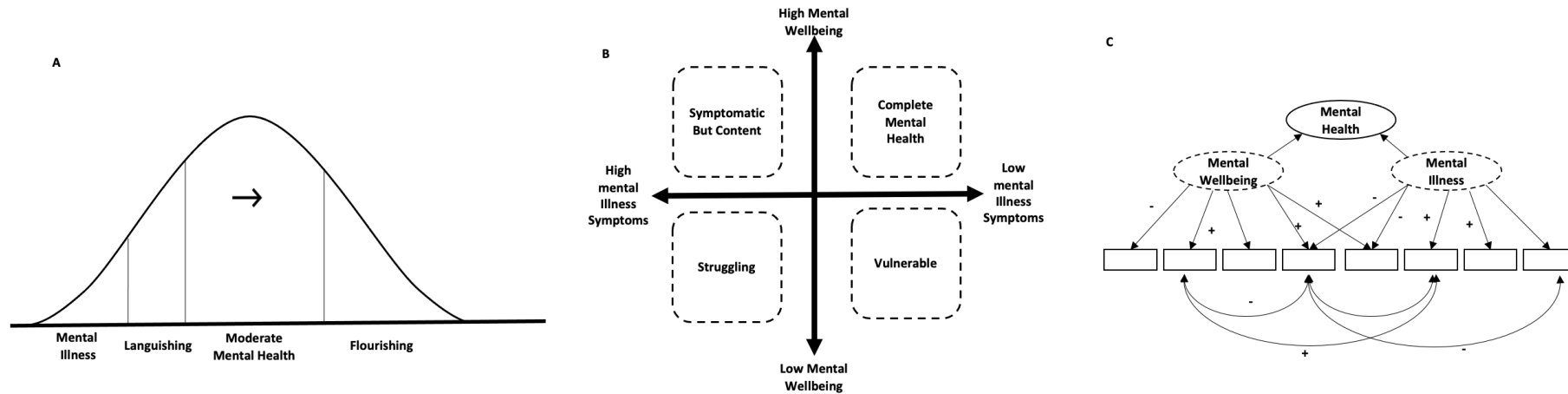
Note: Figure A displays the traditional relationship that has illness and wellbeing operate at the extremes, with an implied normal curve to represent that the whole population can be mapped across the continuum from mental illness to wellbeing. Figure B displays the conceptualisation by dual-factor models, which allow for the creation of four distinct groups across two axes. Figure C is congruent with dual-factor Models, while displaying that outcomes of mental wellbeing and illness share common and unique antecedents, with both being part of the wider umbrella of mental health. Study 1 provides a more in-depth explanation of each of these models and their underpinning strengths and weaknesses.

Similarly, people may show low wellbeing, without showing concurrent signs of illness, although they may be at risk of developing pathology under stressful circumstances. Some may show both symptoms of distress and low wellbeing. Finally, people may have no illness and high wellbeing, also known as *complete* mental health, the only optimal (risk-free) state.

The explanation for the existence of the four quadrants lies in the fact that states of wellbeing and states of disorder share various factors that are common (depending on the type of pathology), but also have factors that uniquely contribute to each construct. A more conducive way to visualise the relationship therefore is displayed in Figure 5C. Coming back to the examples given above, the graph indicates that 1) "positive" constructs (e.g., meaning, self-acceptance) are relevant irrespective of whether an individual is diagnosed with mental illness or displays its symptoms and 2) some elements of illness (e.g., hallucinations, obsessional thoughts) may only be significantly associated with pathology and not wellbeing, and vice versa. The scientific understanding of these common and unique factors is still in its infancy, which can be reasonably traced back to unfounded assumptions of unipolarity of wellbeing and distress. Looking for shared and unique factors does not make sense if you assume illness and wellbeing are part of the same continuum. A small body of research has nevertheless explored this important topic. For instance, Kinderman et al. (2015) found that negative life events and rumination influenced anxiety and depression, while social isolation, adaptive coping and material deprivation influenced wellbeing. Ryff et al. (2006) showed that illness and wellbeing have different biological correlates. In their study they showed that high blood pressure was only significantly correlated to indicators of illness, while lower cortisol, higher norepinephrine, lower wait-hip ratios, and higher high-density lipoprotein (HDL) cholesterol - the "good" type of cholesterol – were only correlated to indicators of wellbeing.

Despite a current lack of scientific understanding of the common and unique antecedents of illness and wellbeing, an established body of research utilising a wide variety of research methodologies disputes the unipolar model as an all-encompassing model of mental health, supporting the need to explore mental health promotion irrespective of the potential presence of mental illness. This focus on reducing the siloes is not a new notion per se and has received support from researchers and practitioners alike. Advocates of areas such as dual-factor models (Greenspoon & Saklofske, 2001; Keyes, 2005), wellbeing therapy (Ruini & Fava, 2012), the recovery movement (Leamy et al., 2011), positive clinical psychology (Wood & Tarrier, 2010) and positive psychiatry (Jeste et al., 2015) have for decades been researching and applying combined approaches. Similarly, there are plenty of individual practitioners who take a more holistic approach, and our care provision for people with the most complex levels of clinical care needs are much more geared towards factors associated with wellbeing while helping manage symptoms, i.e., the focus is

more on personal recovery rather than simply symptom amelioration, and helping people develop skills to live a better quality of life on the whole (Hurst et al., 2022; Stuart et al., 2017).

What is crucially important however is that this work, firstly, is not widely found *across* the broader system nor yet across research. Secondly, it has been applied more to interventions than to assessment. Thirdly, most of these integrated efforts tend to occur in highly clinical areas with individuals who have serious mental health challenges. An explicit focus on promoting mental health in languishing cohorts is missing, i.e., those with low wellbeing without illness. This is even though focusing on states of mental wellbeing (i.e., focusing on strengths and capacities rather than simply focusing on deficiencies) may have inherent benefits for promoting the need to work on one's mental health. For example, where mental health literacy focuses on recognition of symptoms of mental illness (Jorm, 2000), wellbeing literacy refers to building capabilities that lead to general states of mental wellbeing (including a reduction of distress) (Oades et al., 2021), therefore 1) being relevant for all people irrespective of dealing with current illness and 2) providing an alternative avenue for people who are more wary to work within a deficit or pathology frame (Slade, 2010).

4.10.   The Languishing Cohort: Bang for Buck in an Invisible Group

The subsequent studies in this thesis attempt to show how feasible it is to capture states of mental wellbeing with dedicated outcome measures, highlighting that we might have a far bigger mental health problem than we typically cite (AIHW, 2022a). Secondly, the studies aim to show how practical it is to design and implement evidence-based interventions for people who languish, and that these interventions can be delivered without the need for clinical resources and thus avoiding placing more pressure on the clinical system.

This is because, people who are languishing represent an ideal target group for mental health promotion interventions. They are people who currently do not show clinical symptoms of mental illness but are struggling with other aspects of their mental health. Languishing, or low wellbeing, is typified by feelings of emptiness, a lack of meaning and purpose, and a lack of self-acceptance and interest in life (Grant, 2020; Keyes, 2002). This group of people has received extra attention since the COVID-19 pandemic started in 2020[13]. It is a transient group over time, meaning that those who languish are at high risk of developing mental illness in the future. Various independent longitudinal studies clearly show that having low wellbeing, or deteriorating in levels of

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[13] The popular psychologist Adam Grant wrote an influential piece on languishing in the New York Times that gained a lot of traction during the pandemic, see: https://www.nytimes.com/2021/04/19/well/mind/covid-mental-health-languishing.html

wellbeing over time, increases the risk of developing mental illness over time. For example, two studies that were conducted independently in the UK and the US in 2010 found that the odds of developing symptoms of illness was over 7 times higher for people who were languishing (Keyes et al., 2010; Wood & Joseph, 2010). Since then, other studies have replicated these findings, showing that low wellbeing is a risk for developing mental illness in the long term, see for example Santini et al. (2022)

Even though the increased risk mentioned above may be high, the contribution to the total burden of poor mental health remains low if this increased risk only applies to a small number of people in the community. In other words, targeting the languishing group should only be a focal point for systems reform if it affects a sizeable part of our society. This is where we run into challenges as there are surprisingly little empirical insights on the languishing problem in Australia.

A variety of reasons can be posited to explain this lack of knowledge. As alluded to throughout this contextual statement, mainstream mental health measurement does not capture indicators of mental wellbeing. Firstly, most assessment and screening in primary care relies on measures of general distress, i.e., measures that capture symptoms of common mental disorders (Payton, 2009). In Australia, screening typically relies on brief measures of psychological distress such as the Kessler-10 (K10) or the Depression Anxiety and Stress Scales (DASS) (Andrews & Slade, 2001; Crawford & Henry, 2003). Although these scales are reliable and valid to capture distress, they were not designed to capture wellbeing, with measures of wellbeing and distress generally only correlating moderately (Iasiello & van Agteren, 2020). Secondly, larger government data collection efforts and studies such as the NSMHW do not capture indicators of mental wellbeing, and predominantly focuses on diagnosis of mental health conditions rather than estimating the burden of mental illness via measurement of symptoms. This is in itself interesting, as governments with similar mental health systems elsewhere have implemented *some* form of wellbeing monitoring, e.g., in the case of the UK (Office for National Statistics, 2023). Thirdly, routine outcome monitoring – the effort of measuring impact of services across the sector – does not include indicators of wellbeing. For example, the Australian Mental Health Outcomes and Classification Network (AMHOCN) relies on the K10 and on the Health of the Nation Outcome Scales (HoNOS) tools (Brooks, 2000) to estimate service performance, neither of which adequately capture positive states of mental health.

This lack of integration of mental wellbeing outcomes across the board is surprising. This is not in the least because we simply fail to measure anything other than deficits and as such fail to measure *health* (that is, if we adhere to the common notion that health is more than the absence of illness). It is also surprising because of the established presence of a plethora of validated mental

wellbeing measurement tools (Iasiello et al., 2023b; Linton et al., 2016), many of which have been around for decades, and have been extensively validated across different population and cultural groups. There is a considerable amount of diversity among these measures, which is important to consider when choosing a measurement tool or comparing results between studies.

While an extensive review on the properties of wellbeing measurement tools is beyond the scope of this contextual statement, it is worthwhile highlighting several key measures, as they 1) have been used in hundreds of scientific studies across the globe, including my own, and 2) have good psychometric properties when it comes to measuring *overall* mental wellbeing. Firstly, one of the most well-known scales is the Satisfaction with Life Scale (SWLS) (Diener et al., 1985) whose questions are all framed around the satisfaction with (the conditions of) one's life in general. The concept of life satisfaction is often used as a proxy for overall mental wellbeing, although technically it is a sub-domain within Dieners subjective wellbeing framework (Diener, 1984). Secondly, the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) (Tennant et al., 2007) is a different type of scale, using a combination of different positive thoughts and feelings (e.g., feeling useful, confident and close to people) that are linked to good wellbeing to calculate an overall mental wellbeing score. Thirdly, the Mental Health Continuum Short form (MHC-SF) (Lamers et al., 2011) is again different, as it captures three distinct factors representing Diener, Ryff and Keyes' dimensions, as well as an overall score of mental wellbeing (rather than simply an overall score). Each of these measures is widely used, as for example the tally for *validation* studies for the MHC-SF alone stands at 26 studies totalling a combined n = 108,603 people, from a wide variety of countries (Iasiello et al., 2022a).

Each of these scales can be used to reliably capture a sense of overall mental wellbeing. They are highly practical to use because they are short, valid and reliable, are easy-to-use, can provide comparative norms from a range of samples and come with severity cut-offs, thereby facilitating grouping into clusters. They can easily be added to complement measures focused on distress and illness, but the limited use of these established validated measures to date has held us back in determining the real burden of the languishing group. Even where mental wellbeing is an explicit focus for research, studies often fail to use validated scales of mental wellbeing, and rather rely on single items or modified scales. Commonly, these short screening measures do not have validated cut-offs to establish risk, i.e., they do not come with clear indicators that allow us to categorise or diagnose someone as languishing. For example, one of the largest ongoing wellbeing studies in the world, the Organisation for Economic Co-operation and Development (OECD)'s Better Life Index, relies on Cantrill's ladder, a 1-item assessing life satisfaction (Mizobuchi, 2014). The popular Office of National Statistics (ONS)-4 measure relies on 3 single wellbeing items combined with an item on anxiety symptoms, again without clear risk-grouping (Benson et al., 2019).

An important point to make when aiming to estimate the burden of languishing relates to dichotomous versus continuous measuring of mental health (Renshaw et al., 2016). Critics of grouping people into categories or using diagnostic criteria indicate that grouping is artificial and suggest that statistical models could help infer burden without the need to group people or use simplistic dichotomous classifications (Donner & Eliasziw, 1994; Wynants et al., 2019). While this may be correct, relying on validated risk cut-offs is useful in practice. Categorisation of people helps streamline services and clinical decision making and is easy to do once valid cut-offs are established. Measures that do not have cut-offs make it more difficult to practically estimate the burden of the languishing problem. While continuous measurement has inherent benefits, including higher power and being 'truer' to the effect within the population, some of the downsides of dichotomous classification are reduced in studies that rely on larger samples (Ragland, 1992). It is for this reason – the practicality of adoption into future practice and the fact that my studies utilised sample sizes of sufficient size - that the studies in this thesis have relied on validated scales with validated cut-offs to gain a better insight into the current estimates of the languishing problem in Australia.

4.11. Measuring Wellbeing: Insights from South Australia

Our team at the South Australian Health and Medical Research Institute (SAHMRI) has used a custom-built mental health measurement platform called the Be Well Tracker (http://app.bewelltracker.com) to measure the mental health and wellbeing of over 25,000 individuals over the past three years (2019-2022), resulting in two specific peer-reviewed articles that are part of this thesis and that can be used to shed insight into the extent of the languishing problem in Australia. Participants that used *the Tracker* stem from three distinct population pools: 1) academic studies to test the efficacy of wellbeing interventions, 2) projects conducted with industry partners and 3) participants from the general public, who can take a free measurement via our online webpage.

Although we tailor our measurement to the needs of individual projects, our measurement across most projects – and indeed the two studies in this thesis - consists of a few common validated measures of mental wellbeing, resilience and psychological distress. In the observational studies presented below, mental wellbeing was measured using the MHC-SF, the aforementioned 14-item questionnaire that captures emotional (hedonic), psychological and social wellbeing. It is a well-studied tool, with a three-factor structure, as validated by our own team using meta-analytic factor analysis (Iasiello et al., 2022a). Resilience was captured using the Brief Resilience Scale, which defines resilience as the outcome of being able to cope with stress or adversity (Smith et al., 2008). Psychological distress was measured using the DASS-21, which captures distress due to symptoms of

depression, anxiety and stress (Crawford & Henry, 2003). Further to their psychometric properties, the choice of these tools has been influenced by their wide use and validation around the world, assisting in comparisons of our samples against normative data.

Study 2 of this thesis was an observational study conducted in 2020, which allows us to gain some insight into the magnitude of the languishing group. The principle aim of the article was to develop an early understanding of the impact of the start of the COVID-19 pandemic on mental health and wellbeing in Australia (van Agteren et al., 2020). In our paper in *JMIR Mental Health* we investigated the responses of consenting participants from the launch of our platform in February 2019 up until February in 2020, before the start of the pandemic in Australia. We split this sample into two cohorts (combined n=1,604), individuals who engaged as part of organisational projects and those who engaged with our services on their own volition. We then created a third cohort (n=673) of individuals who took a measurement during March to May 2020, which was the period when Australia started rapidly enforcing social restrictions due to COVID-19 (Cheng & Williamson, 2020). The study showed that respondents who took the measure before the start of the pandemic reported significantly lower distress, and higher wellbeing and resilience compared to those during the start of the pandemic, with effect sizes ranging from small to large depending on the outcome of interest (Cohen's *d* = 0.32 to *d* = 0.81).

Importantly, in the study we also investigated the number of people in either of the cohorts with suboptimal mental health, that is people who displayed scores that showed active psychological distress on the DASS-21, had scores that did not reflect high wellbeing on the MHC-SF and had scores that indicated low resilience on the BRS. In other words, these were people who either displayed current symptoms of mental illness or where at elevated risk of them because they were languishing or felt they would not cope if life stressors continued. In the paper, we showed that the percentage of people with suboptimal mental health was up to 58%, which increased to 79% for the COVID-19 cohort (van Agteren et al., 2020). If we were to trace this back to our general definitions of mental health, such as the WHO definition (WHO, 2004), it means that only 42% of participants pre-COVID had optimal mental health.

This data provides empirical evidence that points to the existence of a far larger group of Australians who struggle with their mental health than are typically considered when only focusing on indicators of mental illness, i.e., 1 in 5 people (AIHW, 2022a). It shows that we should expect a sizeable proportion of people who are languishing without clinical symptoms of illness. To date, across our team's projects, totalling over 25,000 people, we see that 19% of respondents are languishing without symptoms of distress, with this group decreasing since COVID-19 by 8% from 27% and the number of people with distress at the same time growing (Be Well Co, 2022). If we

were to conservatively translate this to the wider Australian society, this may translate to millions of Australians[14] being both vulnerable (due to their "languishing" status) and unidentifiable (as clinical assessment tools do not include parameters of wellbeing) (ABS, 2022b).

It is important to understand that the 19% is a crude average, with the impact of languishing being larger in sub-cohorts in the community: cohorts which are often already identified as being at-risk groups for poorer life outcomes, for example people from culturally diverse backgrounds, refugees or LGBTQIA+- people with these groups also being identified as being at higher risk of poor mental health consequences as a result of the pandemic (Batterham et al., 2021; Dodd et al., 2021; Fisher et al., 2020; Li et al., 2021; Newby et al., 2020; Rossell et al., 2021). A specific group of interest to our collaborative research group are university students, who are receiving increasing attention as an at-risk group when it comes to mental health. In Australia leading youth mental health organisations such as Orygen and the federal government have for instance developed a national university framework for mental health (Orygen, 2020). The student population consists largely of young people who face major transitions in life and who across studies consistently show worse mental health outcomes compared to older cohorts (Duffy et al., 2019; Reavley & Jorm, 2010; Storrie et al., 2010). Though life transitions can be a period of growth, it also is a time of stress and change (Praharso et al., 2017). With 1.6 million university students in Australia, it points to a potentially large cohort of individuals who are languishing (Universities Australia, 2022).

Study 3 of this thesis was published in the journal *Student Success* (van Agteren et al., 2019), and formed part of a larger wellbeing project on student wellbeing. The principle aim of the study was to shed insight into the local mental health and wellbeing scores of university students. In this study we found that the percentage of student respondents with *suboptimal* mental health was 81.4%. Looking at wellbeing alone, only 31% showed optimal mental wellbeing, leaving two-thirds of respondents with wellbeing scores that could benefit from improvement. These findings support the notion that languishing may be an even larger problem for at-risk populations such as students. Since publishing the cross-sectional study, our team has undertaken subsequent measurements during 2020 and 2021, showing consistently that students demonstrate worse scores compared to the general public even after stratification. For example, mean wellbeing scores in 2020 for students were 37.28 (standard error = 0.79) on the MHC-SF compared to 45.91 (standard error = 0.61) for the general population (Smith et al., 2023). Furthermore, wellbeing scores since the advent of the COVID-19 pandemic deteriorated both for the student cohorts and the general population cohort.

The two published observational studies have clear limitations. Firstly, there was a lack of a true longitudinal design in both studies, limiting the inferences one can make. Consequently, we

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[14] In 2023 the total population of Australia exceeded 26 million (ABS, 2023).

have started to run a longitudinal mental health and wellbeing study (see section 4.17 below). Secondly, the studies could have suffered from response bias, and as such a degree of caution needs to be taken when extrapolating their findings. Although there would not be a need for a purely representative sample to make adequate predictions on whether the languishing cohort is substantial (Coppock et al., 2018), a degree of error in the estimates can be expected. Regardless – and considering the relative paucity of studies that comprehensively estimate languishing in the Australian setting – the studies provide important data highlighting that the languishing problem is not insubstantial and may differentially affect vulnerable sub-population groups.

4.12. Testing Scalable Formats to Deliver Wellbeing Interventions

Although the languishing cohort is sizeable and can be identified if one were to use the right reliable assessment tools (Kaiser & Oswald, 2022; Iasiello et al., 2023b; Linton et al., 2016), it is only useful for reform if we can feasibly help a significant number of people move from lower to higher levels of wellbeing i.e., 1) the outcome of mental wellbeing needs to be malleable and 2) we need to be able to accomplish this by approaches that are sustainable and scalable. This latter point is important, as we need interventions that are complementary to the existing mental health system and do not rely on scarce clinical resources, particularly the requirement to not rely on one-on-one clinical staff. Without 2), we will further compound the existing resource issues mentioned in sections 4.3 to 4.5 of this contextual statement. As such, the focus of the earlier intervention work associated with studies in this thesis involved testing the utility of cost-effective group- and technology-based intervention programs. Although studying either format per se is not a novelty, my research investigated two specific features that could add to their sustainable impact.

Study 4, published in *BMC Research Notes,* examined the impact of a group-based psychological training program delivered to a cohort of health services staff (van Agteren et al., 2018). The training program was a generalised psychological skills training program combining mindfulness, CBT and positive psychology activities, which was delivered across two full days, and has been tested in a number of other population cohorts (Bartholomaeus et al., 2019; Lo et al., 2020). Rather than relying on trained mental health specialists such as psychologists or social workers, upskilled trainers with non-mental health backgrounds were used to deliver the training. The trainers were trained using a so-called train-the-trainer methodology (Orfaly et al., 2005), which has the potential to increase the scalability of group-based intervention by virtue of a decreased reliance on clinical staff. The use of a non-clinical train-the-trainer methodology is appropriate as wellbeing or mental health promotion interventions do not focus on interrogating and resolving clinical symptoms and pathology, but rather focus on capacity building. Parallels to the success of its

non-clinical format in Australia can be drawn with the successful Mental Health First Aid program, where peers are taught how to recognise symptoms of illness and techniques on how to help those struggling with the symptoms find help (Kitchener & Jorm, 2006).

The focus of the program tested in study 4, however, was wellbeing capacity building, i.e., it aimed to teach people skills to improve their own wellbeing (rather than developing mental illness literacy, which is the focus in Mental Health first aid). Results from study 4, combined with the other studies our team ran (Bartholomaeus et al., 2019; Lo et al., 2020), showed that the group-based program significantly improved outcomes of mental wellbeing and resilience (i.e., feeling able to cope with stressors) across different contexts, generally showing small but significant effect sizes. One of the sub-aims was to determine whether participants that were struggling more at the beginning of the training responded well. In our opinion, this was an important additional analysis as screening for wellbeing and mental health status at the start of wellbeing interventions, unlike for interventions targeting mental illness, is not usually performed. Results showed that the program led to larger effect sizes for participants who were languishing ($r = 0.67$ compared to $r = -0.36$) or had low resilience ($d = 0.92$ compared to $d = 0.24$) at the start of the training[15]. These large effect sizes for participants who were languishing were encouraging. It not only showed that the group-based training worked for people who struggled, but that this was successful in a cohort of professionals that traditionally are wary of traditional mental health interventions (Zaman et al., 2022). By offering the intervention under a strength-focused frame of capacity building, the program was thought to be more acceptable to this audience. The training ultimately was delivered to over 660 staff, of which 160 places were added after the first round was overbooked. Unpublished insights from two focus groups we ran further supported the potential utility that these kind of interventions can have in reaching large amounts of people, as can be captured in the following quote: "*This program is so needed in our hospital. It needs to be something we offer to all our staff*".

In study 5, published in the *Journal of Happiness Studies*, we set out to test the use of another scalable format to deliver a wellbeing intervention to a general community cohort (van Agteren et al., 2021a). The study set out to test whether experience sampling technology using mobile phones could be feasibly used to deliver wellbeing *interventions*. Experience sampling - or ecological momentary assessment - refers to a methodology to collect self-report data at a specific moment-in-time or in a situation, rather than having to rely on reflecting about activities or feelings in the past (Shiffman et al., 2008). By asking questions in the moment however, the technology can double as a self-reflection intervention. The intervention focused on a crucial component of mental wellbeing, the presence of meaning and purpose in life (Martela & Steger, 2016). It was a 7-day

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[15] The use of Pearson's r and Cohen's d was necessary due to the differences in normality for the samples.

program aimed at building a sense of meaning and purpose via short reflection exercises that were designed to increase the saliency of *existing* sources of meaning in our lives, e.g., important relationships, the activities we engage in. Participants completed different activities each morning across the seven days. They also received three questions at random times, asking them to reflect on the activities they were doing at that exact moment and how this may contribute to their wellbeing or sense of meaning. The intervention significantly improved meaning in life ($p = .02$, $\eta 2 = .05$), life satisfaction ($p = .00$, $\eta 2 = .08$) and positive affect ($p = .02$, $\eta 2 = 0.05$) for participants who were randomised to the intervention group compared to a waitlist control group.

Both studies gave our team important insights into the potential sustainability of these two intervention formats at a population level. Both studies were offered as free solutions and recruitment was coordinated via partner organisations, the health service employer in the case of study 4 and the Adelaide City Council for study 5. No major difficulties were encountered in recruiting for either study, demonstrating that there was a demand for both delivery formats, which is an important parameter when determining the utility of interventions. A crucial difference lay in engagement with the intervention. Despite it being a relatively low intensity intervention, the technology solution suffered from high drop-out, which is in line with global literature (Linardon & Fuller-Tyszkiewicz, 2020), whereas no such drop-out was seen in the face-to-face group format. Technology solutions for mental health not only struggle with engagement, but they tend to lead to lower effect sizes, with results not generally maintained over time (Philippe et al., 2022). Although they are still appealing for specific sub-cohorts and may prove to be more useful in the future when technology matures or as adjunct, support or even booster interventions, technology-only solutions are characterised currently by their challenges (Ratheesh & Alvarez-Jimenez, 2022). The experience of the studies cemented this same principle for our team: delivery of facilitated solutions using a scalable framework (i.e., train-the-trainer using non-clinical upskilled staff) looked most promising to pursue, particularly when *supported by* technology, rather than trying to solely utilise technology-only solutions as a focus for interventions to affect the investment-prevalence paradox.

4.13. Mapping the Psychological Building Blocks for Improving Wellbeing

While the content of the various strategies in the first intervention studies proved to be effective, it targeted particular aspects of wellbeing with specific components rather than including a wider range of proven interventions for improving wellbeing across its various elements. When designing interventions, ideally one can rely on a thorough understanding of the role that distinct intervention components play, either as standalone interventions or as part of larger 'complex' interventions (Moore et al., 2015). In the case of wellbeing interventions this understanding has been hampered,

among others due to problems that can be related back to the single-axis conceptualisation of mental health and wellbeing. Traditionally, most interventions targeting wellbeing came from the positive psychology subfield, where an extensive body of research has investigated *positive psychological interventions* (PPIs) (Bolier et al., 2013; Carr et al., 2023; Hendriks et al., 2020; Sin & Lyubomirsky, 2009; Weiss et al., 2016; White et al., 2019). These interventions generally teach simple activities to cultivate positive feelings or behaviours, for example practicing 'acts of kindness', reflecting about good things that have happened to individuals, or completing a 'gratitude journal'. Studies show that PPIs are effective in improving wellbeing, while also having merit in improving outcomes of distress (Chakhssi et al., 2018). An explanation for this finding can be found in Figure 5C, which was presented in section 4.9: If PPIs target antecedents that positively influence both outcomes, for example stimulating positive affect or a sense of purpose, positive changes in both outcomes of distress and outcomes of wellbeing can be expected.

Finding that PPIs can improve distress *and* wellbeing by itself has relevance, as it means that PPIs can more easily be considered as activities within the wider mental health system, e.g., via positive clinical psychology where a focus on symptom amelioration goes hand in hand with a focus on building wellbeing resources (Bohlmeijer & Westerhof, 2020; Wood & Tarrier, 2010). This finding also allows an important flip to be made: there may not be a need to *just* target positive constructs if we want to improve wellbeing. Theoretically, traditional therapeutic approaches that were designed to target illness or dysfunction (e.g., CBT, ACT) could be used to build mental wellbeing, so long as they target the antecedents that also link to mental wellbeing. For example, while ACT is typically used in the context of clinical therapy, its premise of building psychological flexibility can equally be considered useful to build wellbeing (Doorley et al., 2020; Fledderus et al., 2012). Determining the impact of different psychological approaches is important, not only for scientific advancement of our knowledge, but it is also crucial for advancing a stronger case for mental health promotion. If practitioners and policy makers can rely on existing theoretical paradigms and therapies to underpin wellbeing interventions, the potential friction into systematically adopting wellbeing solutions can be reduced, as we could build on existing expertise, rather than introducing new paradigms.

While the evidence for the effectiveness and efficacy of PPIs in improving states of mental wellbeing was extensively documented, there was no synthesis that captured the efficacy of psychological interventions from a wide variety of differing paradigms. This observation led to the decision to conduct study 6, a systematic review published in *Nature Human Behavior* (van Agteren et al., 2021b). The study set out to map the impact of different psychological interventions on improving outcomes of mental wellbeing. The large review included 419 randomised controlled studies (n = 53,288 participants), showing that interventions from different paradigms had

differences in efficacy, both compared to one another and across clinical versus non-clinical populations. For example, CBT based interventions did not meaningfully improve mental wellbeing in the general population but were effective in people with mental illness. Other interventions had utility in both the general population and cohorts of people with a mental illness, for example mindfulness interventions, PPIs and reminiscence interventions, being interventions that use personal recollections and memories to harness change in mental health (Westerhof et al., 2010), see Figure 6.

The review also interrogated the impact of various methodological moderators, including sustainability of effect, the impact of intervention intensity and modality of delivery. Results showed that effect sizes tended to wane after 3 months, pointing to a clear need to provide ongoing intervention touchpoints if improvements in wellbeing are to be maintained. The results showed that interventions performed better if they were delivered over the course of a week or longer, demonstrating that interventions need to be of sufficient intensity to reach a significant effect size. Finally, the study showed that group- and individual-based interventions outperformed technology-only interventions[16], providing a further justification for our rationale to pursue group-based formats (supported by technology, the so-called hybrid formats) over technology-only formats.

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[16] Most technology-based interventions in the review were websites or apps, rather than telehealth solutions.

Figure 6.

Forest plot visualising the impact of each psychological intervention type on well-being compared to control conditions.
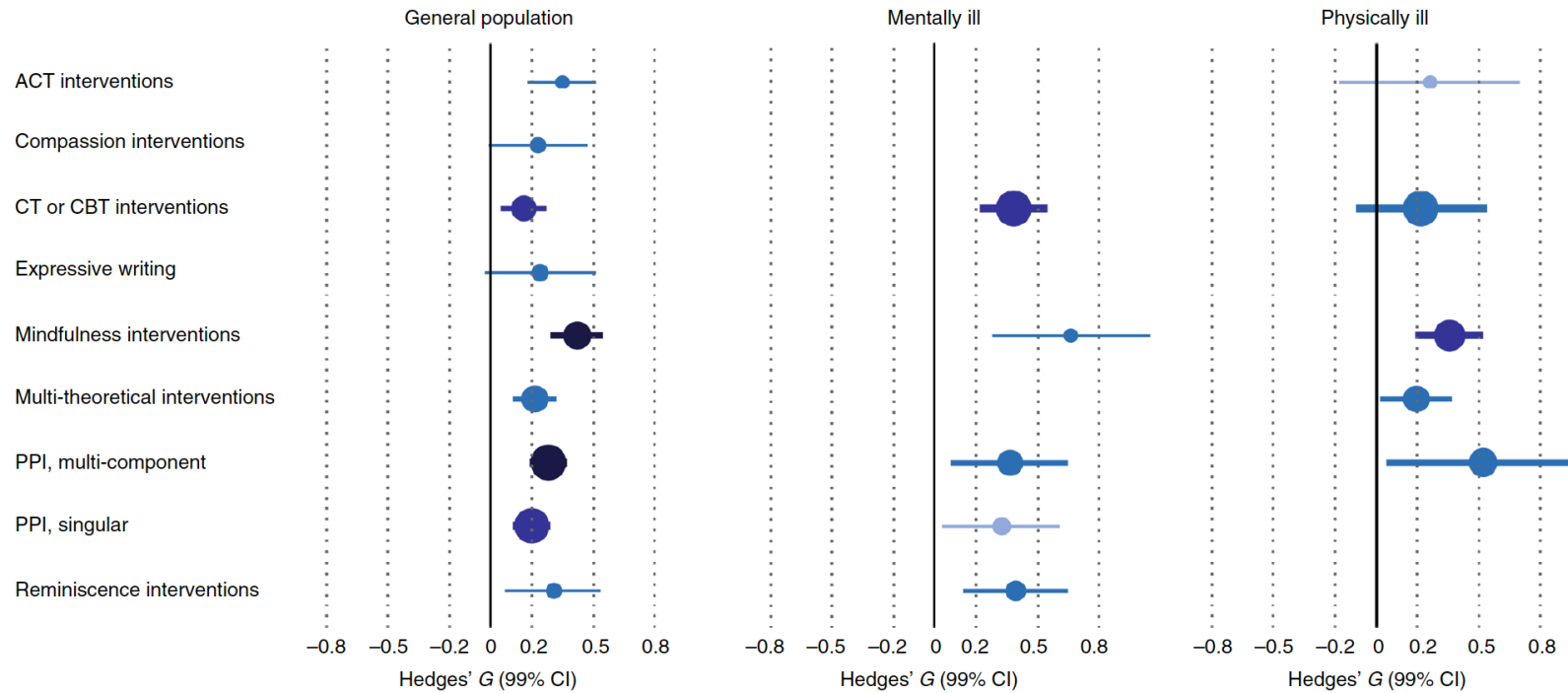
Note: Horizontal bars show 99% confidence intervals (CI), with interventions having a significant effect denoted by horizontal bars that do not cross the solid line. The dashed lines indicate small ($g = 0.2$), moderate ($g=0.5$) and large ($g = 0.8$) effects. Circles sizes reflect sample size included in the meta-analysis for that intervention type. Colours denote the evidence quality based on Grade recommendations (Guyatt et al., 2008) for high (dark purple colour), moderate (purple colour), low (blue colour) and very low (light blue colour) quality of the evidence. ACT = Acceptance and Commitment Therapy, CT = Cognitive Therapy, CBT = Cognitive Behaviour Therapy, PPI= Positive Psychological Intervention.

4.14. Design of a Personalised Group-Based Wellbeing Solution: The Be Well Plan

The research presented above provides the foundation for the final two articles of the thesis, the design (study 7) and preliminary evaluation (study 8) of a new mental health intervention. The goal was to create an intervention that could have high effectiveness as a general psychological mental health promotion solution. Firstly, the aim was to develop an intervention that was designed to improve mental wellbeing while also having utility in being able to improve distress, all the while ensuring its core teachings were congruent with prevailing psychological paradigms utilised in the Australian mental health system. Secondly, we wished to develop an intervention that not only incorporated the findings from the systematic review, but one that could keep advancing with an evolving evidence-base. Thirdly, it needed to be a mental health promotion intervention that could be utilised across various settings, and in both clinical and non-clinical populations, ensuring it had reach and scale. Finally, the intervention needed to be designed with sustainability in mind.

Study seven is a description of the scientific design process of the intervention in a dedicated journal article (van Agteren et al., 2021c). Published in *Frontiers of Psychology*, the article served two broad aims. First and foremost, to ensure that the intervention would have a high standard of rigour, our team decided to use a rigorous intervention development framework called Intervention Mapping (Eldredge et al., 2016). The use of standardised frameworks for intervention development is well-known in medical and (public) health research (Durks et al., 2017), and is particularly beneficial when interventions are complex, i.e., they consist of various components which may act independently or interact with one another to achieve a desired outcome (Campbell et al., 2007; O'Cathain et al., 2019). Most psychological interventions are complex interventions and using a framework like Intervention Mapping allows intervention developers to use a meticulous iterative development process to develop an intervention that has an optimal chance at achieving its desired outcomes and impact. By conducting a needs analysis and crafting a logic model, writing program and change objectives, and matching these detailed change objectives to evidence-based behaviour change techniques (Kok et al., 2016), the paper provides a comprehensive blueprint of the intervention. After laying out the theoretical foundations, the paper continues to describe the design and components of the intervention, and their rationale, based on this theoretical blueprint.

By doing so, the article also fulfils an important second aim. As alluded to before, psychological interventions for mental health are typically complex, even those that are seemingly simple. They often target a multitude of psychological processes or antecedents, and as our review and other research points out, can be dependent on specific moderators related to the intervention and the target population (Cuijpers et al., 2022; van Agteren et al., 2021b). The exact method of delivery and its content is crucial to determining its impact, and therefore a detailed description on

interventions is essential if the purpose of scientific articles is to facilitate scientific replication (Candy et al., 2018; Prager et al., 2019). It is this detailed description that is crucially missing for a significant proportion of psychological intervention research, which hinders stakeholders across mental health research and practice. For example, in research it impedes literature reviewers who aim to determine the true efficacy of psychological interventions, as without the presence of detailed descriptions it is difficult to disentangle how and why interventions are effective (Hoffmann et al., 2017). In practice, it for instance hinders psychologists who wish to create their own programs while staying true to the intent of tested interventions. The article provides that detailed insight into the intervention developed, the Be Well Plan, doubling as a case study of sorts in improving the reporting standards of psychological interventions.

I refer to the manuscript for a detailed description of the program (van Agteren, 2021c). The program includes each of the five common elements for effective psychological interventions as outlined by Goldfried (2019). In short, the standard Be Well Plan is a 5-week 2 hour-session group-based program that teaches individuals to design their own personalised wellbeing plan. The activities in the program are derived from the effective wellbeing interventions in the systematic review and were curated for potential impact on improving psychological distress. Rather than providing a set number of activities, the program introduces different approaches to finding activities that are relevant to that individual, thereby aiming to stimulate tailoring and building motivation to engage with the content (Norcross & Wampold, 2011). One example of this tailoring involves taking a mental health measurement at the start of the program via the Be Well Tracker, our measurement platform. Participants who do the training get given an immediate online report on six outcomes: mental wellbeing, resilience, depressive symptoms, anxiety, stress and subjective perceptions on quality of physical health. These outcomes were chosen as they firstly map onto the WHO definition of mental health, while also capturing key outcomes that are relevant for day-to-day functioning (WHO, 2004). The report gives participants insights into how they score and provides information about what this means and what positive steps they can take to improve it. As such it helps build wellbeing literacy for individuals who engage with the report (Oades et al., 2021). Within the program, participants then work with visual decision aids that matches 30 activities to each outcome, allowing participants to select activities based on their own unique needs. The aim is for people to start exploring their personal drivers them (i.e., what makes them who they are), in a sense tapping into the important role that the self plays for our mental health (Kyrios et al., 2016; Kyrios et al., 2015).

Throughout the five weeks, participants experiment with practical and easy-to-complete activities, along the way figuring out which activities they want to and can embed in their life, aiming

to develop sustainable wellbeing habits. Throughout the program, participants are taught various psychological tips to improve habit formation, for example using implementation intentions, setting goals, and using prompts (Fogg, 2019; Gollwitzer & Sheeran, 2006). At the end of each session participants develop and iterate their personalised wellbeing plan: their Be Well Plan. This highlights the importance of a multi-week format, which firstly aimed to create greater impact, but also allows participants to practise activities in their day-to-day lives. With tailoring and personalisation to individual participant needs at the core of the program, the idea is that the intervention does not require much tailoring to group-needs or settings. Rather, the program allows facilitators to contextualise examples, which combined with a focus on mental health promotion (as opposed to targeting symptoms of specific mental illness), again aims to make the training more universally applicable across a large cross-section of the population, and as such aids in its scalability (Cuijpers, 2022). The personalisation element furthermore helps to increase individual engagement as matching activities to individual needs was hypothesised to lead to higher impact (Proyer et al., 2015).

As mentioned earlier, the program relies on a train-the-trainer approach, aiming to upskill non-clinical individuals to teach the program content within non-clinical settings such as workforces or community (Barnett et al., 2018; Kakuma et al., 2011). It is important to note that, while the program is designed to be delivered in non-clinical settings, this does not mean that individuals with active distress or illness would not participate. Consequently, the intervention has various referral points to professional services embedded within it in case individuals experience distress. If the program is to be delivered to higher risk groups or directly within clinical populations, which is a focus for future research studies (see section 4.17), one recommendation is to co-deliver the training between clinical staff and/or people with lived experience (Shalaby & Agyapong, 2020).

The program is designed so that it can be facilitated in-person and online, ensuring high scalability while maintaining impact and engagement. This latter format, relying on live facilitation using teleconferencing software has most promise for scalability, as it reduces the need for in-person interaction and the logistical challenges that come with it (e.g., transportation, co-location) (Ratheesh & Alvarez-Jimenez, 2022). At the same time, it may counter some of the drawbacks that self-guided online interventions are known to have including high drop-out and the fact that these interventions require high motivation and are not appealing to everyone (Marzano et al., 2015; Nicholas et al., 2017). Having both formats available provides flexibility to trainers allowing them to choose to deliver the program in person (e.g., for people who are less capable in navigating technology) or online (for people who are not located in the same area or region).

4.15.   Testing the Differential Effectiveness of the Be Well Plan on Wellbeing and Distress

The final paper that is included as part of this PhD aimed to test whether the intervention was achieving the hypothesised positive effects in shifting mental health outcomes (van Agteren et al., 2021d). In study 8, an uncontrolled intervention study published in *JMIR Mental Health*, we investigated the mental health of 89 participants who participated in the Be Well Plan. The delivery had to occur online because of the COVID-19 pandemic, which in Australia led to significant social restrictions, including density caps on indoor spaces (Duckett, 2021; Stobart & Duckett, 2022). As a result – and in line with published studies that highlighted the merit of using digital solutions in mitigating the mental health consequences of the pandemic (Holmes et al., 2020; Willems et al, 2021) – all participants received the training via online teleconferencing software, where a live facilitator delivered the training. The unpaid participants were recruited from organisational partners and the general community. The study delivered on meeting its first aim, showing that all mental health outcomes – being mental wellbeing, life satisfaction, resilience, and indicators of psychological distress – significantly improved from start to the end of the training, with small to moderate effect sizes (η^2 ranging between .06 to .22). The study also interrogated the impact on participants who were displaying problematic mental health scores at the start of the study, finding significantly higher effect sizes for life satisfaction, resilience and distress, compared to participants who did not hit any of the risk cut-offs.

Importantly, the study also aimed to investigate whether there were intra-individual differences in mental health outcomes over time. We set out to determine if we could replicate findings by a study by Trompetter et al. (2017) who demonstrated that improvements in wellbeing or distress did not *need* to co-occur in individuals and that differential response patterns to a psychological intervention could occur for different mental health outcomes. Finding such a differential response pattern on outcomes of distress, wellbeing and resilience for participants in the Be Well Plan, would provide further support for the independence of both types of outcomes, as advocated by dual-factor models (Iasiello et al., 2020). Differential change in outcomes would not be feasible if outcomes of wellbeing and distress were polar opposites of the same continuum. Testing for differential response was done by calculating Reliable Change Indices (RCIs) allowing us to determine change between outcomes on an intra-individual level (Jacobson & Truax, 1992). Rather than simply comparing averages on the sample-level, it allows researchers to compare the proportion of participants that showed changes on either outcome alone or combined. The RCIs we found in the study supported to notion of differential response, similar to the findings by Trompetter et al. (2017), pointing to the importance of measuring outcomes of wellbeing and distress together when evaluating psychological interventions.

Since publication of the pre-post study, our collaborative team has conducted a randomised controlled study (Fassnacht et al., 2022), which replicated the results of the uncontrolled study. To rule out any bias as a result of the measurement tools, we decided to utilise different outcome measures for wellbeing (the WEMWBS (Tennant et al., 2007)) and resilience (the Connor-Davidson Resilience Scale (Connor & Davidson, 2003)) and, rather than measuring psychological distress, we aimed to capture changes on clinical symptoms of depression (using the Patient Health Questionnaire (Kroenke et al., 2001)) and anxiety (using the Generalised Anxiety Scale (Spitzer et al., 2006)). The randomised study noted significant changes on all outcome measures in the intention-to-treat analysis, including clinical indicators for the intervention group compared to the control group. These positive findings not only validated the efficacy of the intervention for improving wellbeing, but it also showed that the program may have merit in being able to reduce clinical symptoms of depression and anxiety. These positive findings open the door to test its application beyond purely mental health promotion and provide empirical evidence to explore its impact as a first-line treatment solution for distress in clinical settings where common mental disorder is the principal diagnosis.

Importantly and perhaps under-highlighted in the empirical papers, our work on the Be Well Plan to date shows that a train-the-trainer approach that offers the flexibility to deliver in-person and online can be an effective way to help reach a diverse number of people from across society. Since launching the program 3 years ago, our small research group has been able to bring the program to over 6,000 people. There are already 40+ trainers who operate and are located across most Australian states. The training is being used in government departments, community organisations and across industries including the health sector, aged care, defence, banking, telecommunications, first responders, police, correctional services to name a few. In none of these projects was it necessary to make any changes to the program content except tweaking examples, attesting to the balance of individualisation and contextualisation in group-based settings as being feasible, impactful and scalable.

4.16. Practical Implications of Strengthening the Case for Dedicated Mental Health Promotion Efforts: Where to Next?

The combined body of work in this thesis - underpinned by the references in the introductions and discussions of the included papers, summarised and expanded upon in this contextual statement – contributes to the theoretical and empirical rationale for a different way of approaching mental health promotion and early intervention. What it aims to show is that mental health promotion and early intervention is not only a crucial lever to help reduce the prevalence of mental illness, but that

a practical re-orientation towards mental wellbeing and a focus on targeting strengths *together* with combatting deficits and states of illness is called for and is feasible to be achieved within the constraints of the existing mental health system. In a sense, the combined work brings us back to the future that was the early to mid 1900s, when the mental health hygiene movement was trying to gain traction in convincing us that mental health can be effectively worked on outside the clinical system, benefitting the general population (Bridges, 1928; Jahoda, 1959; WHO, 1951). What was lacking back then were theoretical and empirical underpinnings to help inform the way this could be achieved for large numbers throughout the community using practical solutions. While there is plenty to be improved upon when it comes to our understanding of utilising a focus on wellbeing to fuel mental health promotion (see section 4.17), the findings from the combination of studies adds to a growing body of scientific research that point to *specifically* addressing states of wellbeing and targeting the languishing group as a crucial avenue to achieve the goal of better mental health across the population (Greenspoon & Saklofske, 2001; Herrman, 2001; Keyes, 2014; WHO, 2002).

A crucial first implication of the work is the practical feasibility of developing wellbeing solutions for the mental health system. We already have access to a large array of measurement methods to capture and triage this group of people (Iasiello et al., 2023b; Linton et al., 2016), which can feasibly be used in Australian samples such as the ones in study 2 and 3. These tools rely on similar principles as existing mental health assessment methods, thereby requiring little training for practitioners and little adaptation for assessment systems, e.g., continuous scales, symptom thresholds, severity classifications (Boateng et al., 2018). Psychological wellbeing interventions such as the ones that were part of my studies (study 4, 6 and 7) similarly require little upskilling for psychologist and other allied health staff who run existing psychological programs or already recommend other websites and apps. The interventions for instance rely on many techniques that would be applied as part of clinical therapies, thereby facilitating easy implementation within the current system (van Agteren et al., 2021b). The studies in this thesis, including those covered in the reviews I conducted (study 1 and 5) show that it will not be a lack of scientific evidence of effectiveness nor a lack of practical applicability of psychological approaches that stands in the way of stakeholders being able to adopt wellbeing solutions to complement the clinical system and to stop the languishing cohort from deteriorating.

A challenge for adoption lies in the practical operationalisation and resourcing of wellbeing offerings and the wider re-orientation towards wellbeing as a distinct outcome and mechanism of change, particularly if there is a need to expand the scope of our *existing* services to include the languishing group. The promotion of mental *health* and wellbeing should be considered a *complementary* strategy to preventing and treating illness (Herrman, 2001; Keyes, 2007). To do this

goal justice, it is reasonable to consider whether it would benefit from a dedicated professional specialisation and a dedicated workforce. On a practice level, this proposition by itself signals a clear reform as no model to ensure its successful systematic implementation currently exists in Australia. Reliance on the clinical system to take on the burden of mental health promotion is improbable due to its current resourcing and capacity challenges (Kakuma et al., 2011; Productivity Commission, 2020). Furthermore, a complete reliance on industry (e.g., private workforces) and community to resource promotion efforts will not likely lead to sustainable implementation (Rapee, 2008).

A solution to this challenge would be to establish a formal delineation of responsibility – similar to how this exists for physical health conditions - where mental health promotion is the responsibility of a dedicated workforce and speciality within the existing private and public mental health landscape. In this situation, the – mainly public clinical system *could* take responsibility to promote mental wellbeing (e.g., a sense of purpose, self-development, autonomy, optimism) in people *with* a diagnosed mental illness, while concurrently managing states of pathology. By increasing its focus on wellbeing in treatment for mental illness, it may improve the chances of recovery for the individuals involved (Iasiello et al., 2019; Provencher & Keyes, 2011; Schotanus-Dijkstra et al., 2019). At the same time, it provides opportunities to help individuals who may benefit from complementary approaches to help increase the benefits they receive from treatment (Demyttenaere, 2019). For those without pressing symptoms, i.e., the general population, capacity could be built within the community (subsidised by local or state government support to reach more vulnerable groups and ensure equitable access) and via alternative pathways such as private industry, where investment in mental wellbeing is already taking place (Deloitte, 2019).

What can be considered is a formal diversification of our existing stepped care model, where service provision for mental wellbeing and the treatment of illness are interrelated but standalone streams, see Figure 7 for a visualisation. This diversification does justice to the interrelation but independence of mental wellbeing and mental illness (Iasiello et al., 2020; Iasiello et al., 2023a). Building on the existing stepped-care notion, rather than positioning a focus on wellbeing at the lower tiers of the model, it is placed as its own parallel stepped-care pyramid, i.e., there are wellbeing services offered irrespective of the services someone needs to help manage clinical symptoms of illness. The clinical system on the right side of the figure, in line with current stepped care models, retains a more reactive approach as its main modus operandi, relying on specialised skills matched to complexity of challenges. At lower tiers of complexity, the focus is on treating emerging symptoms of illness, for example by accessing brief intensity therapies delivered using technology (the hybrid formats) or other alternatives to face-to-face therapy (e.g., smartphone apps), with self-help at the bottom focusing on *prevention* of illness specifically.

Figure 7.

A "reformed" stepped-care model that integrates a dedicated system for mental health promotion (left side) alongside our existing system that focuses on the response to illness (right side).
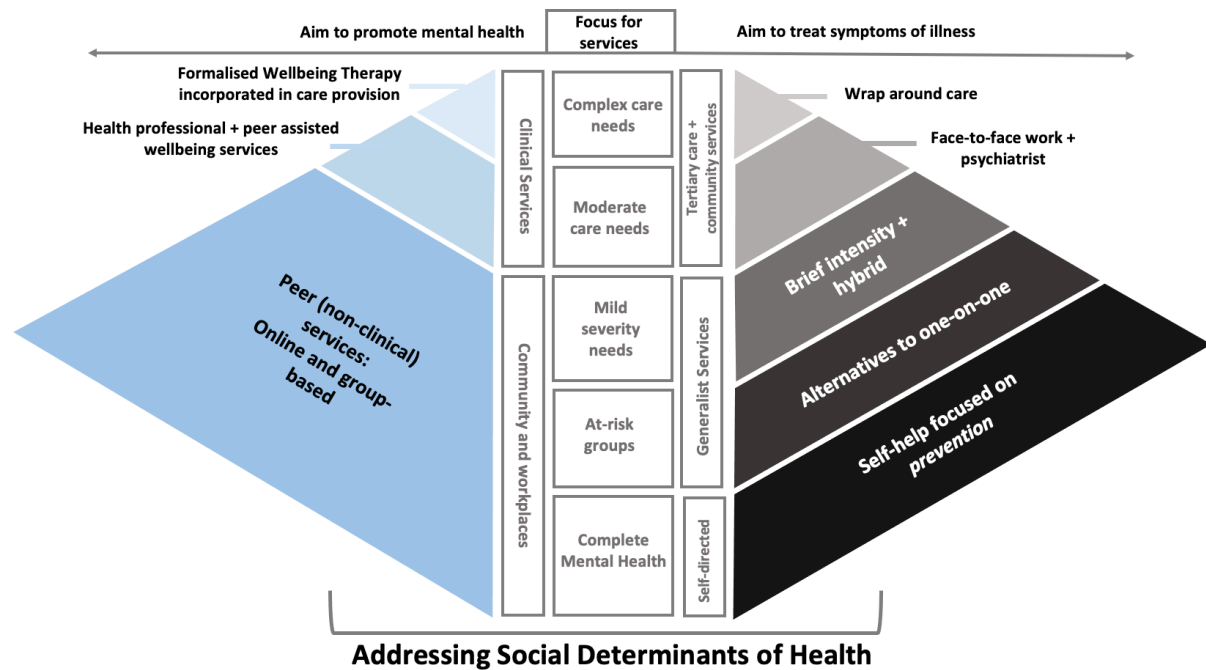
Note: the proposed split in the above figure is congruent with our existing system, while at the same time being flexible to deal with any wider reform, such as a strengthening of focus on social determinants of health or better service provision for the missing middle. The boxes to the left (mental wellbeing services) and right (mental illness services) of the middle denote where services could be provided.

The proposed mental health promotion stream on the left-hand side focuses on implementing wellbeing solutions (Carbone, 2021), including but not limited to the ones tested within the studies that make up this thesis. What it proposes is that wellbeing services ought to be offered to everyone, irrespective of the presence of mental illness, but that their implementation ought to be tailored to clinical status. This is firstly because, as study 6 showed, psychological interventions have a differential evidence-base for people with and without illness, which needs to be considered before their implementation. Secondly, it is because the need for clinical resources and oversight naturally becomes more intense for people who are reaching out to mental health services and are dealing with clinical symptoms, even if the intervention does not target those

symptoms but focuses on wellbeing, see Fava (2016) for an example of the importance of clinical expertise in determining who may or may not benefit from wellbeing services while experiencing clinical symptoms.

In Figure 7 therefore, the top two left tiers refer to wellbeing service delivery that is *coordinated* by existing clinically oriented services. At this top left tier, for individuals with more complex care needs (top left tier of the mental health promotion pyramid), clinical resourcing could be used to implement wellbeing solutions within public services such as community mental health. Existing evidence-based wellbeing-focused interventions and therapies could be delivered by specialists, augmenting our traditional system with formalised strength-based approaches such as wellbeing therapy, positive clinical psychology or positive psychiatry (Fava, 2016; Jeste et al., 2015; Wood & Tarrier, 2010). This means that these wellbeing practices would be integrated within the models of care of public services and would (due to the complexity of the caseload) be delivered largely using in-person or group-based format, as is already the case for most service delivery to people with complex care needs in Australia (Productivity Commission, 2020).

Individuals with moderate care needs (middle left tier of the mental health promotion pyramid) could gain access to wellbeing services in conjunction with traditional mental health services. This could be done together with or complementary to receiving traditional therapy. Clinically trained professionals (e.g., clinical psychologists) could offer the aforementioned formal interventions such as wellbeing therapy (Fava, 2016) that target wellbeing together with illness. Ideally though – and in line with current models of care that rely on diverse allied health staff to deliver low-intensity online therapy (Titov et al., 2018) – a significant proportion of wellbeing services ought to be delivered by mental health nurses, social workers, low intensity cognitive-behavioural therapists or psychologist trainees, so as not to detract from clinical expertise. These services could also be delivered by peers with lived experience, who can play a vital role in helping reduce the capacity issues within the system, while bringing different perspectives on personal mental health recovery (Gagne et al., 2018; State of Victoria, 2021).

Anyone without the need for moderate or complex forms of care for mental illness could rely on wellbeing offerings that are being delivered *outside* the clinical system. The lower left tier would rely on a dedicated workforce of formally trained wellbeing professions that are peer- and community-led. Although technology-enabled offerings can be considered at each of the three tiers, they may have specific utility for the lower tiers. As mentioned before, this is where the large languishing cohort resides, meaning there is a specific need for offerings that can be offered at a large scale. Providing services online and via community organisations ensures this stream remains

accessible across the country, even in rural and remote areas where access to clinical services is limited (Perkins et al., 2019).

The sustainability of this innovation towards the adoption of wellbeing interventions and measurement methods, and ultimately a stronger focus on mental health promotion, is dependent on funding and resourcing. There already is a clear precedent for community organisations, NGOs and industry wanting to invest in and/or promote mental health promotion programs (PricewaterhouseCoopers, 2014). As mentioned earlier, our own work is a testimony to this precedent, with other initiatives such as Mental Health First Aid and the Triple P program being further confirmation that the mental health system does not need to solely rely on government services to have impact (Kitchener & Jorm, 2006; Sanders, 2012). Our own group's workforce projects have been operating on a fee-for-service model, enabling our team to continue with delivery of wellbeing services, as well as to conduct research. For example, our broader group set up a license model for trainers who wished to provide the Be Well Plan as an offering. Similarly, community organisations apply for government and philanthropic grants to fund access to the training or our organisational offerings.

Wellbeing services outside the clinical system, albeit of varying quality, are already offered routinely, with the "mental wellness" industry globally accounting for $131 billion US dollar in 2020 (Global Wellness Institute, 2021). Grassroots approaches to mental health promotion and more alternative ways of delivering wellbeing services is therefore already proving to be of some use, while being able to reach people who need such services. However, in the absence of *any* quality framework and without considering the need for accreditation standards, wastage occurs and the absolute gains we make in term of improving wellbeing are likely to be suboptimal (Pomeranz, 2014). Only when we formalise our efforts can we ensure that mental health promotion will be anchored as an important part across all tiers of the wider mental health system, and treated on appropriate footing when it comes to resourcing, e.g., adding it to the MBS or the system that might replace it in the future. (Hermann, 2001; Tudor, 2996; WHO, 2002).

4.17. Limitations, Gaps and Future Directions for Research

Just as is the case with singular studies, the combined body of work in this thesis is associated with limitations and gaps which require future consideration. The limitations for each individual study are covered in-depth in the respective articles. Below several key limitations, gaps and future directions are covered for the collective studies, generally relating to the domains of measurement and intervention.

The exact proportion of people who are languishing across the Australian society cannot feasibly be extrapolated from the studies presented in this thesis. Firstly, the studies did not rely on adequate representative samples from across the country, leaving exact estimates of the languishing problem for Australia and its diverse multicultural population (Minas et al., 2013) open for the time being. Furthermore, study 3 was conducted in a cohort that is known to struggle more with their mental health, while study 2 was conducted during COVID-19, which inevitably would have affected the precision of any estimates made (Storrie et al., 2010; Zhao et al., 2022). The findings of study 2 and 3 however do align with other global studies providing evidence that the languishing group exists as it can be reliably captured using dedicated assessment methods and is non-trivial in size, particularly in risk-populations such as young people and university students, and during times of community threat as happened during the COVID pandemic (Iasiello & van Agteren, 2020).

As mentioned throughout the contextual statement, there is a paucity of longitudinal data on mental health and wellbeing, with the limited number of ongoing studies largely focusing on indicators of mental illness, despite emphasising a focus on wellbeing. The NSMHW is a prime example of this (ABS, 2020-21). Improvements have been noted when it comes to government wellbeing data collection, but where it does, it tends to rely on single item indicators. While useful, these data collection efforts limit our ability to adequately assess the complex relation of states of illness and health. For example, they do not allow for detection of measurement invariance, i.e., any differential response patterns. Iasiello et al. (2022b) showed that people who are distressed respond differently on individual wellbeing items compared to those who are not (e.g., they may answer items on purpose, autonomy and social acceptance differently, despite having a similar overall score). This detail gives important insights to guide interventions but is limited due to the lack of ongoing studies using comprehensive measures. As a result, our team has commenced a longitudinal study of indicators of illness and wellbeing on a quarterly basis, to continue to provide insights into the mental health and wellbeing of Australians.

There is currently still much unknown on exactly what makes states of wellbeing and states of illness different, both in term of composition and the drivers that influence both states (Kinderman et al., 2015; Patalay & Fitzsimons, 2016; Ryff et al., 2006), although exciting new research, including in areas such as genomics is starting to help us develop a better understanding (de Vries et al., 2022). Our lack of understanding is inherently influenced by our existing measurement approaches, which suffer from drawbacks. There is a lot of definitional ambiguity surrounding mental health and wellbeing, which trickles down into our assessment methods. For example, our team has recently completed a review of measures of positive mental health, finding 155 validated tools that together include a whopping 410 constructs (Iasiello et al., 2023b). Our

mental health is multi-dimensional in nature, but there is a lot of overlap between its constructs, showing clear signs of the jingle-jangle fallacy at play (Marsh et al., 2019): the jingle fallacy refers to two *different* things appearing *the same* because they bear similar names, while the jangle fallacy refers to two *similar* things appearing *different* because they are labelled differently. Although there is a clear need for us to improve our assessment methods, these problems are similar in the clinical field, where questionnaires have readily been adopted for screening and diagnosis. A case can therefore be made, particularly considering four decades of scientific research into wellbeing science, that introduction of existing wellbeing measurement methods in our mental health system should occur, all the while research into measurement continues to mature.

The evidence found for the Be Well Plan is in its infancy. Further evidence on the feasibility of its implementation across the mental health system is needed, with a need to draw on learnings from implementation science (Bauer & Kirchner, 2020). Simply showing effectiveness is not sufficient to demonstrate how to sustainably implement the intervention across the system, and further insights into for instance cost-effectiveness needs to be interrogated (Le et al., 2021). Similarly, the intervention studies here have limitations in that they only look at the short-term effects of the interventions, leaving open the magnitude of long-term impacts. Research, including the review presented in study 5 indicates that effect sizes reduce over time, suggesting that boosters or other ongoing touchpoints are essential in ensuring long-lasting effects (Gearing et al., 2013; van Agteren et al., 2021b). Future studies could interrogate which components are needed to lead to optimal long-lasting results, what the potential resource implications are, and how we could go about implementing these ongoing services. For example, the creation of online platforms for mental health is more scalable than facilitating mental health promotion check-ins via for instance general medical practitioners or, with respect to industry and organisations, via EAP providers.

Within the framework supported in this thesis, an inherent focus is placed on strengths and capacity, rather than deficits. Proponents of strength-based approaches often indicate that this approach has inherent benefits that may be able to tackle some pervasive problems within existing models of care (Rapp & Goscha, 2011). For example, individuals in the general community may be more inclined to work with strength-based promotion interventions rather than reactive clinical interventions, for a variety of reasons including resistance to deficit approaches, cultural associations for minority groups who struggle more with stigma, or negative attitudes towards help-seeking (Rashid, 2015; Schnyder et al., 2017; Slade, 2010). As non-response to treatment is common in traditional psychological therapy (Gloster, Rinner, et al., 2020), utilising approaches that promote mental wellbeing can offer an alternative path to improving response to treatment, i.e., as

promotion of wellbeing is related to personal and functional recovery (Iasiello et al., 2020; Slade, 2010).

Findings on the differential change in outcomes of the Be Well Plan, by lining up with Trompetter et al. (2017), further stimulates the need to investigate the impact of interventions on both indicators of illness and wellbeing together (Widnall et al., 2020). There is no shortage of studies that capture both wellbeing and illness, but they typically fail to report on differential analyses or within-person changes. The calculation of the RCIs we used in study 8 (Jacobson & Truax, 1992; Wise, 2004) is simple to perform and provides important insights for the trajectories of individuals; an outcome which is arguably more important than simply looking at changes at the group level (Molenaar, 2004). Determining which mediators or moderators might drive this differential change is an exciting challenge for future researchers to uncover, allowing us to come closer to improving person-to-intervention fit, i.e., moving to personalised mental healthcare (Berrouiguet et al., 2018).

While the studies in this thesis have utilised non-clinical cohorts, implementation of solutions such as the Be Well Plan in the clinical setting is a further priority, both for our group's research and for the wider system. As the program can be tailored to individual needs, it requires limited tailoring to group needs and can therefore be implemented without much need for change. As such, we are setting up a feasibility study to offer the Be Well Plan as a first line intervention offering for people on a waitlist to receive care, hoping to improve their engagement and service satisfaction, and testing whether it may positively impact service utilisation. We are testing our programs in specific clinical cohorts such as eating disorders, where investigating the role of wellbeing already has precedent (De Vos et al., 2018). Similarly, we are conducting a pilot study with colleagues in the supportive oncology space (Berger et al., 2007; Wardill et al., 2022), testing the benefits of the program for women recovering from breast cancer. It is such studies that provide new avenues to test the role of mental health promotion for people who struggle with the way they feel, both those with and those without clinical symptoms of mental or even physical illness.

4.18. Conclusion

Half a century after de-institutionalisation and the development of the modern mental health system in Australia, the voice for a greater focus on mental health promotion and wellbeing conjointly with addressing illness is growing stronger. This voice is not simply growing in the community or with those with lived experience and is not just traceable to changes in proposed policy. In parallel, it is supported by a growing body of scientific evidence that provides us with an empirical and theoretical justification for a feasible approach to effective mental health promotion.

The studies that make up this thesis further add to this body of evidence and, as such, can be used to underpin decision making and reform, ultimately facilitating better access to evidence-based wellbeing solutions across the wider Australian population. This contextual statement provides the background to why a stronger and reconceptualised focus on early intervention and mental health promotion, with a specific focus on the languishing group using psychological wellbeing solutions, could be a feasible lever to help invoke a positive shift in the burden of mental health. While the word 'reform' is often used to signal drastic whole-sale changes, its definition speaks to improving something in general, i.e., "to improve (someone or something) by removing or correcting faults, problems" (Encyclopædia Britannica, 2023). The research in this thesis aims to contribute evidence that can be used to *improve* the mental health system, by correcting its course - moving towards a salutogenic reorientation and a focus on mental health promotion - and as such towards the much-needed reduction of the burden of poor mental health for Australia and the people that call it home.

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5. Number of publications, citations and impact metrics to date

Publications used to underpin the thesis are presented in bold and preceded by an asterix "*" in the first table. The second table covers any other publications to date that have immediate relevance to mental health. My name is placed in blue within the author line-up for easy recognition. The tables list academic citations per article, percentiles and Field-Weighted Citation Impact scores based on information retrieved from SCOPUS author profiles on 13 March 2023. The percentile benchmarks are based on how citations compare with the averages for similar articles within the (journal's) discipline within an 18-month window. Field-Weighted Citation Impact scores indicates the ratio of citations an article has compared to the citations it is reasonably expected to have compared to other articles in the discipline. This means that scores over 1 indicate that the article outperforms similar articles and those under 1 reflect an underperformance.

The final column provides PlumX metrics, which are alternative metrics for impact, including:

- **Citations**: citations in traditional academic journals *as well as* other publications that may have societal impact such as Clinical or Policy Citations. Any difference between this citation count and the SCOPUS citation count reflects inclusion in such documents.
- **Usage**: a statistic that signals whether people are reading or accessing the research, which includes clicks, downloads and views.
- **Captures**: a statistic that indicates whether someone wants to come back to the work, for example if someone bookmarked the study.
- **Mentions:** indicates activity in media, news articles or for instance reputable blogs.
- **Social media:** indicates any recorded traction on social media such as Tweets and Facebook Likes.

I have provided the total absolute numbers as well as the percentiles, which indicate how well an article performs relative to other articles in that same journal. I list the metrics that were available via PlumX on 13 March 2023.

5.1. Publications included in Thesis.

Publication details	SCOPUS academic Citation Count	Percentile	Field-Weighted Citation Impact	PlumX absolute count per category (percentile)
1. * van Agteren, J., Iasiello, M. Advancing our understanding of mental wellbeing and mental health: The call to embrace complexity over simplification. Australian Psychologist. 2019; 1– 10.	10	77th	1.24	• 10 citations (90th) • 5 usage (70th) • 34 Captures (80th) • 6 Social Media (70th)
2. * van Agteren, J., Bartholomaeus, J., Fassnacht, D. B., Iasiello, M., Ali, K., Lo, L., & Kyrios, M. (2020). Using Internet-Based Psychological Measurement to Capture the Deteriorating Community Mental Health Profile During COVID-19: Observational Study. JMIR Mental Health, 7(6), e20696.	42	96th	4.52	• 46 citations (23rd) • 170 Captures (85th) • 1 Mentions (69th) • 37 Social Media (62nd)
3. * van Agteren, J., Woodyatt, L., Iasiello, M., Rayner, J., Kyrios, M. (2019). Make it measurable: Assessing psychological distress, wellbeing and resilience at scale in higher education. Student Success, 10(3), 1- 13.	8	76th	1.21	n/a
4. * van Agteren, J., Iasiello, M., & Lo, L. (2018). Improving the wellbeing and resilience of health services staff via psychological skills training. BMC Research Notes, 11(1), 924.	13	58th	0.6	• 14 Citations (88th) • 417 Usage (100th) • 105 Captures (100th) • 67 Social Media (100th)
5. * van Agteren, J., Bartholomaeus, J., Steains, E., Lo, L., & Gerace, A. (2021). Using a technology-based meaning and purpose intervention to improve well-being: a randomised controlled study. Journal of Happiness Studies, 22, 3571-3591.	3	74	0.96	• 3 citations (35th) • 30 Captures (76th) • 1 Social Media (65th)

6. * van Agteren, J., Iasiello, M., Lo, L., Bartholomaeus, J., Kopsaftis, Z., Carey, M., & Kyrios, M. (2021). A systematic review and meta-analysis of psychological interventions to improve mental wellbeing. Nature Human Behaviour, 5(5), 631-652.	81	99	19.69	• 83 citations (86th) • 386 Captures (100th) • 17 Mentions (100th) • 277 Social Media (93rd)
7. * Van Agteren, J., Iasiello, M., Ali, K., Fassnacht, D. B., Furber, G., Woodyatt, L., ... & Kyrios, M. (2021). Using the Intervention Mapping Approach to Develop a Mental Health Intervention: A Case Study on Improving the Reporting Standards for Developing Psychological Interventions. Frontiers in Psychology, 3773.	2	44	0.44	• 2 citations (39th) • 33 Captures (88th) • 9 Social Media (82nd)
8. * Van Agteren, J., Ali, K., Fassnacht, D. B., Iasiello, M., Furber, G., Howard, A., ... & Kyrios, M. (2021). Testing the differential impact of an internet-based mental health intervention on outcomes of well-being and psychological distress during COVID-19: uncontrolled intervention study. JMIR mental health, 8(9), e28044.	5	77	1.09	• 102 citations (100th) • 54 Captures (69th) • 17 Social Media (66th)

5.2. Other publications

The table only displays my academic papers which have clear relevance to mental health.

Publication details	SCOPUS academic Citation Count	Percentile	Field-Weighted Citation Impact	PlumX absolute count per category (percentile)
9. Iasiello, M., van Agteren, J., Ali, K., & Fassnacht, D. B. (2023). Positive psychology is better served by a bivariate rather than bipolar conceptualization of mental health and mental illness: a	n/a	n/a	n/a	• n/a

commentary on Zhao & Tay (2022). The Journal of Positive Psychology, 1-5.				
10. Iasiello, M., Muir-Cochrane, E., van Agteren, J., & Fassnacht, D. B. (2022). The Effect of Psychological Distress on Measurement Invariance in Measures of Mental Wellbeing. International journal of environmental research and public health, 19(16), 10072.	0	n/a	n/a	• 44 Citations (38th) • 1 Captures (2nd)
11. Iasiello, M., van Agteren, J., Schotanus-Dijkstra, M., Lo, L., Fassnacht, D. B., & Westerhof, G. J. (2022). Assessing mental wellbeing using the Mental Health Continuum—Short Form: A systematic review and meta-analytic structural equation modelling. Clinical Psychology: Science and Practice, 29(4), 442.	2	86	1.65	• 2 citations (50th) • 19 Captures (50th)
12. Ali, K., Iasiello, M., van Agteren, J., Mavrangelos, T., Kyrios, M., & Fassnacht, D. B. (2022). A cross-sectional investigation of the mental health and wellbeing among individuals who have been negatively impacted by the COVID-19 international border closure in Australia. Globalization and health, 18(1), 1-10.	5	97	5.32	• 5 citations (82nd) • 32 Captures (71st) • 10 Mentions (99th) • 80 Social Media (91st)
13. Fassnacht, D. B., Ali, K., van Agteren, J., Iasiello, M., Mavrangelos, T., Furber, G., & Kyrios, M. (2022). A Group-facilitated, internet-based intervention to promote mental health and well-being in a vulnerable population of university students: randomized controlled trial of the be well plan program. JMIR mental health, 9(5), e37292.	4	91	2.42	• 4 citations (70th) • 52 Captures (90th) • 3 News Mentions (100th) • 41 Social Media (90th) •
14. Post, D., van Agteren, J., Kasai, D., Barrett, A., Doyle, M., Kernot, J., … & Parfitt, G. (2022). Caring for carers: understanding the physical and psychological well-being of carers of veterans in Australia. Health & Social Care in the Community, 30(3), e793-e803.	2	90	2.2	• 2 citations (34th) • 26 Captures (56th) • 1 Social Media (42nd)

15. Bartholomaeus, J. D., Iasiello, M. P., Jarden, A., Burke, K. J., & van Agteren, J. (2021) Evaluating the Psychometric Properties of the PERMA Profiler. Journal of Well-Being Assessment, 1-18.	n/a	n/a	n/a	n/a
16. Lo, L., Iasiello, M., Carey, M., & van Agteren, J. (2020). Improving the wellbeing of female prisoners via psychological skills training: A feasibility study. International Journal of Offender Therapy and Comparative Criminology, 64(15), 1571-1586.	3	54	0.46	• 3 citations (17th) • 51 Captures (83rd) • 10 Social Media (83rd)
17. Iasiello, M., Iasiello, M., & Van Agteren, J. (2020). Mental health and/or mental illness: A scoping review of the evidence and implications of the dual-continua model of mental health. Evidence Base: A journal of evidence reviews in key policy areas, (1), 1-45.	n/a	n/a	n/a	n/a
18. Klein, P., Lawn, S., Tsourtos, G., & van Agteren, J. (2019). Tailoring of a Smartphone Smoking Cessation App (Kick. it) for Serious Mental Illness Populations: Qualitative Study. JMIR human factors, 6(3), e14023.	16	76	1.21	• 16 citations (86th) • 201 usage (100th) • 63 captures (86th) • 11 social media (43rd)
19. Iasiello, M., van Agteren, J., Keyes, C. L., & Cochrane, E. M. (2019). Positive mental health as a predictor of recovery from mental illness. Journal of affective disorders, 251, 227-230.	41	96	4.34	• 41 citations (90th) • 213 usage (85th) • 141 captures (88th) • 7 mentions (100th) • 11 social media (73rd)
20. Pollok, J., van Agteren, J., Esterman, A. J., & Carson-Chahhoud, K. V. (2019). Psychological therapies for the treatment of depression in chronic obstructive pulmonary disease. Cochrane Database of Systematic Reviews, (3).	32	45	0.33	• 34 citations • 39 captures *Percentiles n/a*
21. Bartholomaeus, J. D., Van Agteren, J., Iasiello, M. P., Jarden, A., & Kelly, D. (2019). Positive aging: The impact of a community	26	92	2.73	• 26 citations (70th) • 510 usage (90th)

wellbeing and resilience program. Clinical gerontologist, 42(4), 377-386.				• 238 captures (90th) • 7 social media (70th)
22. Pollok, J., Van Agteren, J., Chong, A., Carson-Chahhoud, K., & Smith, B. (2018). Evaluation of existing experimental evidence for treatment of depression in indigenous populations: A systematic review. Australian journal of psychology, 70(4), 305-317.	3	26	0.05	• 3 citations (33rd) • 298 usage (44th) • 64 captures (100th) • 2 social media (78th)
23. Pollok, J., Van Agteren, J., & Carson-Chahhoud, K. V. (2018). Pharmacological interventions for the treatment of depression in chronic obstructive pulmonary disease. Cochrane Database of Systematic Reviews, (12).	20	28	n/a	• 21 citations • 33 captures *Percentiles n/a*
24. Iasiello, M., Bartholomaeus, J., Jarden, A., & van Agteren, J. (2018). Maximising the opportunity for healthy ageing: Online mental health measurement and targeted interventions. In Telehealth for our Ageing Society (pp. 111-123). IOS Press.	4	61	0.69	• 4 citations • 21 Captures *Percentiles n/a*
25. Lawn, S., Van Agteren, J., Zabeen, S., Bertossa, S., Barton, C., & Stewart, J. (2018). Adapting, pilot testing and evaluating the Kick.it app to support smoking cessation for smokers with severe mental illness: a study protocol. International journal of environmental research and public health, 15(2), 254.	7	59	0.63	• 90 citations (92nd) • 44 usage (46th) • 136 captures (92nd) • 3 social media 69th)
26. Holmes, N. A., van Agteren, J., & Dorstyn, D. S. (2019). A systematic review of technology-assisted interventions for co-morbid depression and substance use. *Journal of Telemedicine and Telecare*, *25*(3), 131-141	12	66	0.82	• 17 citations • 69 usage • 203 Captures • 1 News Mentions • 1 Social Media *Percentiles n/a*

6. Career review Joep van Agteren

6.1. Overview relevant employment history

Co-Lead   Aug '22 – Current
Be Well Co
Director and co-lead of spin-out company that focuses on translating mental health research conducted at the South Australian Health and Medical Research Institute (SAHMRI) into mental health and wellbeing services. This includes some of the solutions used in the studies for this thesis, being the Be Well Tracker and the Be Well Plan.

Co-Lead   Nov '19 – Current
Mental Health and Wellbeing program, South Australian Health & Medical Research Institute
Leading a team of ambitious academics and professionals that deliver translational research projects on mental health and wellbeing across the community. Responsible for operations and raising funds to meet the team's budget together with my co-lead. In charge of the research strategy and overseeing all research and evaluation activities.

Research and Development Lead   May '18 – Nov' 19
Wellbeing & Resilience Centre[17], South Australian Health & Medical Research Institute
Leading the research team and establishing and implementing the research strategy of the Wellbeing and Resilience Centre (now called the Mental Health and Wellbeing program).

Researcher & project lead   Aug '17 – May '18
Wellbeing & Resilience Centre, South Australian Health & Medical Research Institute
In charge of developing and testing wellbeing interventions for the centre, including formative qualitative and quantitative research.

Research lead   Apr '17-Oct '17
Kick.it Pty Ltd
I led the research to underpin the development of a smoking cessation smartphone application called Kick.it. The company that was set up with the aim to further develop the application was put on ice after a failure to attract ongoing funding.

Medical Researcher   Apr '15-Apr '17
The Queen Elizabeth Hospital, Adelaide, Australia
I was tasked with conducting a variety of systematic reviews into respiratory medicine and associated mental health impacts of illness, while supporting the development of behavioural interventions for the unit, looking at utilising technology to improve accessibility of health information.

Professional experience prior to moving to Australia in December 2014 was largely conducted at Maastricht University (the Netherlands), with my roles being largely project- and administration-based, allowing me to support myself financially during and immediately after my BSc. and MSc. In Psychology. Roles included being a project manager, personnel manager and being a student assistant.

6.2. Other relevant professional expertise

Academic/support roles within SAHMRI

2021 - current   SAHMRI mentor for early career researchers
2019 - current   SAHMRI Lifelong health theme[18] executive committee member
2019 - 2021   SAHMRI research advisory committee member

Professional memberships

2021 - current   Society for Mental Health Research (SMHR) member
2015 - current   Cochrane Member

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[17] The Wellbeing and Resilience Centre is the precursor to the Mental Health and Wellbeing program.

[18] The Mental Health and Wellbeing program falls under the LifeLong Health Theme, one of four themes within SAHMRI.

2018 - 2022   Australian Psychological Society (APS) Associate Member

External representation

2021 - current   External member to the Flinders University wellbeing committee
2020 - current   Expert reference group member for the Western Australian Mental Health Commission
2018 - current   headspace Adelaide Consortium member representative for SAHMRI
2019 - current   Flinders University Institute for Mental Health and Wellbeing (affiliate member)19

6.3. Acquired funding related to research oriented projects.

2022   van Agteren J, Iasiello M. What works for mental wellbeing: creating a review resource for Beyond Blue. **$58,400.**
2022   Iasiello M, van Agteren J. Using a mental health promotion campaign to raise the mental health literacy of Tasmanians. **$157,500**
2021   Bougesis A, Miller R, van Agteren J, Fassnacht D, Ali K, Iasiello M. Validation of Disaster Relief Australia's program to Support Veterans and First Responders Grow Byond their Service. **$294,983**
2021   Nixon R, Wild J, Fassnacht D, van Agteren J. Protecting Emergency Responders with Evidence-Based Interventions (PEREI). **$530,000**
2020   Fassnacht D, Ali, K, van Agteren J, Iasiello M, Furber G, Chew D, Kyrios M. Effectiveness of a wellbeing intervention for frontline health care workers during the COVID-19 pandemic: a randomised controlled study**. $22,390**
2020   Fassnacht D, Ali K, Ward P, Kyrios M, van Agteren J, Iasiello M, Holmes-Liew C. Understanding and improving the mental health and wellbeing of doctors and medical students during the COVID-19 pandemic $***30,000***
2019   van Agteren J, Kelly G. IndividuWell. Using *persuasive technology* to facilitate evidence-based positive mental health intervention delivery. ***$297,000***
2018   Post DK, Parfitt G, van Agteren J, Kernot J & Amy B. Understanding the relationship between health behaviours and physical and psychological wellbeing in carers of service men and women. ***$49,166***
2017   Lawn S, Barton C, Bertossa S, Stewart J, van Agteren JEM. Smoking cessation support for young smokers with mental illness: Kick-it; ***$19,840***
2015   van Agteren JEM. The Hospital Research Foundation 50th anniversary awards for '*Kick.it: the development of a social network-based smoking cessation platform for mobile devices.': $25,000*

6.4. National & international conference presentations (academic only)

** denotes presentations given by myself.
1.   ** van Agteren J, Iasiello M. A systematic review and meta-analysis of psychological interventions to improve mental wellbeing: implications for wellbeing research and practice. Invited talk at IPPA Idea Starter Symposium 2021, Oct 29
2.   ** van Agteren J, Iasiello M. Mental Health and Mental Illness: two dots that much be connected. Keynote at AMHOIC 2019, Auckland (NZ), Oct 30
3.   ** van Agteren J, Iasiello M, Bartholomaeus J, Burke K, Jarden A, Lo L, Kelly G. The impact of individual wellbeing levels on positive psychology intervention success. IPPA WCPP 2019, Melbourne, July 18-21
4.   ** Kemp L, van Agteren J, Bartholomaeus J, Davies A, Kelly D. BUILDING MEANING AND PURPOSE USING A MOBILE PHONE APP: IMPACT AND IMPLICATIONS. IPPA WCPP 2019, Melbourne, July 18-21
5.   Kopsaftis Z, van Agteren J, Tan M, Smith B. A theory-based intervention for improved uptake and adherence to chronic obstructive pulmonary disease guidelines in the hospital setting: An intervention mapping approach. TSANZ ASM 2019. Adelaide
6.   Royals K, Kopsaftis Z, van Agteren J, Lawton K, Usmani Z, Smith B. THE FEASIBILITY OF 24-HOUR EXACERBATION SUPPORT: COPD AT HOME. TSANZ ASM 2019. Adelaide
7.   **Van Agteren J, Stafford K, Bartholomaeus J, Iasiello M, Jarden A & Burke K. The effectiveness of wellbeing and resilience training in four distinct populations. Australian Psychological Society Conference 2018, Sydney, 27-30 September 2018.
8.   Iasiello M, Muir-Cochrane E, van Agteren J, Jarden A. Evidence of the Complete State Model of Mental Health and Implications on public policy and practice. 3rd International Conference on Wellbeing & Public Policy. 5 to 7 September 2018

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[19] The institute was formerly named the Orama Institute, switching the FIMHW in 2022. I merged both for simplicity sake.

9. Lawn S, Klein P, Tsourtos G, van Agteren J. Adapting a smartphone App to support smoking cessation for smokers with severe mental illness: Kick.it. SRNT-E 2018, Munich 6-8 September
10. Kopsaftis K, van Agteren JEM, Carson K, O'Loughlin T, Smith B. Smoking cessation in the hospital setting: a systematic review and meta-analysis. ERS International Congress 2017, Milan 9-13 Sep
11. King CM, Carson KV, van Agteren JEM, Kopsaftis ZA, Smith BJ. A qualitative study using innovative technology via a smartphone application to provide demonstrative inhaler technique education for asthma patients. Mar 2017
12. Jayasinghe H, Carson KV, Van Agteren JEM, Ameer F, Hnin K, Smith BJ. Mass media interventions for preventing smoking in young people: a Cochrane systematic analysis.
13. **Van Agteren JEM, Carson K, Jayasinghe H, Smith BJ. The barriers and facilitators to effective use of a smartphone application for smoking cessation by health professionals and smokers. TSANZRS AGM 2016, Perth, 3rd of April 2016
14. **Van Agteren JEM, Carson KV, Smith BJ. Lung Volume Reduction Surgery for diffuse emphysema. TSANZRS AGM 2016, Perth, 4 Apr
15. **Van Agteren JEM, Carson KV, Smith BJ. Bronchoscopic Lung Volume Reduction procedures for chronic obstructive pulmonary disease. TSANZRS AGM 2016, Perth, 5 Apr
16. **Van Agteren JEM, Carson KV, Kopsaftis Z, Jayasinghe H, Pollok J, Smith BJ. Kick.it: the development of a social network-based smoking cessation platform for mobile devices. Virtually healthy, Adelaide, Australia, 30 Oct 2015

6.5. Other conferences, summits, workshops & courses

2020 SAHMRI Leadership program
2019 China-Australia Symposium on Positive Psychology
2019 AMHOIC workshop on implementation of mental wellbeing in models of care
2019 SAHMRI Early Career researcher presentations
2019 World Happiness Dialogue at the World Government Summit (Dubai, UAE)
2017 SAHMRI Wellbeing and Resilience 2-day training
2016 Australian Positive Psychology and Wellbeing Conference (Adelaide)
2015 Aboriginal Cultural Sensitivity & Safety workshop (Adelaide)
2015 Aboriginal Cultural Respect Workshop (Adelaide)
2015 Introduction to writing a Cochrane review (3-day workshop) (Adelaide)

6.6. Media & other dissemination

I get regular requests for interviews on mental health and wellbeing, with contributions provided to ABC national, ABC Adelaide, Sydney Morning Herald, Advertiser, Channel 7, Channel 10, 5AA, Mix 102.3, Sunday Mail.

6.7. Peer review for scientific journals

I have reviewed for BMC Psychiatry, BMJ Psychology, International Journal of Environmental Research and Public Health, Journal of Adolescent Health, Nicotine and Tobacco Research.

7. Statement on author contributions per included article

Study 1. Advancing our understanding of mental wellbeing and mental health: The call to embrace complexity over simplification.

- **Statement on originality of work:** This is to certify that this peer-reviewed publication and the included text, figures and diagrams, are outcomes of the independent and original work by myself, the PhD student, and my co-author.

- **Individual author contribution:** This article was a collaborative piece between me and Matthew Iasiello. The principal idea behind the paper and its conceptualisation was driven by me. I did the bulk of the literature review, while Matthew aided in supplementing the sources underpinning the article. The skeleton of the article was written by me. After that, Matthew and I sent the paper back and forth to land on the final version.

Study 2. Using Internet-Based Psychological Measurement to Capture the Deteriorating Community Mental Health Profile During COVID-19: Observational Study

- **Statement on originality of work:** This is to certify that this peer-reviewed publication and the included text, figures and diagrams, are outcomes of the independent and original work by myself, the PhD student, and the co-authors.

- **Individual author contribution:** I was largely responsible for the conceptualisation of the paper. The methodology and approach to our ongoing observational data collection (of which this paper is a result) is a collaborative process between the co-authors on this paper. It is my responsibility to oversee most of the projects that contributed data to the studies and am directly involved in their data collection. The write-up was a collaborative process. I led the analyses, aided by Jonathan Bartholomaeus and Dan Fassnacht. All of us worked together to write up the article including any revisions.

Study 3. Make It Measurable: Assessing Psychological Distress, Wellbeing and Resilience at Scale in Higher Education

- **Statement on originality of work:** This is to certify that this peer-reviewed publication and the included text, figures and diagrams, are outcomes of the independent and original work by myself, the PhD student, and the co-authors.

- **Individual author contribution:** I was largely responsible for the conceptualisation of the paper, including the methodology and data collection. This was part of a larger student wellbeing project. Each author contributed to the data collection process. Data analysis was conducted by me and checked by Matthew Iasiello. While most of the write-up was driven by me, each of the authors contributed their fair share.

Study 4. Using a Technology-Based Meaning and Purpose Intervention to Improve Well-being: A Randomised Controlled Study

- **Statement on originality of work:** This is to certify that this peer-reviewed publication and the included text, figures and diagrams, are outcomes of the independent and original work by myself, the PhD student, and the co-authors.

- **Individual author contribution:** I was responsible for the conceptualisation of the paper and determining its methodology together with Jonathan Bartholomaeus (Jon). Data collection was a collaborative effort with our community partner: the City of Adelaide. Jon and I coordinated the process of data collection and external stakeholder management. Jon and I set up the intervention in the technology platform and got the study ready for data collection. After data was collected, Laura and Emma drove coding of the qualitative thematic analysis. Jon and I were responsible for data analysis, aided by Adam. All authors together contributed to the write up of the paper, although I oversaw writing the final paper, together with Jon.

Study 5. Improving the wellbeing and resilience of health services staff via psychological skills training

- **Statement on originality of work:** This is to certify that this peer-reviewed publication and the included text, figures and diagrams, are outcomes of the independent and original work by myself, the PhD student, and the co-authors.

- **Individual author contribution:** Study concept and design was done by me. The bulk of data collection was coordinated by Laura. Analysis and interpretation of the data was performed by me and Matt. Write-up of the manuscript was driven by myself, aided by Matt and Laura.

Study 6. A systematic review and meta-analysis of psychological interventions to improve mental wellbeing.

- **Statement on originality of work:** This is to certify that this peer-reviewed publication and the included text, figures and diagrams, are outcomes of the independent and original work by myself, the PhD student, and the co-authors.

- **Individual author contribution:** Conceptualisation of the paper and the methodology of the study was largely driven by me, aided by Matthew Iasiello and Mike Kyrios. Screening of the data was done by me, Laura Lo and Matthew. Data extraction and assigning Risk of Bias was a joint effort between myself, Matthew, Laura, Jonathan Bartholomaeus, Zoe Kopsaftis and Marissa Carey. Data analysis (meta-analysis) was largely conducted by me. All authors contributed to the write-up of the paper, although I had final responsibility over the final result.

Study 7. Using the Intervention Mapping Approach to Develop a Mental Health Intervention: A Case Study on Improving the Reporting Standards for Developing Psychological Interventions

- **Statement on originality of work:** This is to certify that this peer-reviewed publication and the included text, figures and diagrams, are outcomes of the independent and original work by myself, the PhD student, and the co-authors.

- **Individual author contribution:** I was largely responsible for the conceptualisation and determining the methodology of the paper, aided by Matthew Iasiello as well as Kathina Ali. The needs analysis was driven by me and Matthew. Further steps in program design (creating program objectives and crafting the theoretical framework for programme was a collaborative effort with Matt, Dan Fassnacht and Kathina. Creation of the program was a collaborative effort with all authors. Write-up of the article was driven by me together with the other co-authors.

Study 8. Testing the Differential Impact of an Internet-Based Mental Health Intervention on Outcomes of Well-being and Psychological Distress During COVID-19: Uncontrolled Intervention Study

- **Statement on originality of work:** This is to certify that this peer-reviewed publication and the included text, figures and diagrams, are outcomes of the independent and original work by myself, the PhD student, and the co-authors.

- **Individual author contribution:** I was largely responsible for the conceptualisation and determining the methodology of the paper. While I was overall responsible, data collection was a collaborative effort by the entire team. The data analysis was done by me and Dan Fassnacht. The write-up and editing of the paper was largely driven by myself, helped by other team members.

8. Original Articles

8.1. Study 1. Advancing our understanding of mental wellbeing and mental health: The call to embrace complexity over simplification

Title:
Advancing our understanding of mental wellbeing and mental health: The call to embrace complexity over simplification

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ABSTRACT

Objective: Simplified models and schematics can be used to communicate and disseminate scientific evidence and theory, which in turn can improve health literacy; an outcome that plays a fundamental role in improving health outcomes of individuals and populations. This article highlights the risk of oversimplification of scientific research on wellbeing and mental health and explains how it may be impeding health professionals, policy makers, and researchers from advancing and translating our understanding of wellbeing and mental health.

Methods: This article reviews several popular wellbeing and mental health schematics and models, reviews their application in relation to the wider scientific literature, and shares insight into the implications of their use for key stakeholders.

Results: The current article highlights what the past 40 years of scientific research on wellbeing and its relationship to mental health has taught us: it is complex. Both constructs share common and unique predictors, which share complex interrelationships among themselves and in relation to wellbeing and mental health in general. Simplified models and schematics do not do this complexity justice and should therefore be used with caution.

Conclusion: Embracing the complex relationship between mental health and wellbeing can lead to a number of positive changes to the mental health system. It can first lead to much needed advances in mental health assessment. It can improve the design and implementation of interventions that aim to build wellbeing, improve symptoms of mental illness, or both. It can inspire new scientific research and finally can facilitate better health policy.

Keywords
intervention design, mental health, mental health assessment, policy, wellbeing

INTRODUCTION

Wellbeing science and its application to mental health care have advanced immensely over the past decades. The notion that the absence of mental illness symptoms is insufficient to achieve good mental health and wellbeing is readily accepted (yet not always acted upon) in scientific, professional, and lay settings. Decades of work by academics, health professionals, and educators around the world have led to important insights underpinning scientific models and theoretical approaches aimed at explaining mental wellbeing (hereafter wellbeing) and its relationship to mental health (Diener & Oishi, 2018); models and approaches that are often intended to convey complex relationships within simplified forms of communication such as acronyms and schematics, for instance to counteract comprehension problems (McCrudden & Rapp, 2017; Rapp, 2005). Although the use of easy-to- understand forms of communication can help increase much needed wellbeing literacy (Oades, 2017), it comes at the risk of oversimplifying the academic literature and the scientific content that the general public consumes.

This oversimplification can be as detrimental to furthering public understanding, scientific research, health care policy, and to practice as it can be beneficial. Using complex scientific evidence may lead to unnecessary or sometimes harmful outcomes if it is not applied appropriately. For instance, public health campaigns often use simple slogans to try and get messaging across. The slogan "breast is best" is used to describe that breastfeeding is the preferred method of feeding babies. Although breastfeeding has a lot of advantages for most infants (e.g., risk of certain infections and sudden infant death syndrome), scientific evidence also points to associations of breastfeeding with potential short- and long-term negative consequences for some infants; for example, exclusively breastfeeding preterm babies leads to increased risk of hospitalisation (Wilson & Wilson, 2018). While on average, it therefore has an overwhelming beneficial effect on infant health and development outcomes (and thus points to the utility of simplified messaging), it may not for individual infants, highlighting the need for individualisation of care dependent on individual situations when striving for optimal health outcomes.

The current article aims to bring awareness to the negative consequences of over-simplification in mental health and wellbeing research, its conduct in isolation of one another, and its subsequent translation into practice and policy. This is done by investigating a number of popular wellbeing and mental health schematics and models, starting with the mental health spectrum.

THE EXAMPLE OF THE MENTAL HEALTH SPECTRUM

In an in-depth review of positive mental health at the individual and population-level, Felicia Huppert reviewed and summarised the state of the scientific literature on wellbeing and positive mental health in 2005, with positive mental health being defined as positive feelings (or subjective wellbeing) and optimal functioning (or psychological wellbeing) (Huppert, 2005). In this review article, a popular schematic aimed at depicting the mental health spectrum was introduced. The schematic (Figure 1) illustrated the distribution of population positive mental health as a normal curve, drawn along one axis or continuum, that spans from mental illness to high levels of positive mental health or flourishing, with low levels (languishing) and moderate levels of wellbeing in between.

FIGURE 1: The mental health spectrum as visualised by Huppert (2005) indicating the bipolar relationship between mental disorder and high states of wellbeing

'Shifting the curve' of population positive mental health

Mental Disorder   Languishing   Moderate Mental Health   Flourishing
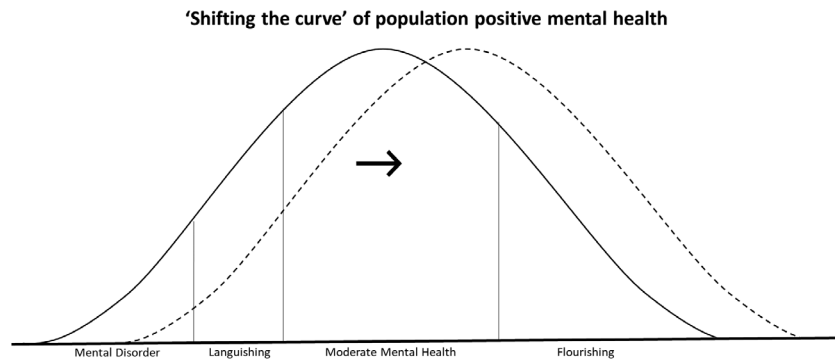
The schematic is a good example to illustrate potential problems that can arise from condensing complex scientific research into easy-to-understand schematics. It describes a phenomenon that makes common sense to most of us, making it an easy message to communicate and be perceived as truth without in-depth validation of its scientific foundations and origins (Kelley, 1992). It is furthermore popular in positive psychology and wellbeing circles and is frequently used in lay, professional, and scientific settings (a Google search finds the image to be linked to positive psychology courses by peak psychology bodies, scientific presentations by federal health directorates, and peer-reviewed wellbeing literature).

The original schematic on the mental health spectrum (Huppert, 2005) was used to reflect population-level mental health, ranging from mental illness to flourishing. The schematic drew upon Geoffrey Rose's research (Rose, Khaw, & Marmot, 2008) which suggests that the more effective approach to decreasing the prevalence of a disease is to reduce the underlying risk factors throughout the population. Huppert concluded that incremental improvement in positive mental health across the entire population curve would create the greatest likelihood for creating vital reductions in mental illness and also improve positive mental health of the population. This was visualised by overlaying the schematic with a dashed normal curve placed towards the "flourishing side" of the figure.

Although the schematic was developed to describe population-level positive mental health, it is often described in and applied to individual-level positive mental health and assessment of its symptoms or diagnostic criteria, even by the original author. For instance, in an illustrative example, Huppert and So, (2013) positioned wellbeing as the polar opposite of common mental disorder within individuals and defined 10 positive opposites to symptoms associated with 10 diagnostic criteria used to diagnose depression and anxiety. A similar figure as presented in Figure 1, with the nuance of common mental disorder as opposed to mental disorder (an important nuance which will be addressed shortly), is often cited alongside it, making it easy to attribute the original model to individual-level wellbeing, especially when original descriptors are missing or were cropped.

Using schematics that apply to individual-level versus population-level mental health interchangeably warrants caution as individual and population level health share both commonalities and differences (Arah, 2009). Misapplying the model in either context can lead to incorrect assumptions and conclusions, and as a result can hinder their education goals. For instance, a single factor (mental health) continuum where mental illness and flourishing (high

levels of positive mental health) are opposite ends of the same spectrum implies that as an individual improves their positive mental health, they simultaneously recover from their disorder to languishing, and gradually continue on the path to flourishing. This reasoning first cannot be applied on a population-level, as individual disease progression is not appropriate at this level, but it also oversimplifies the complicated relationship between mental illness and positive mental health outcomes and symptoms within individuals.

SINGLE-FACTOR VERSUS DUAL-FACTOR MODELS

There is a significant body of research indicating that positive mental health should not be seen as the opposite of mental illness as displayed in bipolar models such as the one posited by Huppert (Keyes, 2005; Suldo & Shaffer, 2008; Wilkinson & Walford, 1998). The large majority of research that focuses on this topic examines or utilises so-called dual-factor models of mental health which consider positive mental health and mental illness as independent but related constructs: see Figure 2 for a visualisation. There is a significant research body demonstrating that people who exhibit psychological distress or show symptoms of mental illness ranging from suicide ideation (Teismann et al., 2017) to affective disorders (Seow et al., 2016) have varying levels of positive mental health; results which have been demonstrated in diverse populations in Western and non-Western societies (Bariola, Lyons, & Lucke, 2017; Peter, Roberts, & Dengate, 2011; Xiong, Qin, Gao, & Hai, 2017). Similarly, evidence can be found that attests to the fact that languishing or having low wellbeing does not equate to having psychopathology (Jayawickreme & Blackie, 2018). This distinction has been described and studied for the past 50 years (Fontana, Marcus, Dowds, & Hughes, 1980; Jahoda, 1958; Smith, 1959; Wilkinson & Walford, 1998), but has only started to gain modest and more recent

FIGURE 2 Visualisation of the interrelation between mental disorder and positive mental health as described by dual-factor models such as the one posited by Keyes (2005) where mental disorder and positive mental health are interrelated but separate constructs
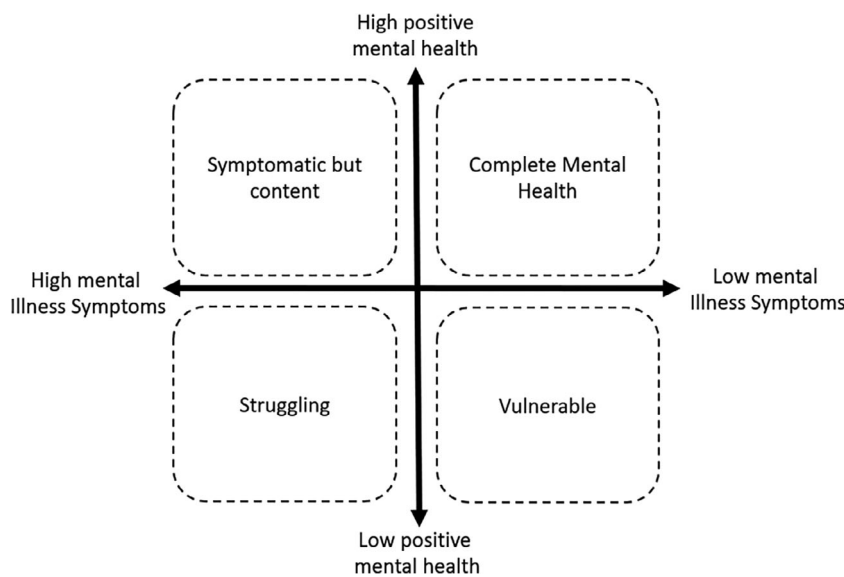
traction in the literature through Keyes' Complete State Model of mental health (Keyes, 2003; Keyes, 2005) and other theorists studying dual-factor models, including Suldo and Shaffer (2008), and Greenspoon and Saklofske (2001).

If high levels of positive mental health can consistently be measured and assessed for people with varying psycho-pathology, and vice versa, the schematic on the Huppert mental health spectrum (Figure 1) would simply be wrong. It is however not that straight-forward. Since 2005, the original mental health spectrum schematic has been nuanced from mental disorder to common mental disorder (Huppert, 2014), with Huppert and colleagues focusing the single-factor model on depression and anxiety. They have argued that dual-factor approaches are unnecessary as they "are less convincing in relation to the common mental disorders, such as major depression and anxiety" and state that it would be "difficult to conceive how someone with a current diagnosis of major depressive disorder could be regarded as flourishing at the same time".

The literature surrounding dual-factor applications in patients with affective or anxiety disorders is indeed less convincing than the literature on other mental disorders, particularly for people with severe mental illness (Bartels, Cacioppo, van Beijsterveldt, & Boomsma, 2013; Smith, 1996; van Erp Taalman Kip & Hutschemaekers, 2018). For instance, Van Erp Taalman Kip and Hutschemaekers (2018) tested positive mental health in a sample of patients diagnosed with clinical mental illness, finding a high negative correlation between mental illness and positive mental health (r = −.71) and a more favourable fit for a one-factor model over a dual-factor model. One of the explanations Van Erp Taalman Kip and Hutschemaekers provide is the fact that "people can only differentiate positive health or wellbeing from negative health if psychopathology does not dominate their entire internal life." This quote highlights the fundamental problem for both single and dual-factor models: proving the existence of either model is dependent on the way we measure and classify the relationship between mental illness and positive mental health.

We often use the DSM-V or ICD-10 criteria to diagnose or categorise mental illness (Stein et al., 2010; World Health, 1992). In these systems and other frequently used assessment methods, symptoms and disease manifestations are grouped together to indicate the presence of a mental illness. A number of symptoms or characteristics associated with the diagnosis of mental illness are the conceptual polar opposite of characteristics associated with positive mental health and wellbeing and this is reflected in common measurement tools. Consider depression and subjective wellbeing (Diener, Lucas, & Oishi, 2002) as an example. Having a strong perception that life is meaningless is associated with depression and finding life very meaningful is associated with subjective wellbeing (Park, Park, & Peterson, 2010; Steger & Kashdan, 2013). When looking at questionnaires that investigate depression and questionnaires that investigate subjective wellbeing, a big overlap can be noted. Wood, Taylor and Joseph (2010) investigated this specifically by comparing measures of depression and subjective wellbeing. They noted that depression and happiness scales share

many common items, have a high overlap in response patterns to both questionnaires and load onto similar factors in factor analysis.

Subjective wellbeing, which focuses on the hedonic aspects of mental wellbeing and is often used synonymously as happiness, is, however, only one aspect of positive mental health. Similarly, major depression is only one type of mental illness. All other types of wellbeing, including for instance psychological or eudaimonic (Ryff, 1989) and social wellbeing (Keyes, 1998), and all other diagnoses of mental illness including anxiety may be influenced by different factors (Headey, Kelley, & Wearing, 1993). Using measurement tools that capture common factors will inherently lead to single continua being produced. Similarly, using measures that capture factors that solely influence negative mental health or positive mental health will lead to confirmation of dual factor models. Depending on the measurement method and focus, either single or dual-factor models can be true. Neither of the models, however, capture the complex interrelations between positive and negative factors on one another and on overall mental health status (Wood & Tarrier, 2010). More importantly, neither type of model captures how to address these factors to improve mental health status.

MENTAL HEALTH STATUS IS INFLUENCED BY A MULTITUDE OF DRIVERS AND INHIBITORS

One of the leading positive psychology theories is the PERMA-model of wellbeing, posited by Martin Seligman (Seligman, 2012). Seligman stated that an individual's wellbeing is influenced by five key domains: Positive Emotions, Engagement, Relationships, Meaning and Accomplishment (or PERMA). Working on these five domains would increase someone's overall experience of wellbeing, causing them to "flourish." Higher PERMA scores are indeed related to subjective wellbeing, as scores have been shown to correlate up to .98 with another measure of subjective wellbeing (Goodman, Disabato, Kashdan, & Kauffman, 2017). An advantage that the PERMA model of wellbeing offers over the general concept of subjective wellbeing is that it provides more insight into specific building blocks of wellbeing. However, just as was the case with the schematic on the mental health spectrum, the PERMA model oversimplifies reality and does not comprehensively capture the drivers of subjective experiences of wellbeing.

Although Seligman has recently stated that the five PERMA domains do not necessarily capture all important drivers of wellbeing (Seligman, 2018), they have previously been posited as a parsimonious list of drivers. This is not uncommon for academics to do, but it leads to the exclusion of the work of prominent scholars from both "traditional" and positive psychology. For instance, Carol Ryff focused on six key domains to determine her model of psychological wellbeing, which has some (e.g., meaning) but not all domains (e.g., autonomy) mentioned in the PERMA model (Ryff, 1989). Corey Keyes' earlier work focused on social wellbeing, as he recognised the importance of the social environment in determining mental health and wellbeing (Keyes, 1998), most of which are not readily

targeted within the PERMA model. It furthermore ignores the role of well-accepted constructs, theories, and therapies such as CBT and mindfulness and their role in improving wellbeing.

None of the popular models of wellbeing and mental health provides a comprehensive overview of the exact building blocks of wellbeing, mental health, and their relationship to both constructs and one another. They simply do not capture the complex reality that determines our mental health status. There is surprisingly little research, relative to the total body of research on mental health and wellbeing, that explicitly targets the overlap of both constructs (Iasiello, van Agteren, & Muir Cochrane, forthcoming). The research that was done suggests that positive mental health and mental illness share both common and unique predictors (Kinderman et al., 2015) and have complex relationships with other psychological outcomes such as resilience(Harms, Brady, Wood, & Silard, 2018) and optimism (Conversano et al., 2010), other health outcomes such as Quality of Life (Connell, Brazier, O'Cathain, Lloyd-Jones, & Paisley, 2012) and a range of other individual and environmental outcomes such as school performance (Lyons, Huebner, & Hills, 2013) and social support (Magalhaes & Calheiros, 2017).

The currently available research hardly paints a complete picture, but it suggests that at any given time, someone's mental health status is influenced by "positively" and "negatively" valanced factors, universal factors such as demographic characteristics, and factors that are individual and environmental (e.g., the social systems we live in); factors which (depending on their "value") can acts as a barrier, a facilitator, or be neutral to their mental health. These factors and characteristics first can uniquely predict response patterns on wellbeing or

FIGURE 3 Model describing the relationship between scores on positive mental health (PMH) outcome measures and outcome measures of mental illness (MI) being influenced by unique and shared factors, both acting to determine the "latent" mental health factor
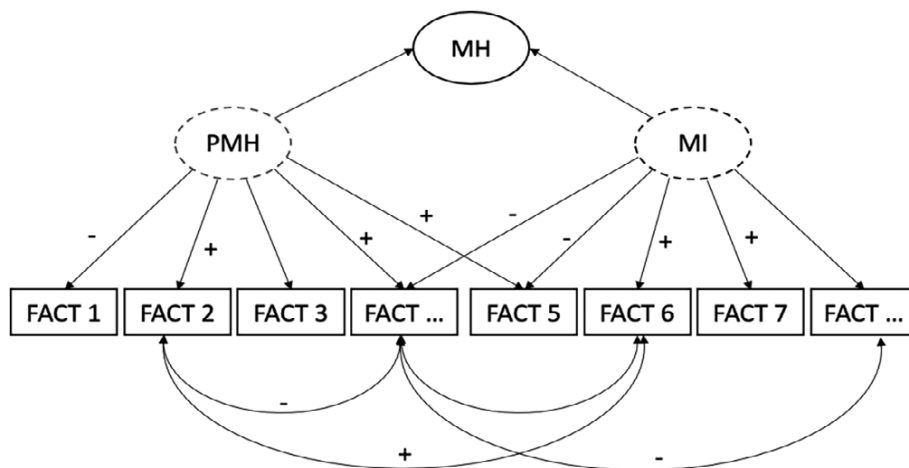
EMBRACE THE COMPLEX RELATIONSHIP BETWEEN WELLBEING AND MENTAL HEALTH IN SCIENTIFIC RESEARCH

Advancing our efforts in determining the interrelationships between all these outcomes and determinants is critical to advancing the way we deliver evidence-based services for mental health issues and wellbeing building: scientific research plays a vital role to underpin this understanding. The more we focus on drivers and barriers to good mental health in general, investigate the differential or common impact of universal factors such as personality (Lyons, Huebner, Hills, & Shinkareva, 2012) and demographics (Bariola et al., 2017), incorporate both the physical and the psychological, and look beyond individual characteristics to include the environment, in measurement and in interventions, that we can truly advance our understanding of mental health. It is only then when we can work towards a truly integrated and salutogenic mental health practice (Keyes, 2014; Wood & Tarrier, 2010).

Researchers can play an important role by measuring both positive mental health and measures of mental ill-ness comprehensively when looking at evaluating impact of psychological interventions and when we assess mental health in individuals and populations; an importance that is increasingly vocalised by academic advocates of and recent literature looking at dual-factor models (Iasiello et al., forthcoming). The good news is that this does not just need to be done in prospective studies. There is a plethora of studies that have measured positive mental health or wellbeing indicators and indicators of mental illness together, but have not explicitly mentioned this; only a limited number of studies have investigated the differential response pattern, especially over a longer period of time. Similar to other rapidly advancing fields such as big data science (Stewart & Davis, 2016) there is a great opportunity to re-visit data of old trials that have previously been published, to test for the response patterns of both outcomes on both the study level, but also the individual level.

One specific avenue of interest should be to explore whether psychological interventions impact positive mental health and mental illness similarly or differently, and the assessment of whether interventions are considered successful needs to look at the impact of the intervention on both outcomes. A study by Trompetter, Lamers, Westerhof, Fledderus, and Bohlmeijer (2017) looked at the impact of an Acceptance and Commitment Therapy-based intervention on positive mental health and mental illness. The study found that two thirds of the participants only showed improvement in either positive mental health or mental illness, with only a third showing improvement in both. Simply discounting mental illness interventions as ineffective if there is no immediate positive response on mental illness indicators is inadequate, as our understanding of the differential response is currently too immature. There is evidence that improvements in or high levels of positive mental health are protective of mental illness in the future (Keyes, Dhingra, & Simoes, 2010; Wood & Joseph, 2010) and similarly there is evidence that improving positive mental health in people with mental illness is related to potential recovery in the future (Iasiello, van Agteren, Keyes, & Muir Cochrane, 2019; Schotanus-Dijkstra, Keyes, de Graaf, & ten Have, 2019). Creating

a better understanding of whether improving on positive mental health can facilitate a better treatment response to mental illness down the line has important implications for mental health models of care, as it for example can fuel a focus on integrative clinical psychology that addresses both (Wood & Tarrier, 2010).

Second, mental health, but wellbeing research particularly needs to look beyond simple models to guide their studies, as they are simply too limited. Major models of wellbeing are almost entirely psychological and overlook important moderators of mental health such as genetics (Bartels, 2015), personality (DeNeve & Cooper, 1998; Lamers, Westerhof, Kovacs, & Bohlmeijer, 2012), or aspects of physical health (Hernandez et al., 2018). By overlooking these mediators and moderators, researchers may paradoxically increase the complexity of wellbeing research, as the simple wellbeing models have diminished explanatory power in their absence. It is likely that these mediators will differentially influence mental illness and mental health, as for instance has been shown to be the case for personality (Lamers et al., 2012; Lyons et al., 2012), thus becoming important targets for illness prevention and health promotion.

The literature has seen its fair share of simplistic and even redundant theories or concepts that do not add new insights to what we know, for instance the concept of grit which adds little to the well-established concept of conscientiousness (Credé, Tynan, & Harms, 2017). We need to move beyond it to start explaining something as all-encompassing as mental health and wellbeing. In health behaviour change research an active move towards taxonomies and ontologies of behaviour change (Kok et al., 2016; Larsen et al., 2017) is being made in favour of using singular theories to guide intervention design. These taxonomies synthesise active components across theories as opposed to within theories. While working with taxonomies has its own caveats (Peters, De Bruin, & Crutzen, 2015) they provide a more detailed overview of what works than looking at single theories or approaches. Similar moves are being made in integrating therapeutical approaches to design universal mental health therapies (McKay, Fanning, & Ona, 2011) and integrated holistic research that will determine the universal building blocks of mental health and wellbeing would be a welcome addition.

ADVANCING MENTAL HEALTH AND WELLBEING PRACTICE AND POLICY

Health professionals working in mental health, in all spaces including treatment and assessment of mental illness, mental health prevention, coaching and mentoring, can benefit from integrating scientific research on both mental illness and wellbeing into their practice. Mental illness does not operate in a silo from positive mental health, work wellbeing does not stop when you leave the office, and psychological techniques alone will not be reliably effective if someone's environment or physical health is severely impaired—by keeping these siloed approaches optimal outcomes will never be achieved. All dimensions to life need to be considered when coming up with our strategies to build mental health.
This does mean we need to assess more aspects of mental health in a more efficient way, so

it does not lead to more demand on an already overburdened and under- resourced system (Lancet Global Mental Health Group, 2007). Simply screening for psychiatric disorders and psychological distress to find at-risk groups is insufficient as the research on wellbeing's protective effect on mental illness suggests (Keyes et al., 2010; Wood & Joseph, 2010), but adding wellbeing measures will potentially add logistical constraints (e.g., more time to assess and different constructs to interpret). It means we need to start diversifying our intervention offering, beyond a system that mainly focuses on mental illness symptom reduction and towards a system that moves towards personalised mental health care across the life course, in ill and good health. Technology can play an important role here, if used well, by facilitating assessment, health status monitoring, and treatment support (Berrouiguet et al., 2018). Similarly, we need to play more attention to interventions that are not just focused on improving individual mental health, but need to place more emphasis on testing interventions that target a wider array of societal factors (Price, 2017).

If researchers and health professionals operate on the front foot, policy makers in mental health and other areas such as child development, can be stimulated to look beyond considering mental illness and wellbeing separately, which currently is not readily done (Slade, 2010). A parallel with medicine can easily be made, where Quality-Adjusted Life years in addition to "hard" outcomes such as service utilisation and recovery time are now key components of health policy (MacKillop & Sheard, 2018). Although it would be easy to look at simply incorporating quality of life measures, these tools do not sufficiently capture wellbeing, as the items that are often included in their "emotional" or "psychological" wellbeing domains vary too much and are too narrow, and therefore do not consistently assess the same concept (Linton, Dieppe, & Medina-Lara, 2016). Stimulating policy makers to add a holistic focus on mental aspects of wellbeing (i.e., not simply use life satisfaction as a proxy) in addition to advocating for quality of life is necessary.

If research, practice, and policy will start looking at integrating wellbeing and mental health, widespread adoption by consumers can be expected. Health literacy has tremendously improved over the past century (Kutcher, Wei, & Coniglio, 2016), through a large effort from health educators and public health campaigns, as well as increased access to resources due to the internet. Consumers understand the difference between physical illness and physical fitness. They know that they can get sick, even if they are physically fit, and vice versa: they can live a "disease-free" existence, without living a healthy life. The popularity of wellbeing initiatives, mindfulness apps (Mani, Kavanagh, Hides, & Stoyanov, 2015), and yoga (Jeter, Slutsky, Singh, & Khalsa, 2015) shows that more people are becoming aware of the importance of a mentally healthy mind, even if they are not diagnosed with mental illness. Consumers need to be educated on evidence-based ways to create a health mind, irrespective of the presence of mental illness, as currently a large proportion of people seeking to improve their mental health are not being guided by evidence, but rather by folk knowledge or the tremendous (often unregulated) wellness industry. This responsibility starts with academics and professionals, who must embrace the complexity of mental health in all aspects of professional life to do so.

CONCLUSIONS

Simple models and schematics are important in furthering the public's understanding of mental health and wellbeing and opening up conversations between professionals who are not familiar with the concept of mental wellbeing or some of its key characteristics. They therefore have a real purpose, but their use should be a starting place only. Mental health and wellbeing, their drivers and barriers, and their interrelationships are complex, as is increasingly being shown in scientific research, with both outcomes playing an important role in determining how "mentally healthy" one feels on a day-to-day basis. By embracing the complexity in our professional lives, in research and practice, we can further reduce the impact of mental illness and low wellbeing on individuals and society, an outcome which is much needed.

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8.2. Study 2. Using Internet-Based Psychological Measurement to Capture the Deteriorating Community Mental Health Profile During COVID-19: Observational Study

<u>Original Paper</u>

Using Internet-Based Psychological Measurement to Capture the Deteriorating Community Mental Health Profile During COVID-19: Observational Study

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Abstract

Background: The coronavirus disease (COVID-19) is expected to have widespread and pervasive implications for mental health in terms of deteriorating outcomes and increased health service use, leading to calls for empirical research on mental health during the pandemic. Internet-based psychological measurement can play an important role in collecting imperative data, assisting to guide evidence-based decision making in practice and policy, and subsequently facilitating immediate reporting of measurement results to participants.

Objective: The aim of this study is to use an internet-based mental health measurement platform to compare the mental health profile of community members during COVID-19 with community members assessed before the pandemic.

Methods: This study uses an internet-based self-assessment tool to collect data on psychological distress, mental well-being, and resilience in community cohorts during (n=673) and prior to the pandemic (two cohorts, n=1264 and n=340).

Results: Our findings demonstrate significantly worse outcomes on all mental health measures for participants measured during COVID-19 compared to those measured before (*P*<.001 for all outcomes, effect sizes ranging between Cohen d=0.32 to Cohen d=0.81. Participants who demonstrated problematic scores for at least one of the mental health outcomes increased from 58% (n=197/340) before COVID-19 to 79% (n=532/673) during COVID-19, leading to only 21% (n=141) of measured participants displaying good mental health during the pandemic.

Conclusions: The results clearly demonstrate deterioration in mental health outcomes during COVID-19. Although further research is needed, our findings support the serious mental health implications of the pandemic and highlight the utility of internet-based data collection tools in providing evidence to innovate and strengthen practice and policy during and after the pandemic.

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Introduction

Background

The advent of the coronavirus disease (COVID-19) and the widespread (social) control mechanisms implemented around the world are expected to lead to significant deterioration in mental health in the wider community; however, the magnitude of the damage is unknown [1,2]. The impact of the pandemic on health systems, the worsening economy and associated high rates of unemployment, the widespread social restrictions and quarantining, and the constant presentation of confronting news messages from the media are unprecedented challenges for communities and the mental health of its members [3-6].

It is crucial to thoroughly assess the potential community mental health consequences of the pandemic and gain insight into local data on mental health outcomes, as a shift in the mental health profile of the community will have short- and long-term consequences for health services, policy makers, and society in general. In addition to their ability to improve the psychological assessment process in general [7-9], internet-based measurement of mental health outcomes can play an important role in gathering data to inform policy and practice during and after the pandemic [10]. Such measurements inherently possess the ability to collect data on a large scale and facilitate immediate reporting on user mental health status, which ultimately can enhance participant mental health literacy and stimulate help-seeking behavior [11].

This is particularly relevant in light of the reduced ability and opportunity to conduct traditional assessments and screening for mental illness during COVID-19 as a result of physical distancing protocols. There is an important role to play for internet-based measurement of the general distress and well-being profile of the community, which is more suitable for online testing compared to assessment of specific disorders or severe mental illness. Higher rates of community distress and significant deterioration of positive and adaptive states of mental health—mental wellbeing and resilience—can signal the immediate and long-term presence of mental illness in the wider population [12-14]. As such, they are key indicators of the deterioration of mental health in the general community.

The Australian Context

As of the June 2, 2020, Australia had a total of 7204 confirmed cases of COVID-19, resulting in 103 deaths (1.4% death rate) [15]. The first reported case of COVID-19 in Australia was on January 25, 2020, in Victoria [16]. The Australian Government Department of Health [17] reported that cases peaked in March, and since April, the number of identified cases have remained relatively low. Of the states and territories within Australia, on June 2, 2020, New South Wales had the highest number of COVID-19 cases (3104 cases), followed by Victoria (1663 cases), Queensland (1059 cases), Western Australia (591 cases), South Australia (440 cases), Tasmania (228 cases), Australian Capital Territory (107 cases), and Northern Territory (29 cases) [18]. To put these numbers in perspective, rates in Australia are approximately 282 per 1 million compared with 5184 in the United States, 4009 in the United Kingdom, and 3848 in Italy [19].

In an attempt to flatten the curve of COVID-19 in Australia, the Australian Government began to slowly introduce lockdown measures. On February 1, 2020, travelers from mainland China were required to self-isolate for a period of 14 days from the date they left China, but widespread societal measures were not considered. Early March 2020 saw the rise of panic buying in supermarkets, and, through the rest of the month, the federal and state governments established progressively tighter lockdown restrictions, including limiting social gatherings and nonessential travel, and lockdowns of gyms, bars, restaurants, and schools [20]. Other nonessential workplaces instructed their staff to work from home where possible. With the exception of minor incidents, the rules on restrictions were generally followed by the Australian population, despite its flow-on effects resulting in many thousands of people losing their livelihoods, as well as resulting in large-scale social change and restrictions of freedom.

This Study

The impact of the COVID-19 pandemic in Australia has had a serious impact on a community and societal level. As a result, it could be expected to negatively impact mental health outcomes in the wider community, not simply limited to those directly affected or exposed to the illness. Therefore, it is important to quantify the local impact of the pandemic on community mental health outcomes, data that can feasibly be gathered using internet-based tools and methods. This study investigates the mental health outcomes of Australian community members accessing internet-based mental health assessment and psychological skills training during COVID-19 in comparison to cohorts of people engaged in these services prior to the pandemic.

Methods

Participants and Recruitment

Participants were adults who engaged with services offered by the South Australian Health and Medical Research Institute (SAHMRI) Wellbeing and Resilience Centre, based in Adelaide, Australia. The center provides internet-based measurement of mental health and well-being, and delivers general psychological skills training to the general community, with the aim of improving mental health and well-being.

Participants recruited during COVID-19 (hereafter, COVID-19 group) registered to participate in the study from March 29, 2020, onwards, well into the period of social restrictions in Australia, which occurred mid-March. Recruitment was conducted via two weblinks. The first was from the generic website of the Wellbeing and Resilience Centre, where people could find mental health resources and register for a free evidence-based mental health and well-being measurement. The second is a website that provides information about free online psychological skills training called the Be Well Plan, where participants could preregister and complete the same mental health and well-being measurement offered on the first website, prior to commencing the training.

Participants from the comparator cohort were adults who participated in mental health and well-being measurement and

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training between February 2019 and February 14, 2020, a month before social restrictions were implemented and when incidence of COVID-19 in Australia remained low. The first comparator cohort (general [GEN] group) consisted of participants who either took part in a group-based psychological skills training that was offered prior to COVID-19 or registered via the generic SAHMRI website for a free well-being measurement. Participants for the training included individuals from the public or people recruited for specific projects, for example, training provision to workforces. Participants from those projects were not community members reaching out on their own accord (ie, their employer may have directed them to participate), which meant their motivation could have been different to the COVID-19 cohort. This led to the creation of a second comparator cohort (help-seeking [HELP] group), consisting of individuals from the general population who engaged in the training or measurement of their own volition.

After registration, all participants completed the measurement online via internet-enabled devices (approximately 10-15 minutes to complete). The measurement captured basic demographic information (ie, gender, age, employment, and study status) to keep questionnaire burden low. After completing the measurement, participants were automatically provided with their individual scores and an individualized online report that explained the results and provided information about subsequent options to improve their mental health, as well as information on mental health services in case of immediate need.

Outcome Measures

The measurement included items assessing psychological distress associated with symptoms of depression and anxiety, as well as positive (mental well-being) and adaptive (resilience) states. Psychological distress was measured using the Depression Anxiety and Stress Scale-21 items (DASS-21) [21]. The DASS-21 offers reliable cut-off points for symptom severity (ie, "mild," "moderate," "severe," and "extremely severe" symptoms). Analyses were conducted using total scores for each of the three domains; internal consistencies for depression (α=.92), anxiety (α=.84), and stress (α=.86) were good. Well-being was measured using the Mental Health Continuum Short-Form (MHC-SF) [22]. The MHC-SF is a valid and reliable measure of mental well-being, providing both a continuous measure of three key domains of well-being (hedonic, eudaimonic, and social well-being), as well as a "diagnosis" of overall well-being into "flourishing" or high well-being, moderate well-being, and "languishing" or low well-being. Internal consistency was assessed on the summed total score of

all 14 items (α=.94). An additional well-being measure was used to specifically capture satisfaction with life. The Satisfaction With Life Scale [23] is a universally accepted measure, demonstrating high internal consistency (α=.91). Adaptive states were measured using the Brief Resilience Scale (BRS) [24]. The BRS conceptualizes resilience as an outcome and is a well-accepted tool to gain insight into resilience, with cut-offs for low, normal, and high resilience. Internal consistency was high, α=.88.

Data Analysis

Independent samples *t* tests and chi-square tests were conducted to investigate demographic differences between groups. Differences between groups were assessed using multivariate analysis of variance to test for an overall difference between conditions and subsequent analyses of variance to test for differences in each dependent variable. Covariates were entered to control for any baseline differences between the groups in the analyses. Given that all dependent variables were moderately correlated, a Bonferroni correction for multiple comparisons was employed, using an alpha level of =.008. Listwise deletion was employed to handle missing data. The previously mentioned measurement cut-offs were used to determine whether participants were "healthy" compared to participants who demonstrated distress or at-risk scores; healthy participants referred to high levels of well-being, normal levels of resilience, and no symptoms of distress in any of the three domains.

Results

The COVID-19 group consisted of 673 participants, while the control cohorts consisted of 1264 participants and 340 participants from the GEN group and HELP group, respectively. Demographic characteristics of the cohorts are reported in Table 1. There were less males in the COVID-19 sample compared to the two control cohorts (χ^2_2=194.1, *P*<.001), and the average age in the COVID-19 cohort was marginally higher ($F_{2,2274}$=3.56, *P*=.03, $\eta^2_{partial}$=0.003). A significant difference also existed in the proportion of participants employed (χ^2_2=243.1, *P*<.001), as the COVID-19 cohort consisted of more unemployed participants. Finally, there were significantly less people studying in the GEN group compared to the other two cohorts (χ^2_2=243.1, *P*<.001) in each sample. As a result, age, gender, study, and employment status were controlled for in the subsequent analyses.

Table 1. Demographics.

Demographic	COVID-19[a] (n=673)[b]	GEN[c] (n=1264)[d]	HELP[e] (n=340)[f]
Age (years), mean (SD)	44.8 (14.7)	42.7 (11.4)	42.6 (11.8)
Gender (female), n (%)	437 (65)	583 (46)	198 (58)
Unemployed, n (%)	168 (25)	30 (2)	36 (11)
Studying, n (%)	107 (16)	46 (4)	53 (16)

[a]COVID-19: coronavirus disease.

[b]The COVID-19 cohort consists of participants recruited in March and April 2020.

[c]GEN: general.

[d]The GEN cohort consists of participants engaging in mental health training and measurement during February 2019 to February 2020.

[e]HELP: help-seeking.

[f]The HELP cohort is a subset of the general cohort, which consists of users who reached out to the service on their own accord (as opposed to being invited as part of a specific project).

There was a significant multivariate difference between the three samples on all outcome measures (Pillai V=0.17, $F_{2,2268}$=35.66, $P<.001$, $\eta^2_{partial}$=0.06; refer to Table 2 for means and SDs for all outcome variables). Subsequent univariate analyses indicated a significant difference between the cohorts on depression ($F_{2,2268}$=93.8, $P<.001$, $\eta^2_{partial}$=0.051), stress ($F_{2,2268}$=47.8, $P<.001$, $\eta^2_{partial}$=0.066), anxiety ($F_{2,2268}$=108.8, $P<.001$, $\eta^2_{partial}$=0.031), well-being ($F_{2,2268}$=28.8, $P<.001$, $\eta^2_{partial}$=0.017), life satisfaction ($F_{2,2268}$=44.2, $P<.001$, $\eta^2_{partial}$=0.020), and resilience ($F_{2,2268}$=150.5, $P<.001$, $\eta^2_{partial}$=0.075). Tukey post-hoc comparisons indicated that the COVID-19 cohort showed significantly worse outcomes compared to both control cohorts on depression, stress, anxiety, well-being, life satisfaction, and resilience (Table 2). No differences between the two control cohorts were found for general well-being, life satisfaction, depression, and anxiety. The GEN group differed significantly from the HELP group in stress and resilience, with the HELP group showing worse outcomes.

Table 2. Means and SDs for the COVID-19 and control cohorts.

Variables	COVID-19[a,b], mean (SD)	GEN[c,d], mean (SD)	HELP[e,f], mean (SD)	COVID-19 vs GEN		COVID-19 vs HELP		GEN vs HELP	
				Cohen d[g]	P value	Cohen d	P value	Cohen d	P value
Depression	12.69 (10.56)	6.79 (8.52)	8.05 (8.63)	0.62	<.001	0.48	<.001	0.15	.06
Stress	16.11 (9.48)	10.14 (8.29)	12.48 (8.66)	0.67	<.001	0.40	<.001	0.28	<.001
Anxiety	8.41 (8.01)	5.22 (6.60)	5.84 (6.67)	0.44	<.001	0.35	<.001	0.09	.30
Well-being	42.87 (14.30)	47.35 (12.98)	47.85 (12.59)	0.33	<.001	0.370	<.001	0.04	.81
Life satisfaction	20.86 (6.98)	23.80 (6.55)	22.93 (6.11)	0.43	<.001	0.32	<.001	0.14	.08
Resilience	3.13 (0.81)	3.82 (0.90)	3.40 (0.81)	0.81	<.001	0.33	<.001	0.49	<.001

[a]COVID-19: coronavirus disease.

[b]The COVID-19 group consists of participants recruited in March and April 2020.

[c]GEN: general.

[d]The GEN group consists of participants who engaged in mental health training and measurement during February 2019 to February 2020.

[e]HELP: help-seeking.

[f]The HELP group is a subset of the general cohort, which consists of users reaching out on their own accord.

[g]Effect sizes were calculated using Cohen d, where 0.2 is a small effect, 0.5 is a medium effect, and 0.8 is a large effect.

Finally, the study investigated the proportion of participants that displayed problematic scores on at least one of the outcomes (ie, the proportion of participants with mental health problems). The COVID-19 cohort displayed a significantly higher proportion (n=532/673, 79%) of participants reporting problematic mental health outcomes, compared to the GEN (n=657/1264, 52%; χ^2_2=135.78, $P<.001$) and HELP cohort (n=197/340, 58%; χ^2_2=49.88, $P<.001$).

Discussion

Our findings suggest a significant deterioration of mental health profiles for general community members engaging with mental health services during COVID-19 compared to before the global pandemic. All indicators of psychological distress as well as indicators of mental well-being and resilience were significantly lower, providing evidence to indicate the pervasive short-term

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mental health impact of the pandemic and the heightened risk of mental illness onset in the future for the general community [1,25].

The psychological impact of the COVID-19 pandemic observed in this study aligns with emerging global research and research into previous pandemics and disasters—research that largely focuses on distress and mental illness. Rajkumar [26] conducted a review of the literature related to mental health and the COVID-19 pandemic, indicating that elevated levels of anxiety, depression, and stress were the most common psychological reactions to COVID-19. Although this study did not investigate the exact mechanisms underpinning the psychological distress, the review also identified editorials and commentaries describing the potential mental health impacts of the pandemic, drawing from previous disease outbreaks. Unpredictability, uncertainty, severity of the diseases, social isolation and loneliness, misinformation, and economic impacts were cited among the factors most likely associated with the increased psychological distress [27,28]. Similar results on psychological distress were found in the context of the Korean Middles East respiratory syndrome outbreak [29], in medical staff following the Ebola outbreak in African nations [30], and in the severe acute respiratory syndrome–related coronavirus outbreak in Taiwan [31].

The impact of pandemics or lockdowns on positive and adaptive mental health states such as mental well-being has been researched far less than the impact on psychological distress; however, several determinants of mental well-being are impeded during the lockdowns. The clearest impact of the lockdown is on personal agency and autonomy, key determinants of psychological well-being and self-determination theory [32,33]. Recent research has validated the importance of loss in agency, showing that it may have a significant impact on levels of life satisfaction [34]. Physical activity is another strong determinant of mental well-being and distress, and a protective factor against psychological distress, which has been impacted by COVID-19–related restrictions [35]. The closure of gyms, sporting clubs, public parks, and recreational areas may have contributed to the results observed in this study [36]. Other important drivers of well-being [37] that were affected, and therefore can play a role in explaining the results found here, include spirituality and interpersonal relationships—as a result from places of worship, restaurants, bars, and universities closing—the loss of purpose or meaning in life due to financial distress or loss of employment, significant changes to lifestyle such as homeschooling children, and social isolation and loneliness to name a few.

The significant levels of distress in the current cohorts of Australian community members are alarming. First, they flag a deterioration of mental health profiles among the general nonclinical population, suggesting an urgent need for prevention or early intervention to improve mental health and well-being, and equip people with resources to better cope in times of adversity [25]. Mental well-being is a known protective factor from psychological distress and mental illness [14,38]; therefore, the deterioration in mental well-being is a cause for concern for the mental health in the mid- and long-term of the pandemic. Second, it is likely that levels of distress among people with mental disorders are even higher, pointing to an urgent need for local research and subsequently intervention when this is confirmed.

The HELP cohort was, on average, less resilient and experienced higher levels of stress compared to the GEN control cohort. The HELP cohort was constructed to lower the impact of bias between the COVID-19 group and the control group, as both the HELP and the COVID-19 cohorts proactively engaged with the services on their own volition. The results found in the study however make intuitive sense. Specifically, it can be expected that individuals suffering from increased levels of stress in their lives will seek out mental health service offerings to alleviate their stress. We further expect to see individuals low in self-reported levels of resilience (the measure of resilience used here focuses on feeling resilient to cope with stressful times [24]) to seek out the program to increase their self-perceived resilience. Taking these findings into account further highlights the impact of COVID-19 on participants mental health, as the COVID-19 cohort significantly deviated on all outcomes from the HELP cohort.

The results need to be placed in the Australian context, where the impact of COVID-19 has been less severe compared to countries in Europe or the United States and social control has been less restrictive. Furthermore, although the participants in this sample were seeking out mental health services, they most likely largely represented a nonclinical community sample. Significant levels of psychological distress were observed in participants, which may indicate the presence of mental disorders in some of the participants; the current findings should, however, not simply be generalized to demonstrate the impact of COVID-19 on people with (severe) mental disorders [39].

A silver lining to these results can be found, as the pandemic has triggered significant interest in mental health, and signs of acceleration and innovation in the way we measure and support mental health can already be seen; for example, increased access to electronic health apps for mental health [40,41]. The measurement used in this study was freely accessible via internet-enabled devices and resulted in an immediate, individualized report for the participants. Improving access to internet-based services can act as an important complement to face-to-face measurement methods, as it may reduce barriers to seeking help [42]. Harnessing internet-based innovations in mental health service provision can stimulate wider mental health reform and help strengthen services for the entire population, regardless of the presence of (severe) mental disorders [43]. This is particularly important in relation to access to mental health services for vulnerable groups. The results here, for instance, suggest that unemployed people are reaching out for help with their mental health, which, in light of the mass unemployment recorded around the world, has important implications for mental health care services resourcing across the spectrum [44].

A number of areas, highlighted by our findings, will provide fruitful avenues for future research. First, although we have shown that COVID-19 had a detrimental impact on participant's mental health in general, understanding specifically the effects that COVID-19 may exert on people already experiencing a

mental illness is important [1]. This pandemic may have compounded the issues already faced by a proportion of the population, particularly those who are the most vulnerable; understanding this interaction is the first step to providing more effective help to at-risk and mentally ill people in the community while facing adversity. Second, our findings suggest that the COVID-19 pandemic, as a whole, was detrimental to individuals' mental health. However, our findings were unable to disentangle the specific mechanisms of decreased mental health during this pandemic. For instance, was social isolation the primary driver of decreased mental health, was it the loss of economic certainty, or was it caused more so by fear induced by media reporting? Future in-depth research of which determinants underpin the mental health impact of pandemics is required (eg, the role of social determinants of health [45]). Third, research and intervention aimed to improve psychological resilience may prove an economical way to improve community coping with large scale negative events. Future research on the

mental skills that foster psychological resilience will enable the promotion of positive mental health in general and during widespread negative events [46], such as a pandemic, thus reducing the negative psychological impact of these events on the community.

In summary, more research is needed, particularly in monitoring the long-term consequences and determining the clinical impact of COVID-19 in different populations. This study is limited in its use of generic outcomes and its cross-sectional design. This means that more rigorously controlled studies are essential to capture the complexity of mental health amid a global pandemic. Our findings, however, demonstrate the utility of internet-based psychological measurement and contribute valuable data to equip stakeholders with evidence to further understand the considerable negative consequences of the COVID-19 pandemic—results that can be used to intervene and prevent amplification of its impact on community mental health.

Conflicts of Interest

None declared.

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Abbreviations

BRS: Brief Resilience Scale
COVID-19: coronavirus disease
DASS-21: Depression Anxiety and Stress Scale-21 items
GEN: general
HELP: help-seeking
MHC-SF: Mental Health Continuum Short-Form
SAHMRI: South Australian Health and Medical Research Institute

8.3. Study 3. Make It Measurable: Assessing Psychological Distress, Wellbeing and Resilience at Scale in Higher Education

Make It Measurable: Assessing Psychological Distress, Wellbeing and Resilience at Scale in Higher Education

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Abstract

There is an ever-increasing focus on the importance of addressing the mental health of students across the higher education sector. Measuring psychological distress or symptoms of common mental disorders as a proxy for mental health does however provide a limited picture of someone's mental health status. There is a need to comprehensively measure mental health via outcomes of psychological distress combined with "positive" and "adaptive" states of mental health such as mental wellbeing and resilience. This paper describes a study of 905 students in which an online mental health and wellbeing platform was used to measure the mental health of students, all the while providing real-time individual reports to each individual student. The data provides evidence of high levels of psychological distress (i.e. anxiety) and low levels of mental wellbeing and resilience in students, relative to population norms, with merely 18.6% of students demonstrating optimal scores on all outcomes. Contrary to predictions we found no evidence of poorer wellbeing amongst international students when compared to domestic students. The results indicate that complimenting measurement of distress with measurement of positive and adaptive states can more comprehensively capture the precarious mental status of our tertiary students. Providing this measurement in a scalable and targeted way provides universities and its students the opportunity to provide and use mental health interventions based on the needs of particular cohorts of students, moving beyond resource-intense but intermittent or untargeted approaches to intervention.

Keywords: Mental health; resilience; wellbeing; intervention.

Mental Health in Higher Education

Having good mental health and wellbeing is important to all of us – as individuals, family members, friends, neighbours and within our communities. When we thrive, we see benefits across many aspects of our lives. Improving our mental wellbeing lowers our risk of mental and physical illness (Keyes, Dhingra, & Simoes, 2010; Wood & Joseph, 2010), and can speed up recovery when we do get sick (Diener, Pressman, Hunter, & Delgadillo-Chase, 2017; Iasiello, van Agteren, Keyes, & Cochrane, 2019). Our social lives improve and we have a higher number of positive relationships (Kansky & Diener, 2017). When we

have higher levels of mental wellbeing our productivity increases, which can translate to better academic outcomes (Huppert, 2009).

Many researchers are proposing that issues of psychological distress are on the rise amongst university students (Orygen, 2017; Scott-Young, Turner, & Holdsworth, 2018). This can have implications for student success as it may form a significant barrier to retention, completion, and achievement. The impact of managing psychological distress during the study period extends beyond university life, with research links to outcomes like employability and wellbeing at work, both presently and in the future (Scott-Young et al., 2018). Carter, Paliano, Francis & Thorne (2017) for instance suggested that mental health difficulties follow students when transitioning into employment and subsequently lead to lifelong negative impacts. Given this, it should perhaps be unsurprising that students see their mental health not just as a means to success, but as a key outcome by which they measure their own success (O'Shea & Delahunty, 2018).

The impact of psychological health on students and their success has led to recommendations to implement institution-wide approaches to support student wellbeing and mental health across the university sector (Orygen, 2017; Okanagan Charter, 2015). However, in order for the Higher Education sector to make progress on this issue, student wellbeing and mental health needs to be "made measurable" (Orygen, 2017). Despite millions of dollars spent in student support, it has proven challenging to reliably measure and track change in mental health and wellbeing outcomes across the sector or within an institution (Carter et al., 2017). Firstly, a challenge for assessment of wellbeing and mental health across higher education is balancing questionnaire burden with sufficient validity to allow for evidence-based decisions to be made in relation to the mental health of the student group. Secondly, higher education institutions have a duty of care to ensure students are cognisant of their current distress status, but are similarly aware of their mental wellbeing and resilience status, and to provide students with resources or interventions that can be used to improve the experience of their mental health status.

What Needs to be Measured when Assessing Mental Health in Higher Education (and why)

Psychological Distress

The vast majority of research on mental health in higher education investigates psychological distress symptoms. Psychological distress, which focuses on distress resulting from symptoms associated with depression, anxiety or stress, has been associated with significant reductions in academic performance and engagement (Andrews & Wilding, 2004; Stallman, 2010). Students that experience high psychological distress are significantly impacted in their capacity to study, with research showing that, on average, students using university health services are prevented from work or study for 8 days over a 4-week period as a result of their distress (Stallman, 2008). Further, research suggests students may experience these symptoms at higher levels than the general population. For example, in a survey of more than 5,000 students at the University of Melbourne in Australia, Larcombe et al. (2016) found that students reported elevated levels of stress, anxiety and depression relative to population norms.

Symptoms of psychological distress are often aggregated into a single score, thereby capturing psychological distress as a total construct. For example, screening tools such as the Mental Health Inventory (MHI)-5 (Berwick et al., 1991) or the popular Kessler (K)-10 (Kessler et al., 2002) have the benefit of being validated and are readily used in Australia, but do not breakdown scores for the independent subdomains of depression, anxiety or stress independently. An aggregated score of psychological distress can be useful to show a wider mental health need but reduces the ability of a person or organisation to respond to particular outcomes through targeted intervention. While symptoms associated with depression and anxiety share common and differential antecedents (Eysenck & Fajkowska, 2018), they show differences in their relationship to mental wellbeing (Iasiello, van Agteren, & Muir-Cochrane, forthcoming) and similarly may influence outcomes related to student success differentially. Thus, although there is a need to assess psychological distress, there is a need to do so in a nuanced way that leads to a specific indication of the mental health need.

Mental Wellbeing and Resilience

Capturing psychological distress only highlights one aspect of the overall mental health of students. It is similarly necessary to measure "positive" and "adaptive" mental health outcomes such as mental wellbeing and resilience (Suldo & Shaffer, 2008). Mental wellbeing is related to but distinct from the absence of psychological distress and mental illness and is an important resource for student success (Denovan & Macaskill, 2017; Iasiello et al., forthcoming). Mental wellbeing (which can encompass

a range of positive emotional and motivational states) can significantly impact student success, as demonstrated in a several studies. In a longitudinal study of students across four years of study in Hong Kong, good mental wellbeing was associated with higher levels of engagement and subsequent learning outcomes (Yu, Shek & Zhu, 2018). Students showing better adjustment to university life during their first 6 months of study experience higher mental wellbeing (compared to those with poorer adjustment), which is associated with higher academic performance (Baily & Phillips, 2016).

Mental wellbeing describes the more "positive" aspects of human emotional and motivational states. Measures of mental wellbeing are typically classified as either hedonic or eudaimonic. Hedonic measures of wellbeing generally focus on subjective feelings of wellbeing (as in the presence of positive affect or positive motivational states, the absence of negative affect or negative motivational states and the presence of life satisfaction) (Diener, 1984). Eudaimonic wellbeing focusses instead on the experience of positive functioning, including aspects such as autonomy, personal growth, and a sense of meaning in life (Ryff & Keyes, 1995). When measuring the wellbeing of university students, both hedonic and eudaimonic aspects of wellbeing should be measured to capture a holistic image of student wellbeing. Imagine a student who is goal orientated, and feels that they are learning new things and have purpose, and yet they do not experience subjective feelings of happiness or enjoyment. Difficult emotions, failure, and frustrations may be part of the learning environment when one is challenged, but if this is associated with a growing sense of connection to others, purpose, or growth, even these negative feelings can be part of wellbeing (Kashdan & Biswas-Diener, 2014).

Where hedonic and eudaimonic wellbeing focus on individual feelings and ability to self-realise, social wellbeing describes one's wellbeing in relation to their community (e.g. the student population) or society. Social health or wellbeing has traditionally been an important aspect of sociological theory (Durkheim, 2005), and has been integrated into overall mental wellbeing (Keyes, 2002; Keyes, 1998). Social wellbeing describes one's appraisals of their circumstances and functioning in society. Broadly, it includes domains of social integration, social acceptance, social contribution, social actualisation, and social coherence, which have been described elsewhere (Keyes, 1998). While some research has investigated the conceptual overlap between student social wellbeing and sense of community and participation in university community (Cicognani et al., 2008), it is often overlooked in university student mental health research in favour of isolation and loneliness (Houghton, Hattie, Carroll, Wood, & Baffour, 2016). Social wellbeing may be particularly relevant for international students who may be least likely to participate in the university community and report higher levels of loneliness and isolation (Alsahafi & Shin, 2016; Macionis, Walters, & Kwok, 2018).

Irrespective of current levels of psychological distress and wellbeing, students need to possess the ability to cope with and restore from the stressors or adversity that are inevitable parts of student life (Davydov, Stewart, Ritchie, & Chaudieu, 2010). The student's perceived ability to manage the stressors in their life, defined here as resilience, is a valuable outcome to measure. If high levels of resilience are present, the student is better protected from developing low levels of wellbeing or distress in the future. It is therefore unsurprising that resilience has been linked to student success at university (Baik et al., 2017; Stamp et al., 2015) and can provide valuable insight in identifying at-risk students. For example, students may not be experiencing worrisome stress levels at the moment but may feel that they could not deal with stress when it would arise in the future. Measuring students early in the semester may not highlight issues with stress, but if the student has low resilience, this can flag potential challenges in the future, e.g. closer to exam periods.

The Current Study

Taking this more comprehensive and nuanced approach to student mental health measurement can provide greater insight into the student experience and can better inform student mental health interventions (Iasiello et al., forthcoming). For example, a student may experience heightened stress during their studies, but if this is balanced by resilience, high subjective wellbeing, and positive coping behaviours then the student may still be experiencing positive mental health. Another student may experience low levels of stress or anxiety, but also low feelings of subjective wellbeing (low on purpose, growth, or happiness) and may be at risk of poor mental health. Studies in high school students consistently show that measuring both well-being and distress outcomes can identify sub-groups of students that are at risk of low academic performance including lower attendance rates, academic scores, self-efficacy and academic self-perceptions (Rose, Lindsey, Xiao, Finigan-Carr, & Joe, 2017; Suldo, Thalji, & Ferron, 2011; Suldo & Shaffer, 2008; Venning, Wilson, Kettler, & Eliott, 2013; Xiong, Qin, Gao, & Hai, 2017). Studies with university students are less common, identifying the need to determine the impact of these outcomes on student success in this population.

The current study attempts to make mental health – encompassing wellbeing, resilience and distress – measureable. Given that local educational contexts may impact on student psychological wellbeing, the study was conducted with the aim of getting insight into local psychological wellbeing and distress levels, as the first stage of developing a targeted student mental health and wellbeing program. Given previous research it was expected that psychological distress would be higher amongst university students relative to population norms. Similarly, it was hypothesised that wellbeing would be lower, as well as the general resilience of the students compared to general norms. Furthermore, the impact of various moderators was investigated. For instance, it was expected that the mental health and wellbeing of international students would be lower than that of domestic students, as research suggests that the wellbeing of international student is worse than that of domestic students due to the range of pressures and stressors such as learning new cultural norms, language barriers, level of engagement with the host society, loneliness, financial security, and accommodation concerns (Han, Han, Luo, Jacobs, & Jean-Baptiste, 2013; Leung, 2001; Poyrazli & Grahame, 2007; Wu, Garza, & Guzman, 2015).

Methods

Participants

During the months of March to April 2019, the entire student population from the disciplines of Education, Psychology and Social Work at Flinders University (n = 5791) in Australia were invited to participate in a measure of mental health and wellbeing. Students were invited via student newsletters, direct email, announcements in lectures and by asking academic staff to promote the wellbeing survey directly to their students. Within a three-week response period, a sample of n = 905 (15.6%) students completed a baseline measure.

Approach

The study was a collaborative project between the university and the South Australian Health and Medical Research Institute (SAHMRI), which specialises in the measurement of intervention in mental health and wellbeing. SAHMRI has developed a specialised technology platform (app.completementalhealth.com) which has been designed according to the highest privacy standards (e.g. the platform is General Data Protection Regulation (GDPR) compliant) to ensure individual participant anonymity and privacy. Students were invited to log into the platform via mobile-enabled devices on a browser that adhered to modern web standards. Communication from both the university and SAHMRI, was devised to ensure that the student understood that an external research institute was guardian of the data. Students were directed to take the measurement online, which took roughly 10 to 15 minutes to complete.

The platform, in addition to acting as a measurement tool, had the aim to improve student mental health and wellbeing literacy (Oades, 2017). Each student who completed the measurement received an in-depth online report that summarised the student's scores on each of the outcomes, provided an explanation for each of the domains and gave recommendations on activities to complete when scores warranted improvement. The report was accessible in real-time on the platform after completing the measurement. In addition to the tailored report, students could read a variety of wellbeing and mental health related content accessible on the platform's homepage. Finally, information regarding university wide health, mental health and wellbeing resources and services was sent to students as part of the questionnaire procedure.

Data Analysis

A variety of statistical techniques were used in this study including independent samples, t-tests, Chi-Square tests, analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) to control for relevant covariates where necessary. While normality of scores is typically an issue for wellbeing measures, ANOVA is relatively robust to a violation of normality, leading to the decision to retain the original scores as opposed to conducting transformations to the data. Where possible, documented cut-offs were used to form categorisations into risk-groups or to help infer severity of symptoms in the presented graphs.

Results

A breakdown of demographic information on the participants is displayed in Table 1. The respondent sample was largely representative of the total student population, with gender proportions (female: sample 84.1%, student population 73.8%) being the only variable that was different between the participant sample and the overall student population. The majority of respondents were Australian citizens, who overwhelmingly identified as non-indigenous (99.1%), with the proportion of international students in the sample being 12.4%.

Table 1

Demographic Information on Student Population at Measurement

	Education students	Psychology students	Social Work Students	Entire Sample
n	370	293	242	905
Response rate	11%	26%	18%	16%
Gender				
Female	300	248	212	759
Male	70	45	30	144
Other	-	-	-	-
Age				
18-24	234	217	86	537
25-34	76	43	92	211
35-44	23	17	41	81
45-54	29	16	15	60
55+	6	0	8	14
Indigenous status				
Indigenous	4	2	2	8
Non-indigenous	364	289	239	890
Unknown	2	2	1	5
Citizenship				
Australian	354	289	149	791
International	16	4	93	112
Course level				
Undergraduate	261	269	75	605
Postgraduate	108	24	166	298

Note: *n* = number of participants

Outcome Variables

The mental health measurement was carefully crafted to allow for reliable and valid assessment of mental health outcomes, while reducing questionnaire burden by choosing scales with low item numbers. Wellbeing was measured using the Mental Health Continuum Short-Form (MHC-SF) (Keyes et al., 2008). The MHC-SF is a valid and reliable measure of wellbeing, providing both a continuous measure of three key domains of wellbeing (hedonic, eudaimonic, and social wellbeing), as well as a "diagnosis" of overall wellbeing into "flourishing" or high wellbeing, moderate wellbeing and "languishing" or low wellbeing. Internal reliability was conducted on the summed total score of all 14-items ($\alpha = .921$).

Psychological distress was measured using the Depression Anxiety and Stress Scale – 21 items (DASS-21) (Henry & Crawford, 2005). The DASS-21 has clear cut-off points for level of severity of symptoms, allowing grouping of scores into "mild", "moderate", "severe", and "extremely severe" symptoms of psychological distress. Analysis was conducted using total scores for each of the three domains: depression ($\alpha = .909$), anxiety ($\alpha = .842$), and stress ($\alpha = .807$).

Finally, the student's own interpretations of their ability to deal with and bounce back from stress or adversity (i.e. resilience) was measured using the Brief Resilience Scale (BRS) (Smith et al., 2008). The BRS conceptualises resilience as an outcome and is a well-accepted tool to gain insight into resilience, with cut-offs for low, normal and high resilience (Windle, Bennett, & Noyes, 2011). Participants answered 6 questions on a 1 (Strongly disagree) to 5 (Strongly Agree) scale (e.g., I tend to bounce back quickly after hard times; (α = .839).

Mental Wellbeing (Flourishing) correlated r = 0.516 with resilience, while correlating between -.491 and -.515 with stress and anxiety. The correlation between positive mental health and depressive symptoms was higher than expected at r = -.741, which has been observed in other cohorts with high severity of symptoms (van Erp Taalman Kip & Hutschemaekers, 2018). The constructs of psychological distress were correlated between .615 and .734.

Wellbeing, Resilience and Distress in Total Sample

Scores on the MHC-SF found that only 30% of student responders had high wellbeing, 59.91% had moderate wellbeing and 9.08% were languishing (see Figure 1). Resilience scores for the sample indicated that almost half of the sample (45%) displayed low levels of resilience, with 51% demonstrating normal levels of resilience and 4% indicating high levels of resilience. Average psychological distress scores indicated that a relatively large proportion of students display psychological distress levels that are at mild or above levels, 57% for depression, 62% for anxiety and 52% for stress. Looking at scores for students displaying moderate or above symptoms of psychological distress, it was found that 65% of the student population met the requirements for at least one of the three types of distress. The large proportion could be attributed to scores on anxiety and depression, as stress only accounted for 9% of the total 65%. An overview of all mean scores can be found in Table 2.

Figure 1

Proportions of students displayed per cut-off for wellbeing (left graph), resilience (middle graph) and psychological distress (right graphs)
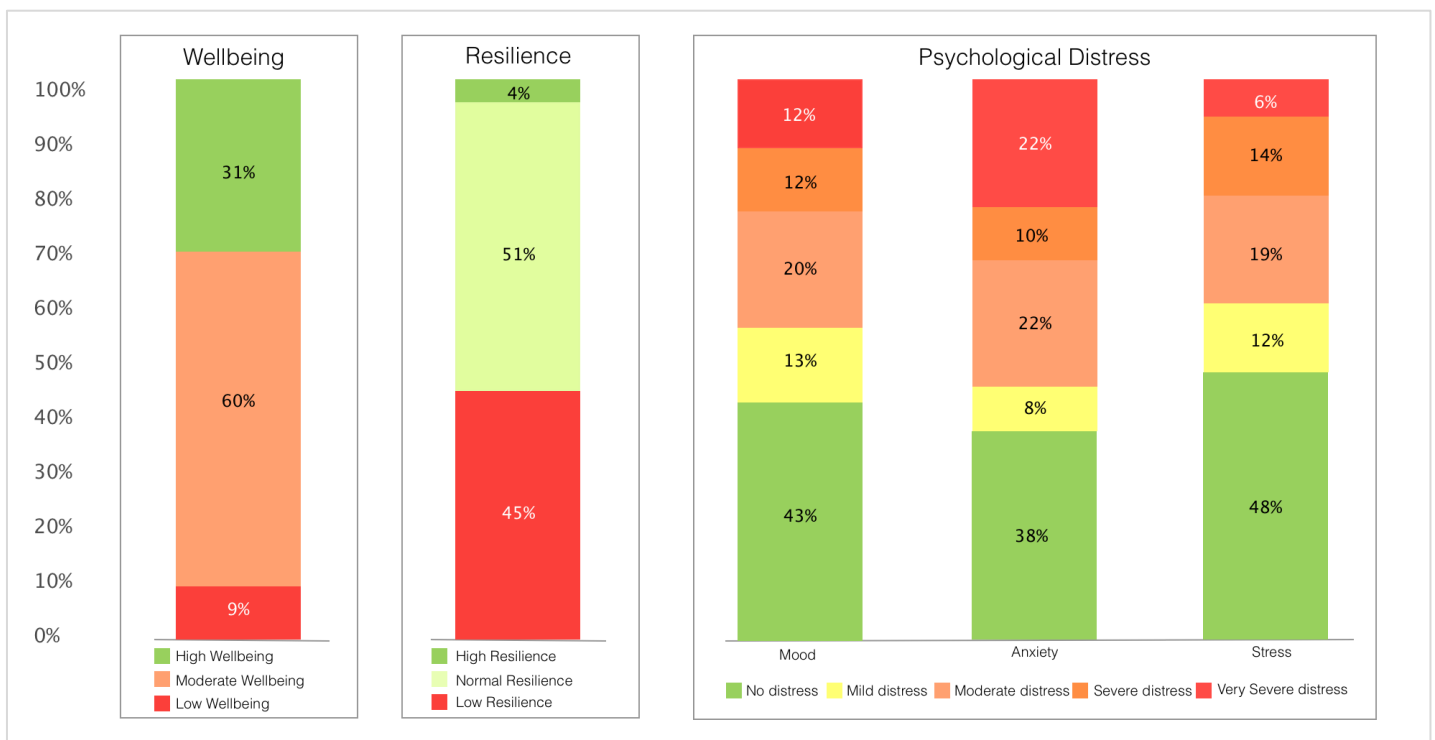
Table 2

Unadjusted mean scores and standard deviations (in brackets) for all domains, overall and split for gender, age, internationality. Significance values are reported next to each sub-group with significance (displayed in bold)

		Gender					Age				Internationality		
	Overall	Male	Female	Sig.	18-24	25-34	35-44	45 - 54	55+	Sig.	Domestic	International	Sig.
Overall Wellbeing	41.01 (13.13)	40.73 (13.2)	41.06 (13.12)	0.781	39.51 (13)	40.2 (13.51)	46.11 (10.5)	46.8 (11.17)	55.57 (12.33)	**0.00**	40.91 (13.05)	41.72 (13.71)	0.543
Subjective	9.61 (2.99)	9.29 (3.35)	9.68 (2.91)	0.152	9.53 (2.95)	9.29 (3.1)	10.11 (2.83)	10.23 (2.73)	12.07 (3.12)	**0.00**	9.66 (3)	9.31 (2.92)	0.247
Psychological	18.53 (6.24)	18.59 (6.32)	18.52 (6.23)	0.9	17.66 (6.28)	18.4 (6.25)	21.53 (4.52)	21.25 (5.38)	24.85 (5.08)	**0.00**	18.56 (6.24)	18.32 (6.26)	0.696
Social	12.85 (5.35)	12.84 (5.32)	12.86 (5.36)	0.976	12.3 (5.17)	12.54 (5.6)	14.46 (4.89)	15.31 (4.94)	18.64 (5.13)	**0.00**	12.68 (5.27)	14.08 (5.73)	**0.009**
Distress													
Depression	13.18 (10.35)	12.72 (10.25)	13.27 (10.38)	0.564	14.52 (10.51)	12.94 (10.32)	9.72 (9.06)	8.88 (8.21)	4.42 (6.28)	**0.00**	13.47 (10.47)	11.15 (9.29)	**0.027**
Anxiety	11.78 (9.38)	11.11 (9.4)	11.91 (9.38)	0.354	13.24 (9.44)	11.63 (9.34)	8.05 (6.99)	6.03 (7.1)	2.71 (2.99)	**0.00**	11.82 (9.56)	11.5 (8.03)	0.73
Stress	16.86 (9.35)	15.1 (9.13)	17.19 (9.36)	**0.014**	17.83 (9.37)	17.11 (9.37)	14.27 (8.47)	12.81 (7.76)	7.71 (7.14)	**0.00**	17.12 (9.4)	15 (8.82)	**0.024**
Resilience	3.6 (0.91)	3.88 (0.88)	3.55 (0.91)	**0.00**	3.52 (0.89)	3.51 (0.89)	3.84 (0.9)	4.11 (0.84)	4.22 (1.02)	**0.00**	3.61 (0.94)	3.56 (0.64)	0.63

Note: sig. = significance value.

The Overlap of At-Risk Students when Considering Psychological Wellbeing, Distress and Resilience

From a preventative perspective, students of interest were those not currently suffering from symptoms of psychological distress, but those that demonstrate either moderate or low levels of wellbeing, or low levels of resilience. The overlap between these outcomes is depicted in Figure 2. Sixty-three percent of students met the criteria for moderate distress severity in at least one of the psychological distress domains of depression, anxiety, or stress. Only 34.4% of students reported mild or no distress for all three domains. Of these 34.4% of students reporting low levels of psychological distress, 17.9% of students reported low levels of resilience, putting them at risk of future distress as they do not feel prepared to manage the challenges in their life. Of the remaining 82.1% (28.2% of total sample), 66% achieved the category of flourishing mental health, which is the optimal wellbeing score. Thus, considering psychological distress, resilience, and wellbeing together – only 18.6% of students demonstrated the optimal outcome of high wellbeing, normal levels of resilience, and no or mild levels of psychological distress. When taking a less conservative approach to this analysis, by looking at students who reach the mild distress cut-off or above (scores which warrant low intensity psychological services), merely 6% of students demonstrated optimal scores.

Figure 2

The overlap of at-risk students when considering psychological wellbeing, distress, and resilience
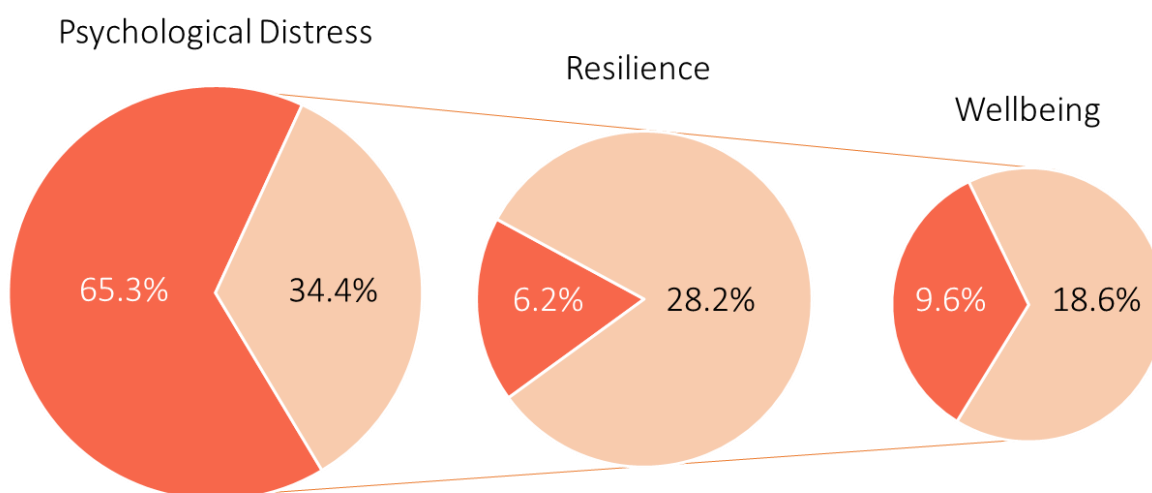
Note. Light colours represent the proportion of the total sample with optimal scores of each outcome. Successive graphs depict the breakdown of the previous optimal proportion, while the percentages reflect the proportion of the whole sample. This figure indicates that 18.6% of the total sample could be considered to have optimal mental health (no psychological distress, normal/high resilience, flourishing wellbeing) and remaining students would be considered at-risk.

Influence of Moderators

Age significantly influenced wellbeing, resilience and indicators of psychological distress, such that all outcomes tended to improve with older age. The impact of age on subjective wellbeing indicated a small effect (Partial Eta^2 = 0.02), while a moderate effect was found for social and psychological wellbeing (Partial Eta^2 of 0.05 and 0.06 respectively). Similarly, a significant moderate effect of age on resilience was found (partial Eta^2 = 0.04). Regarding psychological distress, the impact of age indicated moderate effects for symptoms of depression, anxiety, and stress (partial Eta^2 of 0.04, 0.07, and 0.04 respectively). There were significant differences found between undergraduate and postgraduate students for all three outcomes, but after controlling for age differences neither outcome remained significant.

Gender effects differed per outcome. There were no significant differences between males and females in relation to wellbeing, on any of the three wellbeing domains. There were significant gender differences in resilience, in that women tended to have significantly lower levels of resilience compared to men (p = 0.00, partial Eta^2 = 0.02). Females showed significantly higher levels of psychological distress due to stress compared to males, although the effect did not reach the threshold of a small effect,

partial Eta^2 = 0.07. No significant gender differences were found between psychological distress as a result of mood and anxiety.

There were no significant differences in any domains of wellbeing or resilience between the domestic and international students tested. Surprisingly, domestic students scored significantly higher in distress due to mood and stress symptoms than international students, although the partial Eta^2 did not reach the threshold of a small effect (partial Eta^2 of 0.01 in each case). No differences were found for distress due to anxiety.

Discussion

This study demonstrated the importance of assessing mental health via measures of psychological distress as well as wellbeing and resilience. The current study found low levels of wellbeing, high levels of psychological distress and a relatively high proportion of students with low resilience in an Australian tertiary student population, with less than one fifth of the students scoring high on any of the outcomes.

The results of this sample showed evidence of distress higher than population norms. In particular, symptoms of anxiety were a significant issue for students, with one third of the population reporting severe or extremely severe levels of psychological distress. The distress levels found in the current study were higher than the typically reported values of between 20 to 25% in students and the Australian general population, but approach the results found by Stallman (2010), namely 83.9% of students displaying sub-clinical distress or higher. These rates fall within the range of reported values, as the prevalence of distress in student samples widely varies between studies. For example, medical student samples demonstrate distress estimates between 12.2 and 96.7% (Hope & Henderson, 2014). The current study was conducted with a student population comprising 905 students, and a "stress-free" moment in the academic year for the data collection was deliberately chosen. Therefore, this study makes an important contribution to the data pointing to a high distress prevalence in the wider student population.

Two specific factors, age and internationality, showed interesting response patterns. The results found in this study suggested that older students generally were doing better than younger students. Although higher distress levels are sometimes found to be higher in younger adults (Jorm et al., 2005), wellbeing is typically considered to follow an inverted u-shape in relation to age-effects with a clear dip happening in mid-life (Steptoe, Deaton, & Stone, 2015); a finding that does not uphold for the currently studied student population. While mature-aged entry students may experience a number of barriers to study, they may also have a set of psychological skills that can hold them in good stead for success, which may explain these results.

Contrary to expectations, international students were doing better than their domestic counterparts. While international students are often thought to be at high risk of problematic mental health, for instance due to challenges related to help-seeking behaviour (Clough, Nazareth, Day, & Casey, 2019), their distress levels were not higher than domestic students. Although this is in line with some studies which failed to find a difference between domestic and international students in Australia (Khawaja & Dempsey, 2008), the findings in this study warrant caution. For instance, there may have been possible limitations of language and culture that hide various cultural specific expressions of poor (or positive) mental health.

The low levels of wellbeing and resilience, both together and independent from psychological distress, are a clear target area for future intervention programs. Longitudinal studies clearly indicate that low wellbeing and resilience leads to increased risk of future mental illness (Wood & Joseph, 2010). Similarly, high levels of wellbeing are protective for future mental illness (Keyes et al., 2010) and improving wellbeing among people with mental illness improves their rate of recovery (Iasiello et al., 2019). The current sample featured a large proportion of students with a need for improvements in resilience. These students may be psychologically unprepared for challenges and stressors, which they are almost certain to encounter in their academic and personal lives. This is not only a personal wellbeing need but will be a graduate/employability need. This data is already being used to co-design (with students and staff) an intervention that will target support of these needs. Good measurement not only highlights the need but informs targeted use of finite resources to address that need.

A variety of interventions can be considered for improving wellbeing, resilience or mental health (Bolier et al., 2013; Macedo et al., 2014), but only limited evidence exists for interventions that are designed to improve all outcomes targeted in this study. Different psychological and behavioural interventions have various intervention impact depending on different parameters, e.g. cognitive-behavioural therapy (CBT) based interventions are impactful in improving wellbeing in people with mental illness,

but do not have the same effect in people without mental illness (Trompetter, Lamers, Westerhof, Fledderus, & Bohlmeijer, 2017; van Agteren et al., submitted). The current student sample showed a complex pattern of individual mental health and wellbeing scores, results which indicate a need for a multi-faceted intervention that takes an individual's mental state and personal characteristics into account and matches intervention components to these characteristics. For example, students who have mental illness and are flourishing may benefit most from traditional approaches to mental illness such as CBT. Students who have moderate or low wellbeing and mental illness may benefit most from a combination of traditional approaches, new-wave approaches such as acceptance and commitment therapy (ACT) or approaches aiming to improve wellbeing using positive psychological principles. Mental health complexity requires more than generic catch-all interventions. Ongoing measurement will allow for continuing identification and iterative design of wellbeing supports across a university.

The current study was limited in a number of ways. Although the sample was largely representative of the larger organisation, the response rate was less than 16%. This means that conclusions for specific subsets of the population (e.g. the mental health and wellbeing of Aboriginal or Torres Strait Islander students) was limited as the sample size and power was too low. In addition, the current study is limited to one of six colleges within the larger university (encompassing Education, Psychology and Social Work) meaning that the conclusions are limited to this sub-population. Furthermore, the current study was a cross-sectional study which means no cause-effect can be established and the influence of confounders and bias (e.g. the influence of timing of the study) cannot be ruled out. The study furthermore only relied on quantitative measures, which means it is impossible to determine the exact drivers of the lower psychological profile of the students, with future studies needing to focus on including a qualitative component to investigate core constructs such as stress on student success (Hurst, Baranik, & Daniel, 2013; Robotham & Julian, 2006).

Conclusion

The current study found high levels of distress, low levels of wellbeing and relatively low levels of resilience in this tertiary student population, with results indicating that age moderated the results on all three outcomes. The project highlights the complex interrelations between mental health and wellbeing and will serve as a foundation to inform future interventions and maximise their effectiveness and efficiency.

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8.4. Study 4. Using a Technology-Based Meaning and Purpose Intervention to Improve Well-being: A Randomised Controlled Study

RESEARCH PAPER

Using a Technology-Based Meaning and Purpose Intervention to Improve Well-being: A Randomised Controlled Study

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Abstract

Increasing the saliency of existing sources of meaning and purpose in life could be a practical
focus area for innovative wellbeing interventions. This randomised controlled study aimed to assess the impact of a brief seven-day technology-based intervention on meaning in life, life satisfaction, and affect compared to a waitlist control group. A mobile phone application was used to deliver daily activities and momentary reflection questions. Significant improvements where observed in the presence of meaning in life ($p=.02$, $\eta^2=.05$), life satisfaction ($p=.00$, $\eta^2=.08$) and positive affect ($p=.02$, $\eta^2=0.05$) for the intervention versus the control group. Ecological momentary assessment data found increases in life satisfaction and meaning in life ($b=0.044$, $p=.041$) and shed insight into activities that fostered fulfillment. These findings pave the way for future meaning and purpose interventions to build mental health and well-being.

Keywords Meaning in life · Purpose · Ecological momentary sampling · App-based Intervention · Well-being

1 Introduction

Having a high sense of meaning in life is linked to a vast range of physical and psychological benefits. Meaning in life is associated with better physical health outcomes, longevity, lower hospital utilisation, and a reduced risk of conditions such as stroke, myocardial

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infarction, loss of physical functioning, and Alzheimer's disease (Kim et al., 2014; Roepke et al., 2014). Previous research has found associations with a lower incidence of psychological disorders and suicidal ideation, and increased utilisation of adaptive coping strategies (Heisel & Flett, 2004; Steger & Kashdan, 2009; Thompson et al., 2003). Conversely, reductions in meaning and purpose are a risk factor for psychological disorders, especially in light of major life transitions such as retirement and ageing (Kim & Moen, 2001; Pinquart, 2002). It can generally be concluded that when people report higher levels of meaning in life, this is accompanied by higher levels of life satisfaction, quality of life, and general well-being (Steger, Oishi, et al., 2011). This scientific evidence showing positive associations with psychological and physical outcomes, makes the construct of meaning in life an ideal candidate to underpin programs aimed at increasing our day-to-day well-being.

1.1 The Construct of Meaning in Life

Research into meaning in life does not investigate the philosophical question of the universal meaning *of* life, but rather explores the subjective experience of meaning within an individual's life and the experiences that contribute to this overall sense of meaningfulness (Martela & Steger, 2016). In light of definitional ambiguity, which is common within well-being research (Dodge et al., 2012), Martela and Steger (2016) reviewed and consolidated existing literature on the topic. Their definition states that meaning emerges "from the web of connections, interpretations, aspirations, and evaluations that 1) make our experiences comprehensible, 2) direct our efforts toward desired futures, and 3) provide a sense that our lives matter and are worthwhile" (Martela & Steger, 2016, p. 538). In their review, Martela and Steger landed on a simple theoretical overview that summarises meaning in life as a trichotomy consisting of coherence, purpose, and significance.

Coherence speaks to the degree to which people can make sense of the world and their place and experiences within it (Heintzelman & King, 2014). It is the cognitive component to the sense of meaning, where one tries to make sense of the world by finding patterns and establishing predictable connections that they can rely on. *Purpose*, the second component of meaning in life, represents long-term future-oriented goals that give life direction and help to shape actions in the present (McKnight & Kashdan, 2009). As Victor Frankl (1963) stressed, we should view purpose over the life-course, which speaks to the importance of long-term future-oriented aims and goals. Lastly, *Significance* refers to the sense that life is worthwhile and has real value or worth. These three facets speak to three distinct domains of meaning in life: coherent understanding (the cognitive component), worthwhile pursuing (the motivational component), and valuing living (the evaluative component). Therefore, establishing a sense of meaning can be thought of as an integrative and reflective process that allows people to develop personal clarity around the value of their life as a whole and to develop a sense of overarching purpose (Martela & Steger, 2016);

This reflective and integrative process is influenced by various concrete 'sources' that can lead us to experience a sense of meaning in life, with research by Schnell (2009) and by Emmons (2003) investigating specific categories or dimensions of these sources. Schnell's research suggests the existence of four dimensions that can be used to group sources of meaning in life: 1) "self-transcendence", where we find meaning by committing to objectives beyond our immediate needs, to others, and to a cosmic power; 2) "self-actualisation", where we employ, challenge and foster our capacities to realize our own fullest potential; 3) "order", where we focus on the values we have in life; and 4) "well-being and

relatedness", where we strive to cultivate and enjoy life's pleasures in privacy and company (Schnell, 2009). Emmons's (2003) in his own research found categories of sources of meaning in life that largely fit with Schnell's dimensions, being "achievement/work", "relationships/intimacy", "religion/spirituality" and "self-transcendence/generativity".

The sources that bring us meaning in life are considered to be stable, with research seeing meaning as a stable and enduring psychological resource (for review see Steger, 2012). While, for instance, one's place of employment may change, the value placed on being employed and contributing to society is less likely to change. Studies have endorsed this perception of stability, finding that levels of meaning are moderately heritable and stable over time (Steger & Kashdan, 2007; Steger, Hicks, et al., 2011). This stability is explained as a consequence of people's motivation to maintain the sense of meaning they have created (Heine et al., 2006) so as to avoid any anguish associated with the experience of meaninglessness (Ryff & Singer, 2008). By doing so, meaning can be seen as a tool to preserve well-being and resist suffering, as it is an enduring and strengthening resource to our wellbeing (Frankl, 1963).

1.2 The Relation Between Meaning in Life, Wellbeing and mental health.

The theoretical underpinning to meaning in life and the dimensions of sources that fuel a sense of meaning presented above, provide a detailed theoretical insight into a construct that plays an important role in various scientific models of wellbeing. Ryff as early as 1989 included the concept of 'purpose in life' as one of six pillars in her eudaimonic model of psychological wellbeing (Ryff, 1989). Her conceptualisation of purpose closely resembles the broader high-level 'meaning in life' construct presented above and draws from existential work by Frankl and Sartre, as well as work from Russel, Jahoda and Allport (Ryff & Keyes, 1995; Ryff & Singer, 1996). Meaning is among others also postulated as a central pillar to wellbeing in Seligman's PERMA model (Seligman, 2012), a model that combines hedonic and eudaimonic principles, and the concept is part of a tripartite "model" of wellbeing posited by Keyes which combines hedonic, eudaimonic and social wellbeing into a single measure of human flourishing (Keyes, 2014).

Due to its central position in wellbeing theories that are oriented towards or include eudaimonic aspects, the positive relationship between eudaimonic wellbeing and meaning in life should come as no surprise (Steger, 2012). If one were to focus on assessing subjective or hedonic domains of wellbeing, a similar positive relationship can be expected to be found, although the relationship is more complex (Alea & Bluck, 2013; Diener et al. 2018; Van Agteren & Iasiello, 2020). Subjective wellbeing, which often is used as a synonym for 'happiness', typically includes assessments of overall life satisfaction and an assessment of affect balance (Edward Diener et al., 2002). Meaning is seen as a resource to or driver of subjective wellbeing, but is not including in the main theoretical model (Diener et al, 2018). Research has shown that a happy life – simplistically put: a life with more positive than negative emotions—and a meaningful life share overlap but also important differences (Baumeister et al., 2013): being happy is not always associated with high levels of meaning and vice versa. For instance, if meaning in life is driven by sources that cause prolonged stress, i.e. a high workload and responsibilities, it can cause lasting emotional problems, which can ultimately flow into more serious mental health issues and diminished happiness. While studies such as the one by Baumeister et al. therefore can find contradictory results in specific situations, generally, people who have a higher sense of meaning in life

are more likely to have higher subjective states of wellbeing and life satisfaction (Diener et al., 2018; Newman et al., 2014).

1.3 Designing a Meaning and Purpose Intervention

While observational research into meaning in life and wellbeing in the general population has significantly advanced, intervention research is still trailing behind. In other words, the scientific evidence that determines whether dedicated meaning in life interventions under normative circumstances also results in increased wellbeing is less established (Shin & Steger, 2014). Where studies have tested intervention, they have typically done this in specific populations and in more broader wellbeing interventions, as opposed to dedicated meaning interventions. For instance, previous research has utilised and tested "meaning" interventions in various "clinical" populations, for instance in patients with cancer and in those in palliative care (Guerrero-Torrelles et al., 2017; Park et al., 2019). These studies, which investigate interventions such as Meaning-Centred Group Psychotherapy, show that, among others, interventions have the potential to significantly improve subjective wellbeing in these clinical populations. These populations however deal with a significant life altering event that directly impacts life evaluations, which is hard to enact in the general population. Intervention studies in the general population often use meaning activities as part of larger multi-component (positive) psychological interventions, rather than testing them as standalone interventions solely focusing on meaning (Shin & Steger, 2014). These interventions, such as positive psychological interventions (Carr et al., 2020) or reminiscence interventions (Westerhof et al., 2010) generally find improvements in mental wellbeing after taking part in such interventions, but their specific impact on improving meaning in life is less widely investigated in general wellbeing studies.

As Shin and Steger posited back in 2014, there is a need for meaning and purpose interventions that 1) focus on broader normative development as opposed to a restorative narrative 2) have been designed to specifically address meaning and purpose, not just overarching wellbeing and 3) draw upon a clear conceptual framework. Combining Martela and Steger's (2016) theoretical unification with concrete sources of meaning, as guided by Schnell (2009) and Emmons (2003), provides a sufficiently detailed theoretical underpinning to guide the design of such a standalone meaning intervention for the general population. By reflecting on existing sources of meaning and the specific behaviours that foster these sources (coherence), what makes life worth living (significance), and reflecting on or setting long-term goals (purpose), one might strengthen their sense of meaning in life. Using this theoretical underpinning, substantial improvements in meaning ought not to require large changes to the way people live their lives, but rather can be done via introspection and reflection of where they currently are, what they like to do, and where they'd like to be. Increasing the saliency of the sources of meaning in life and how day-to-day experiences and behaviours are contributing to the sense of meaning provides a starting point for building a sense of meaning.

The rapid development of technology and the resulting advent of e- and mHealth interventions (technology-based interventions) have made the creation of such an intervention even more attainable, as it has the potential both facilitate the intervention delivery and the study of its impact (Baños et al., 2017). Firstly, technology has made it far easier to study the impact of interventions, as online survey tools make assessing of overall impact far more resource efficient and scalable. In addition, technology can be used to measure daily fluctuations in outcome variables, in addition to simply determining the impact of

interventions pre and post said intervention. So called experience sampling methods or ecological momentary assessment (EMA) technology (Barrett & Barrett, 2001; Shiffman et al., 2008) can be used to record day-to-day experiences as well as increase the saliency of the sources of meaning in life. These methods have widely been used to collect observational data on well-being (Csikszentmihalyi & Hunter, 2003), but can also be used to facilitate introspection and reflection. As such they can demonstrate how relevant outcomes change in-the-moment and can facilitate insight into specific variables that cause these changes. Of particular interest are specific behaviours that participants do on a daily basis that are associated with a particular high sense of meaning and life satisfaction, i.e. the concrete sources highlighted earlier by Schnell (2009) and Emmons (2003).

Further, the use of experience sampling technology is not limited to simply recording free-text answers but can include a number of techniques to engage participants and promote introspection. For instance, Steger and his colleagues (2013) utilised a photographic method to understand individual's sources of meaning in their lives. This enabled them to bypass the difficulties people can often face in articulating how they experience meaning in life. Existing experience sample platforms can facilitate the use of these methods in wellbeing research (de Vries, Baselmans, & Bartels, 2020) and provide a relatively cost-effective method to test the potential utility of a novel meaning in life intervention, while facilitating the use of a rigorous experimental design to determine its impact in a real-world setting.

1.4 The Current Study

As detailed above, innovative, low intensity methods that build meaning in life may be able to improve meaning in life as well as well-being, but have not widely been tested yet in the general population, particularly in a technology-based format. Having accessible low intensity interventions that can be scaled (Yaden et al., 2018) can be a welcome addition to the existing psychological interventions that have been proven efficacious in improving positive states of mental health and well-being (Bolier et al, 2013; Weiss et al., 2016). Although this by itself is a worthy outcome, improving mental states of wellbeing furthermore buffers the individual from mental illness in the long-term and can aid the recovery of people under active distress (Iasiello et al., 2019; Keyes et al., 2010). In line with the call from scholars for active mental health reform, increased focus on low intensity interventions, and attention to prevention and wellbeing (Patel et al., 2018), we suggest that these methods may function to allow individuals to engage in a self-help method to build their well-being or as a complimentary tool, used by practitioners, to reduce the impact mental illness and low well-being on the individual and society. A first necessary step however is to test whether the creation of such an intervention will result in observable changes in relevant outcomes of meaning and wellbeing.

The current randomised controlled study therefore had the aim of investigating whether a brief week-long technology-assisted meaning program could produce significant improvements in meaning in life and well-being (operationalised as positive affect, negative affect, life satisfaction, the presence and the search for meaning in life) compared to a waitlist control group. In addition, the study aimed to investigate the temporal change of participants reports of meaning in life and life satisfaction as they moved through the intervention. Finally, the study also explored whether the general type of behaviours and daily activities each participant engaged in during the intervention period were associated with momentary levels of meaning, life satisfaction, and fulfilment.

2 Method

2.1 Participants and Setting

Participants were adults drawn from the general community in Adelaide (Australia). The CONSORT statement in Fig. 1 depicts participant enrolment throughout the study; out of a total of 413 community members who were randomised, 133 participants provided complete data that was used to determine the impact of the intervention. The majority (89.47%) of participants were female with age ranging from 19 to 79 years ($M = 43.47$, $SD = 13.18$). Most participants (88.72%) identified as Australian or New Zealander. Level of education varied with 20.30% having completed high school, 38.35% having completed a university degree, and 41.35% reporting a graduate qualification. Most participants worked full time (52.63%), while the rest worked part time (30.08%), were unemployed (10.53%), or retired (6.02%). Over half of the participants reported no religion (66.92%), and 72.18% were married or in a long-term relationship. Of the participants providing both pre and post-intervention measurements 86 were randomised to the control condition and 47 to the intervention condition.

Participants were recruited via two pathways. The first pathway involved recruitment via the city of Adelaide who were community partners in this project. Residents who had previously shown interest in well-being projects were contacted via a generic email with a summary of the project and a link to the registration website. These residents were also targeted using generic communication channels, including email newsletters, social media, and a press release. The second pathway involved recruitment via a generic email list belonging to the South Australian Health and Medical Research Institute (SAHMRI) consisting of people who were interested in well-being research. Participants were excluded if they were under the age of 18, did not own a smartphone, or were unable to read English. No incentive, other than gaining access to the content in the study, was provided to participants throughout the study.

2.2 Program Description

The program in this study consisted of seven activities delivered over seven days—one completed each morning between 08:00am and 12:00 pm, with each activity lasting approximately 10 to 15 min. Respectively, the daily activities focused on the following. On day 1, participants were presented with essential knowledge of the meaning construct and reflected on why working on meaning would be beneficial to them. The second day asked participants to identify specific sources of meaning in one's life. On day 3 participants worked on the comprehension of one's meaning in life by reflecting on what makes them the person they are. The fourth day got participants to identify their own values. On day 5 participants worked on goal alignment and committing to setting a personal life goal for the next year. On day 6 participants reflected on their purpose and create a purpose statement and on day 7 they integrated the previous daily tasks into a vision for living their life more meaningfully going forward. The exact activities and content provided to the participants can be found in the supplementary material.

The activities were structured according to the tripartite structure of meaning and focused on developing coherence, significance, and purpose. Each activity was designed to engage the participant in an explicit behaviour or action. For example, one activity involved taking three pictures of things that made the participant's life meaningful. In order
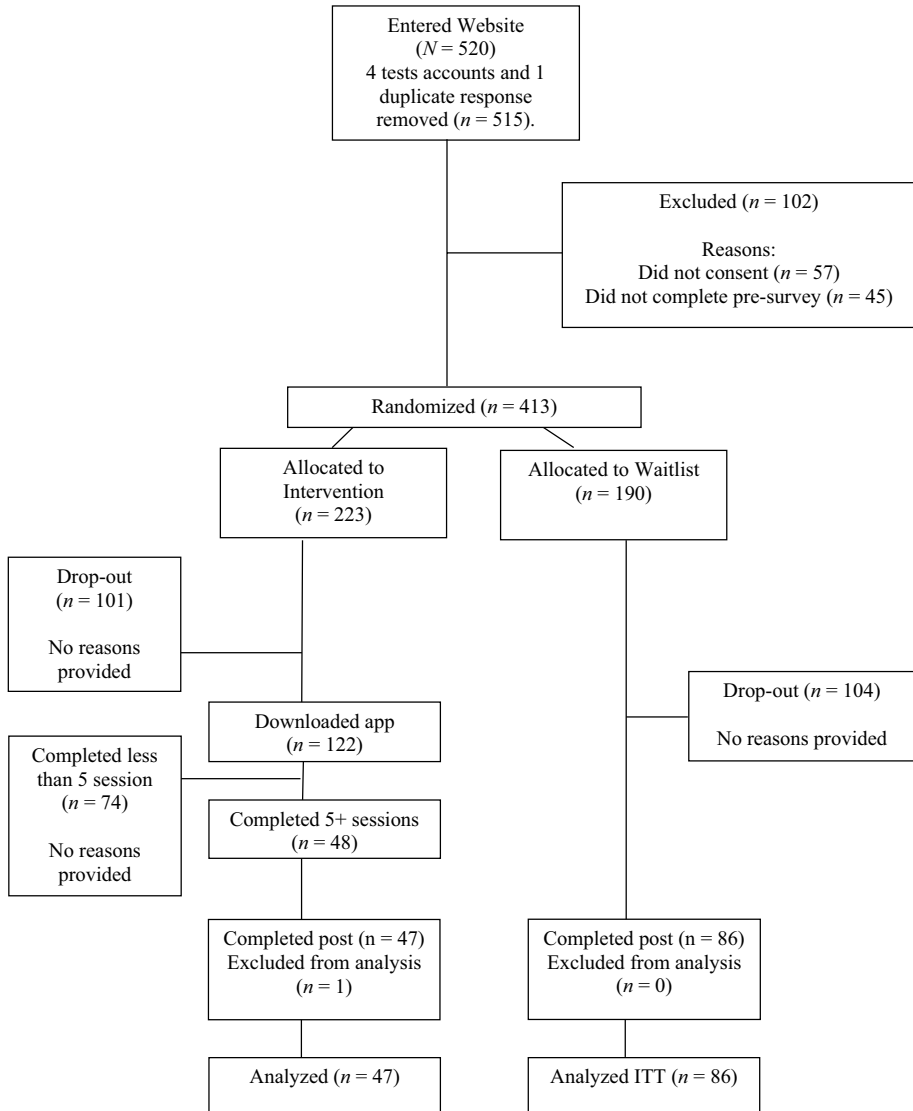
Fig. 1 Consort Diagram: Intervention Study

to optimise the chance that the activities led to sustainable behaviour change (that is, participants increased ability to perform subsequent behaviours or actions in the future), they were crafted in line with behaviour change determinants stemming from the Theoretical Domains Framework (TDF; Cane et al., 2012). The TDF is a framework that synthesises 33 theories of behaviour change into 14 distinct domains, each of which can represent a target area for interventions. For example, the determinant 'knowledge' can be a target area for interventions that aim to build awareness of the importance of working on one's mental health. A visualisation of each daily activity and the behaviour change domains they target is given in Fig. 2.

In addition to the daily activities, users were prompted, by the app, to respond to three questions three times a day, delivered on a random schedule between 08:00AM and 08:00PM. These questions were designed to assist participants in thinking about how and why their day-to-day life activities were building meaning in their lives. The questions asked about how satisfied participants had been with their lives over the past hour, how meaningful their lives had been over the past hour, what activity they were currently doing, and how fulfilling they found the activity.

2.3 Procedure

After registering interest in the study, participants were directed to an online survey page hosted by SurveyMonkey where they were provided with a detailed information sheet, asked to provide informed consent, and after doing so, presented with the baseline assessment. After completion of the questionnaires, participants were automatically randomised to intervention and control groups on the last page of the survey. The investigators were blinded from group allocation. Participants were made aware of their group allocation at the point of randomisation and therefore were not blinded.

At the end of the baseline assessment, intervention group participants were automatically re-directed to instructions on how to gain access to the smartphone app. The intervention was delivered via a third-party experience sampling platform called LifeData. Intervention participants were directed to download the LifeData app to their smartphones and download the meaning and purpose program within the LifeData app. Users received a push notification every time an activity or question was due to be completed. At the end of the seven-day program, intervention group participants were prompted to complete their post assessment, after which they were thanked for their participation. Participants randomised to the control group were placed on a waitlist for a seven-day period. After the seven days control participants received an email from the investigator team with a link to their post assessment. Once participants had completed this post assessment, they were given access to the intervention. Post-intervention data from participants that were first allocated to the control condition and then completed the intervention were not included in the analyses. Due to the significant drop-out in the intervention group, completer-analysis was used to determine the impact of the intervention, see results section below.
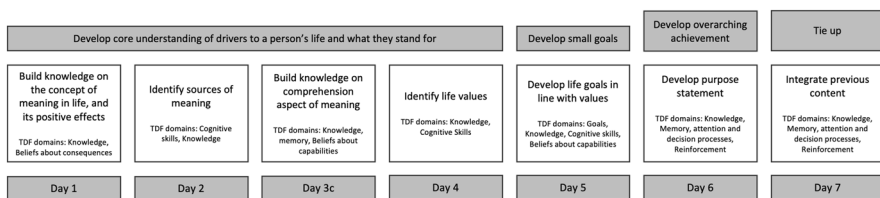
Fig. 2 Overview of core topics covered in the Meaning and Purpose program, and the respective Theoretical Domains Framework (TDF) (Cane et al., 2012) components underpinning each activity

2.4 Measures

2.4.1 Outcomes to measure change from before until after the intervention

The following outcomes were used to assess life satisfaction, affect and meaning in life. The Satisfaction with Life Scale (SWLS; Diener et al., 1985) consists of five items that measure life satisfaction. Items are rated on a 7-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*). A higher mean score across all five items indicates a high level of satisfaction with life. The scale demonstrated acceptable reliability in both pre and post measurements, $\omega_1 = 0.89$, $\omega_2 = 0.90$. An example item is, "I am satisfied with my life".

The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) consists of 20 items in two subscales that measure positive and negative affect over the past week. Items are rated on a five-point Likert scale ranging from 1 (*Very slightly or not at all*) to 5 (*Extremely*). Higher scores on each subscale represent higher levels of positive or negative affect. Both subscales showed acceptable reliability, Positive affect $\omega1 = 0.91$, $\omega2 = 0.92$; Negative affect $\omega1 = 0.86$, $\omega2 = 0.90$. Examples items are, "Excited", "Enthusiastic" (*positive affect*), and "Distressed", "Upset" (*negative affect*).

The Meaning in Life Questionnaire (MLQ; Steger et al., 2006) consists of 10 items in two subscales that measure the presence and the search for meaning in life. Items are rated on a 7-point Likert scale ranging from 1 (*Absolutely untrue*) to 7 (*Absolutely true*). A higher mean score on each subscale reflects higher levels of the presence and the search for meaning in life, respectively. Both subscales demonstrated acceptable reliability in both pre- and post-measurements, Presence $\omega_1 = 0.93$, $\omega_2 = 0.94$; Search $\omega_1 = 0.91$, $\omega_2 = 0.93$. Example items include, "I understand my life's meaning" (*presence*) and, "I am searching for meaning in my life" (*search*).

2.4.2 Momentary Assessments of Meaning and Life Satisfaction

Single items with a response scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) were used to assess momentary evaluations of meaning, "In the past several hours I have led a purposeful and meaningful life", and life satisfaction, "In the past several hours I have been satisfied with my life". Single overarching wellbeing and meaning in life items were chosen to minimise questionnaire burden in the moment.

2.4.3 Assessing daily sources of meaning

To determine which activities may have been associated with meaning and life satisfaction, participants were asked about the exact activity they were doing when they were queried about their momentary levels of meaning and life satisfaction. The questions asked the following: "What activity are you currently doing?", and "Is your current activity fulfilling?". Participants were able to provide free-text responses to the activities and provide an explanation as to why they found the activity meaningful.

Table 1 Descriptive statistics for intervention and control groups

| | Control (n = 86) | | Intervention (n = 47) | |
	Pre-intervention M (SD)	Post-intervention M (SD)	Pre-intervention M (SD)	Post-intervention M (SD)
Age	42.02 (12.99)		46.11 (13.25)	
Gender	88.37% (femle)		91.49% (female)	
Positive affect	3.14 (0.73)	3.17 (0.81)	3.21 (0.75)	3.48 (0.69)
Negative affect	1.92 (0.61)	1.94 (0.70)	1.90 (0.69)	1.69 (0.74)
Life satisfaction	4.71 (1.27)	4.71 (1.35)	4.72 (1.32)	5.23 (1.15)
MLQ: Presence	4.52 (1.42)	4.57 (1.45)	4.73 (1.42)	5.12 (1.35)
MLQ: Search	4.85 (1.23)	4.71 (1.39)	4.85 (1.53)	4.68 (1.66)

Table 2 Correlations between all outcome measures pre and post intervention

	1	2	3	4	5
1. Positive affect		−.46***	.66***	.69***	−.26**
2. Negative affect	−.45***		−.53***	−.48***	.28**
3. Life satisfaction	.67***	−.44***		.70***	−.29**
4. MLQ: Presence	.65***	−.44***	.65***		−.31***
5. MLQ: Search	−.20*	.20*	−.29**	−.35***	

Bottom triangle are correlations between pre-intervention scores and the top triangle are post-intervention scores

*Correlation is significant at 0.05 level; **Correlation is significant at 0.01 level; ***Correlation is significant at 0.00 level

3 Results

Descriptive statistics for the five outcome variables are displayed for control and intervention groups in Tables 1 and 2 displays the correlations between all outcome measures pre and post intervention.

In the intervention condition, participation in daily activities was acceptable, 2.12% did not complete any of the daily activities; 10.64% completed three activities, 25.53% completed four activities; 36.17% completed five activities; 12.77% completed six activities; and 12.77% completed all seven activities.

3.1 Change in Outcomes before and after the Intervention

To establish the efficacy of the intervention a between-subjects multivariate analysis of covariance (MANCOVA) was used to determine changes in affect, life satisfaction, and meaning in life between the intervention and control groups. Change scores—the difference between post-intervention scores and pre-intervention scores—for each of the five outcomes were calculated and entered into the MANCOVA as the dependent variables. Change scores were used as they are a recommended between-group analysis approach

(O'Connell et al. 2017). The pre-intervention scores for each of the five outcomes were entered as covariates to adjust for any baseline differences between groups, which also needs to be considered in case of using change scores (Clifton & Clifton, 2019). Intervention condition was entered as a fixed effect. Four univariate and four multivariate outliers were detected and excluded from the analysis as they influenced the result and violated the assumptions for use of MANCOVA. All other assumptions for use of MANCOVA were met.

There was a significant multivariate difference in change scores between the intervention and control groups, Wilk's $\Lambda = 0.902$, $F(5, 114) = 2.47$, $p = 0.037$, partial $\eta^2 = 0.098$, displaying a moderate to large overall effect for change in outcomes between the intervention and control group. Planned comparisons indicated a significantly larger improvement in positive affect, life satisfaction, and the presence of meaning in life for the intervention group compared to the control group, see Table 3. The significant effect sizes found in this analysis generally were medium (η2 ranging between 0.05 and 0.08). There was no significant change in search for meaning in life or negative affect when scores were compared between the two groups. The comparison of change variables between groups is visualised in Fig. 3.

3.2 Daily Change in Meaning and Life Satisfaction Over the Course of the Intervention

The use of a experience sampling app allowed for the use of EMA to track daily change in outcomes for the intervention group. Analysis of this data provided another angle on the change experienced by participants, specifically in their levels of satisfaction with life and sense of purpose throughout the invention. Multilevel modelling (MLM) was employed to analyse the within-person change over the course of the intervention. Preliminary analysis indicated a very strong correlation between EMA items of life satisfaction and meaning in life ($r = 0.85$, $p = 0.000$). Therefore, a single-factor exploratory factor analysis (EFA) was conducted with the two outcome variables using maximum likelihood estimation. The single factor explained 79.8% of the variance in the two indicator items. Both items loaded at 0.893 on the single latent factor. These similar loadings were expected as 81.8% of responses across the two items where the same. Factor scores were then derived from the EFA using regression and these scores were then entered into the MLM analysis as representative scores for growth in both satisfaction with life and purpose in life across the intervention (referred to as *growth scores*). Analysis of Mahalanobis distance indicated four multivariate outliers which were subsequently removed from the data set. The final MLM model contained 21 potential total measurement occasions nested within 47 participants for a total of 577 growth score observations (410 observations were *NA*).

Table 4 provides a summary of all multilevel models. Model 1 was an intercept only model, where growth scores were regressed on measurement occasion. Model 1 acted as a baseline comparison for all other models. Model 2 introduced participants as a random intercept, which resulted in a significant improvement in model fit and indicated that participants varied significantly in their starting growth scores. Model 3 regressed growth score on both participants and measurement period (entered as a fixed effect). This model showed significant improvement over Model 2 and indicated the measurement period nested within each participant was a significant predictor of participants growth score. Finally, Model 4 allowed for the random variation of slope based on an interaction between participants and measurement period, which accounts for potential differences between

Table 3 Mean Change Scores, Adjusted Mean Change Scores, and Planned Comparisons for the Second MANCOVA

	Control (n = 81)		Intervention (n = 44)		ANCOVA's			
	Change scores M	Adjusted change scores M [95% CI]	Change scores M	Adjusted change scores M [95% CI]	F	df	p	η2
Positive affect	0.006	0.022 [−.077, .121]	0.253	0.225 [.090, .360]	5.690	1, 118	.019*	.046
Negative affect	−0.015	−0.006 [−.112, .101]	−0.148	−0.165 [−.309, −.020]	3.066	1, 118	.083	.025
Life satisfaction	0.012	0.042 [−.110, .194]	0.509	0.455 [.248, .662]	10.059	1, 118	.002*	.079
MLQ: Presence	0.054	0.052 [−.098, .203]	0.359	0.363 [.158, .568]	5.772	1, 118	.018*	.047
MLQ: Search	−0.183	−0.171 [−.360, .018]	−0.109	−0.131 [−.388, .126]	0.060	1, 118	.807	.001

*Significant using the Benjamini–Hochberg correction for multiple comparisons, with a false discovery rate of 5%
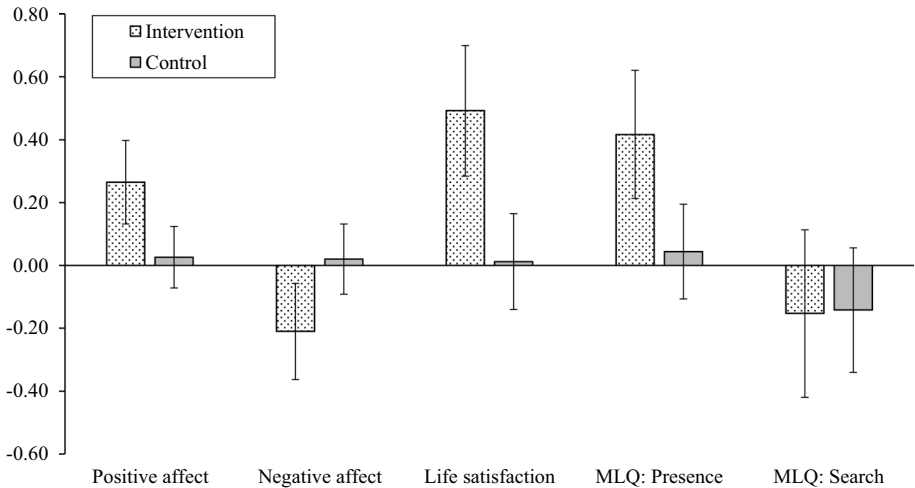
Fig. 3 MANCOVA Estimated Mean Change Scores for all Dependent Variables with 95% Confidence Intervals

Table 4 Multilevel model comparison: intervention participant growth over course of the 7-day program

Model	df	Comparison	Log-likelihood	Δ Log-likelihood	p	AIC
Model 1	2		−793.70			1591.40
Model 2	3	1 vs 2	−669.54	248.32	.000	1345.08
Model 3	4	2 vs 3	−665.85	7.39	.007	1339.69
Model 4	6	3 vs 4	−662.53	6.64	.036	1337.05

participants' rate-of-change over the seven days. Model 4 showed an improved model fit and showed that participants' rate-of-change varied significantly between participants ($b=0.044$, $p=0.041$). However, there was substantial relative variation around participants' rate-of-change ($SD=0.091$). Indeed, the intercept by slope correlation was negative and moderate ($r=-0.605$) indicating that, as participants increased in their starting scores the growth they experienced throughout the seven days decreased. Overall, this model indicates a general positive trend for intervention participants over time, but also indicates a considerable level of individual variability in their responses Fig. 4.

3.3 Results of Momentary Reports of Activities

To understand which activities led to higher levels of fulfillment we analysed the relationship between participants' reports of their current activity throughout the seven-day study and their momentary reports of fulfillment using multilevel modelling (MLM). The first stage of this analysis categorised participant's free responses to, "What activity are you currently doing?" according to two different criteria. The first criterion was an amalgamation of the domains of well-being outlined by Schnell (2009) and Emmons (2003), which include relationships, self-transcendence, well-being, work, and other. This categorisation
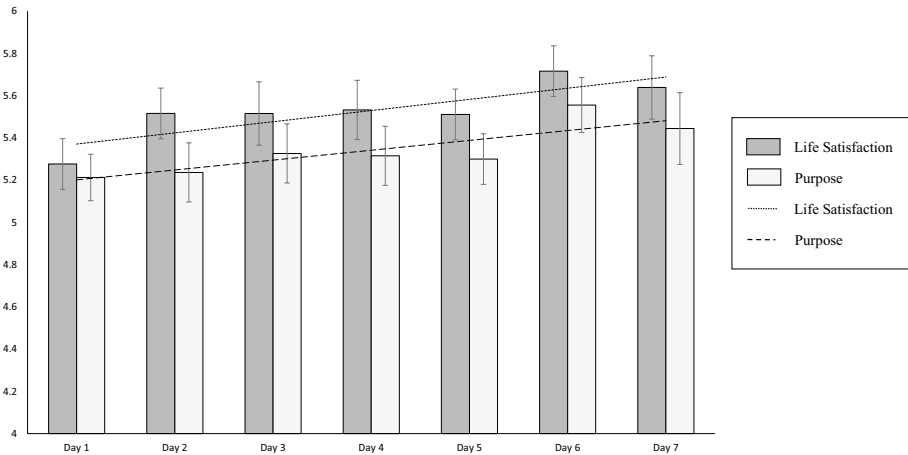
Fig. 4 Average Self-report Life Satisfaction and Meaning in Life for Intervention Participants by day

allowed us to investigate participants fulfillment against a theoretical grouping of activities. The second criterion emerged from the free responses as we categorised participants activities into concrete types, such as commuting, housework, or rest/self-care. This allowed a practical investigation into the types of everyday activities that participants found fulfilling. Coding was performed by two independent raters, with a third resolving any disputes. The interrater reliability was strong, as determined by a Kappa of 0.85.

Two separate models were used to then understand the impact of each categorisation on participants' momentary levels of fulfillment. The intra-class correlation (ICC) indicated that there was a small association between individuals' successive reports of fulfillment throughout the seven days ($ICC = 0.20$). The magnitude of this correlation (i.e. nonzero) was such that we considered it essential to nest fulfillment scores within participants. The first model regressed the five broad categories on participants' momentary scores of how fulfilling they considered the activity to be. This model gave an indication of which category of activity produced significantly higher reports of fulfillment. The second model regressed participants' activities grouped in the 15 more concrete categories onto their momentary sense of fulfillment. Similar to the first model, the second model gave an indication of which activities predicted significantly higher scores of fulfillment.

Results from the first model, which regressed participants momentary fulfillment scores on the five broad categories, indicated that spending time maintaining relationships, $b = 1.17$, 95% CI (0.94, 1.40); self-transcendent activities, $b = 0.64$, 95% CI (0.36, 0.93); and well-being activities, $b = 0.29$, 95% CI (0.13, 0.45) all contributed significantly to fulfillment. Work activities, however, did not, $b = -0.06$, 95% CI (-0.21, 0.09). The second model, which regressed fulfillment on the 16 groups of activities, indicated that caring for animals, $b = 1.00$, 95% CI (0.35, 1.66); caring for other humans, $b = 0.37$, 95% CI (0.03, 071); eating food, $b = 0.71$, 95% CI (0.46, 0.95); enjoying hobbies and leisure activities, $b = 0.44$, 95% CI (0.16, 0.72); physical activity, $b = 1.23$, 95% CI (0.82, 1.63); maintaining relationships, $b = 1.11$, 95% CI (0.87, 1.34); and volunteering, $b = 0.90$, 95% CI (0.30, 1.50) all contributed significantly to a sense of fulfillment. Whereas using social media or browsing the internet, $b = -0.93$, 95% CI (-1.43, -0.43) and watching TV or a movie, $b = -0.53$, 95% CI (-0.79, -0.28) were significantly associated with a decreased sense of fulfillment.

None of the other activities, being commuting, educational-activities, housework, resting, shopping or work-activities, significantly impacted a sense of fulfilment.

4 Discussion

The findings of this study point to the efficacy of a brief 'low intensity' technology-based meaning and purpose intervention. A significant between-group difference in average levels of change in positive affect, life satisfaction, and the presence of meaning in life was observed. The study did not find a significant decrease in the search for meaning in life and negative affect. The improvements in meaning in life were also found when looking at intervention participants' daily growth scores, although variation in the individual growth of participants existed. Further, the study found that activities such as caring for animals and other humans, eating, hobbies, maintaining relationships, and volunteering were reported as fulfilling. Activities like browsing social media or the internet, and watching TV or movies were generally reported as unfulfilling.

4.1 Explanations for the different findings

This meaning intervention, following focus areas recommended by Shin & Steger (2014), aimed to stimulate meaning comprehension, purpose and significance. The results provide support for the underlying notion that encouraging people to focus on sources of meaning that already exist in their lives and educating them about the concepts of meaning and purpose first and foremost lead can lead to a significant increase of self-reported meaning (Steger, 2009). This study shows that this can be achieved within the general population under normative circumstances, rather than in clinical populations and under life-altering circumstances (Guerrero-Torrelles et al., 2017; Park et al., 2019). The results here will be encouraging for other meaning in life interventions that aim to achieve a similar goal, as for instance is the case for so-called 'Life-Crafting' interventions (Schippers & Ziegler, 2019).

The constructs of meaning in life and life satisfaction are considered to be relatively stable (Steger & Kashdan, 2007), and it was therefore anticipated that it would be too difficult to stimulate meaningful differences by directing individuals to identify and build new sources of meaning in life. As the current intervention did not introduce any new sources of meaning in life or encourage people to seek new sources of meaning in life, it is not surprising that a significant decrease for the search for meaning was not observed. It may well be that new and personally meaningful changes, either positive or negative, need to occur in a person's life in order to decrease the need to search for meaning (Roepke, 2013; Silver & Updegraff, 2013). This may require securing a new meaningful vocation, having a spiritual or religious experience, or have a significant life event occur. This arguably requires more significant changes in someone' life beyond what this intervention could deliver, and would be more suitable for interventions that have shown benefit under these circumstances, e.g. logotherapy (Frankl, 2014).

The second main finding showed that this low intensity intervention led to a significant increase in overall well-being post intervention, compared to the control group. Our results show that meaning and well-being can be built using brief technology interventions that are simple to use. Considering the important role of meaning in underpinning general well-being, and the well-documented association of well-being in preventing and reducing

mental disorder (Iasiello et al., 2019; Keyes et al., 2010), this proves to be promising as a therapeutic or self-help avenue for both clinical and non-clinical populations. The fact that it was delivered via a smartphone app also facilitates scalability, with minimal resourcing required, showing its utility in testing proof-of-concepts in wellbeing research.

The intervention tested here utilised introspection and reflection on existing resources and strengths, which draws similarities to positive psychology exercises that draw on existing resources, for instance using values and strengths to guide positive behaviour and positive outcomes (Schutte & Malouff, 2019). This study specifically focused on one core construct, rather than combining various techniques; a construct that plays a central role in various wellbeing theories and a significant body of wellbeing research. This specific focus may explain why the moderate effect sizes found in this study surpass the effect sizes typically observed in other well-being interventions, which are generally small (White et al., 2019). This is particularly promising in light of the effect sizes typically observed in other well-being interventions, which are generally small (White et al., 2019). This is particularly promising in light of the typically documented intensity effect, where wellbeing interventions that last longer than a month have a higher impact than those that are shorter in duration (Bolier et al., 2013).

The improvements in meaning and life satisfaction were furthermore observed in daily ratings, showing the utility of experience sampling platforms to conduct research and deliver interventions, including in wellbeing research (de Vries, Baselmans, & Bartels, 2020). This study joins a limited number of other technology-based meaning and purpose interventions utilising a similar technology. A noteworthy intervention is the Jool Health app (Bidargaddi et al., 2018; Jarden, 2017), which is based on Victor Strecher's work on purpose (Kim et al., 2014; Strecher, 2016). Both the Jool health app and the program tested here use experience sampling as a core component to encourage people to reflect on their existing daily routines. This highlights the ability for experiences sampling and the related approach of ecological momentary assessment to be used as a tool to help people build mental health and well-being, in addition to its normal use as a research tool; an innovative approach which is already being used in other health areas (Simons et al., 2017; Van Knippenberg et al., 2018).

The momentary levels of meaning displayed interesting results, where most behaviours that are traditionally associated with hedonia were negatively associated with fulfillment compared to those that are traditionally thought of to be eudaimonic. Eudaimonic behaviours are activities that work towards factors of life that are inherently worthwhile (Ryan & Deci, 2001) like fulfilling personal potential and building positive resources such as healthy relationships. They have previously been shown to be linked to both momentary and global levels of meaning (Steger et al., 2008b). By contrast, prototypically 'hedonic' activities may lead to momentary pleasure but do not build enduring well-being resources, e.g. watching tv (Seligman, 2002). A seemingly surprising result is the lack of a link between 'work' and fulfilment, as having active employment is often considered to be an important resource for meaning. A potential explanation may lie in the fact that participants did not evaluate their job in general, but rather rated daily activities. It is not surprising that a sense of fulfilment is lacking when asking someone to reflect on the activity they are doing in the moment: individuals would evaluate mundane tasks as opposed to how employment contributes to an individual's identity.

4.1.1 Limitations and implications for future research

The current study was not without a number of limitations. The main limitation involves the high drop-out rate in the intervention arm. Drop-out rates in eHealth studies are well-documented (Blankers et al., 2010), especially in studies where no incentives are provided. Due to resource constraints, this study did not set out to develop a custom-made app. It rather used an existing experience sampling platform, which was not optimised for usability or engagement, and arguably was not designed to act as an engaging intervention method. Usability, both a well-designed user interface and a good user experience, are key drivers to engagement (Kelders et al., 2012). While this study was effective as a proof-of-concept, future intervention studies need to focus on designing engaging solutions, which has the potential to further strengthen the efficacy of interventions and help retain participants.

The participants that did complete the intervention must have been highly motivated to participate given no incentive was provided for participation. This means caution is warranted when trying to extrapolate the findings to people that show lower engagement or intrinsic interest or concern for their mental health and well-being. This being said, the use of incentives in psychological research does not come without its own issues (Sharp et al., 2006) and the lack of incentives means the sample better represents real-world adoption, where payment for use of services is not the standard. The sample was too small to do any meaningful post hoc analysis on engagement, a task for future studies.

Other limitations involved a large overrepresentation of females (almost 90%) which can be attributed to the recruitment strategy, which largely relied on mailing-lists for people interested in well-being projects. The sample furthermore consisted of community samples, which means that the results should not simply be interpreted for a clinical population. Future research on simple meaning in life interventions for individuals with recurrent psychopathology and how it may assist with recovery would be undoubtedly a fruitful area of investigation, particularly in light of the increasing focus on personal versus functional recovery in mental illness (Leamy et al., 2011).

The analysis of participants' EMA data provided insight into the change experienced by the intervention group. This type of data and analysis is not usually seen in RCTs and is one benefit of using a digital RCT design. As our design used a waitlist control, no EMA data was collected from the control during the intervention period. This limitation means that we could not compare participant growth across the two groups. Nonetheless, the analysis of participant change over time provides insight into the unique nature of each participants growth, that is, despite participants showing unique starting growth scores and varying in the rates of growth over the seven days, all participants demonstrated a general positive trend in growth scores over the seven days. Future research with EMA data from both intervention and control participants will enable an analysis of the comparative growth, stasis, or decline between the two groups during the intervention. Further, the current sample was too small to allow analysis on participants completing differing numbers of daily interventions (i.e. > 4 compared to < 4 daily activities) and how this might influence outcomes. Our findings suggest broadly that any engagement in thinking about sources of meaning in life has a positive effect. Future research on intensity of intervention would be illuminating.

Finally, as the current investigation only looked at short-term effects of the intervention, future research on the long-term effects of similar interventions would be of great interest. Not having a longer term follow-up is a limitation of the study and results

should only be interpreted in light of this limitation. Although some brief wellbeing interventions have found longer-term effects, generally lower intensity wellbeing interventions do not produce long-lasting effects. As effect sizes in this study were higher than is the case in average wellbeing studies, and the technology we used was not designed for optimal engagement, we remain hopeful that interventions such as the one presented here may have the ability to provide impact beyond the immediate short term.

5 Conclusion

This community-based randomised controlled study of a short technology-based meaning and purpose intervention showed promising short-term results. It paves the way for larger studies with more adequately developed technology as an innovative avenue to build well-being and promote mental health, both in the general community and in clinical populations.

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Terms and Conditions

Supplementary information to:

Using a Technology-Based Meaning and Purpose Intervention to Improve Well-being:

A Randomised Controlled Study

[Author names omitted]

Intervention content

This document details the exact intervention content for the Meaning and Purpose intervention that was tested as part of the "Using a Technology-Based Meaning and Purpose Intervention to Improve Well-being: A Randomised Controlled Study" article. Brackets indicate content that belonged to each screen in the app. An overall aim to each daily activity is provided below as well as an indication of the word count per daily activity.

The content below only displays the intervention specific content. Any artwork or filler imagery is excluded.

Introduction.
Aim: this content describes the welcome page that participants would see after they enrolled in the study. The content
Word count: 225

[Welcome to the *[name omitted]* and *[name omitted]* Meaning and Purpose project
This program is designed to help you think more deeply about "meaning in life" and how you can use it to start feeling and functioning better. At the end of this program we hope that you will have a better understanding of how your values, purpose, and goals can work together to build a sense of meaning, and we provide you with some concrete activities which aim to help you grow your meaning in life into the future.]

[The program will give you seven activities to do over the next seven days; one activity each day. The program will also ask you three questions at different times during the day; questions that will help us get a bit more insight into your levels of meaning, purpose and wellbeing while your days progress. We will also ask you what activity you are doing at that moment, so we get a better understanding whether specific activities can influence the programs' results.]

[Please be honest when answering these questions: we assure you that your data will be kept secure, and will not be shared with anyone other than the research team involved. Each morning at 09:00 you will receive a short activity to complete: try to put aside 10 minutes to undertake it. You may respond to each activity for up to 3 hours after you receive the notification before the window closes. Be sure to have notifications turned on for this app, as we use notifications to deliver your daily activity and check in with you throughout the program.]

[If you have any questions or complaints during this program please contact our research team at [study email address]. The program will start tomorrow at the time you select below.
We wish you all the best.
• 	Please enter your name and email address.
• 	Please select at what time you would prefer to receive your daily activity.
7:00am, 8:00am, 9:00am, 10:00am, 11:00am]

[Thank you for completing the introduction. Remember: over the following days we will send you three questions at different times. Try and respond immediately when you see the notification on your app.
We will check back in tomorrow with your first meaning building activity. See you then.]

Activity 1 – Theoretical and program outline
Aim: The aim of this activity is to educate the participant about a simple theory of meaning in life and the structure of the program over the next 6 days. The purpose is psychoeducation or to build knowledge that serves as a foundation for the rest of the program.
Text: 536 words

[Welcome to the first day of your meaning and purpose program. Let's start by explaining what we mean with meaning in life, and why we think it is important.]

[Having a sense of meaning in life has been a central interest of religion and philosophy for many years, and more recently has received attention from psychologists and researchers who wanted to know: what are the benefits of having meaning in life, and how can we grow someone's sense of meaning in life.]

[What is meaning in life?
Meaning in life can mean a lot to different people. You can see it as a feeling that you can make sense of the world; as the relationship between people and things; as pursuing and attaining life goals; and as a broad concept of the significance of your own life.
You can generally split it into two parts: comprehension and purpose.
1. Comprehension is your ability to find patterns and significance in events and experiences.
2. Purpose can be seen as a highly motivating long-term goal that you are passionate and highly committed to, or that has deep value to you.
We summarised it in the figure below.

[Figure placeholder]

This picture visualises how meaning in life can be built, and how it relates to some of its building blocks. We will explore this more in the upcoming days.]

[Why is meaning in life important?
Meaning in life is important for the way you function and how well you feel. The greater your sense of meaning the fewer negative emotions you feel. For instance, you may notice less problems with your mood or have fewer anxious feelings. It even may lower your risk of more serious psychological problems down the track.
Above all, it can help you give direction to your life, and can help guide you when important life decisions are coming up.]

[How does this program work?
This program is based on the model presented to you earlier. Let's revisit it so we can remind ourselves what is coming up in the upcoming days. In this program, you will:

- identify the sources of meaning in your life,
- start to better understand your own sense of meaning,
- identify deeply held values important for meaning and purpose
- make some key short-term goals to build meaning in your life, and
- start working on developing your own purpose in life.]

[Today's Activity
Try and reflect on the text you just read; feel free to go back and read it again if you have to.
Now ask yourself:
Why would building more meaning in your life be good for you, your close relationships or maybe even your community?
In other words: what are your drivers for building more meaning in your life?
Write down your answers in the box below.]

Activity 2 – Sources of meaning
Aim: To help participants understand the people, places, things, and activities in their lives that contribute to their sense of meaning in life.
Text: 264 words

[Welcome to day two of the program. By now you should have received several brief measurements of your meaning, purpose, and wellbeing. These measurements keep going for the next six days: please keep completing them as they give us important insights at the end of the program.]

[Today's activity focuses on the sources of meaning in your life. That is, the people, goals, events, or objects that give you a sense of meaning in your life.

Identifying and naming your personal sources of meaning is a great way to start working on getting more meaning in your life. By pointing to something real in your life and acknowledging that it adds positive value to your life, you link an abstract construct (the philosophical concept of 'meaning in life') to something that you can see, feel and understand. Creating a couple more of these explicit links will be the goal of today.]

[**Activity**
Throughout the day, take three photos of things that you feel bring a sense of meaning to your life. These photos can be of anything that is meaningful to you or anything that represents something that is meaningful to you. Your job, your hobbies, your loved ones, your neighbourhood, your morning routine; you name it. Anything that is important to you goes.

You can browse through your camera roll in the next screen, or immediately start taking pictures. The activity is open until 12PM tonight.

Want to keep snapping pictures? There is an extra activity called 'photo-time' that you can access every-time you open the life data app.]

Activity 3 – Meaning comprehension

Aim: The aim of this activity is to educate participants about the comprehension component of meaning in life and to encourage them to reflect on this.
Text: 258 words

[Here we are, day three. If you can remember back to the first day we looked at how meaning in life is divided into two parts, comprehension and purpose. Today we will discuss and further explore the comprehension side to meaning in life.]

[The comprehension aspect of meaning is made up of understanding who we are, how we understand the world around us, and our unique opportunities in the world.
   • Understanding who we are looks at things like our personality, characteristics, abilities, preferences, strengths, and weaknesses.
   • Understanding the world is about reflecting on our worldviews and beliefs.
   • Finally, thinking about our place in the world focuses on thinking about our life roles, opportunities, and the limitations we face.
Let's do a short exercise to help you focus on who you are, the world you live in, and your significance in this world.]

[Activity
To help you better understand who you are and how you fit in the world, think about how you want to be remembered. Imagine that you are being given an award to recognise you as a human, and for all the good things you stand for.
   • What would the award description say about your life, who you are and how you lived?
Focus on the positive things you are known for; identifying your strengths and what you stand for is the important part here. Take five minutes to reflect, and write down what you would like your award, and the speech during the ceremony, to say in the box below.]

Activity 4 – Values
Aim: The aim of this activity is to introduce the concepts of values, goals, and purpose. It will then focus on understanding the importance of values and help participants to identify their values.
Text: 306 words

[It's day four of the grogram; you are already half way through the program! Over the next three days we will discuss values, life goals, and purpose, and how these three areas interact to promote meaning in life. Today we will focus on values. Reflecting on your values, the areas of life that matter most, is the foundation for developing meaningful goals in life and at a broader level your purpose in life.]
[Values are the ideals or areas of life that we hold to be important. There are many values out there, some examples are creativity, relationships, kindness, spirituality, or achievement. Identifying the things that are important to you, is beneficial not only for your sense of meaning in life but for your overall wellbeing. With this in mind, consider the questions below, reflect on them and provide an answer when you're ready.]

Questions

[Think about a special, peak moment (or multiple moments) when life was especially rewarding, engaging or significant. What was happening? Write them down below. When you are done writing down your answer, press continue to go to the next part of the activity.]

[Let's try and match some values to these life events. What were the values that were being honoured in that moment? List them below. Take your time and really think about it. When you are done writing down your answer, press continue to go to the next part of the activity.]

[Now let's think beyond life events: what do you value in your life (other than basic needs such as food and shelter)? Love, creativity, adventure? Write them down on a piece of paper.
Having answered the above questions could you list the three most important values in your life? Please write these in the box below. Also write it down on a piece of paper if you need a memory jog; we will come back to it over the next few days.]

[Need some help? If you want to find out more about your values you can visit the VIA Character strengths website and take the free survey to help identify your top character strengths.
www.viacharacter.org/www/Character-Strengths-Survey]

Activity 5 – Life goals
Aim: The aim of this activity is to encourage participants to think about life-goals that align with their values and to set up small steps they can take in the next week to furthering these goals.
Text: 298

[Welcome to day five. We have been learning a lot about who we are and what we stand for. Now let's explore the goals we can achieve in life. Something more tangible, something we can strive towards, and "cross off".]

[Research suggests that pursuing personal goals helps give your life structurem can lead to more personal meaning, and is important for self-discovery. Goal setting and goal pursuit is essential for achieving a sense of meaning and wellbeing in life.

Having any life goals is good, but having goals that align with your deeply held values is even better. When we pursue goals that are personally meaningful to us we enter a feedback loop—we pursue a goal that aligns with one of our values, making progress in that area encourages us to keep going and reinforces our underlying value.
With this in mind, try answering the questions below.]

[**Questions**
Think back to yesterday and the three most important values you identified. Can you think of a current life-goal that you hold for each of these values? If you don't have a current goal for a value, can you think of one now?]

What goals can you think of that you would like to achieve in the upcoming year that is in line with your values?

Breaking down goals into smaller parts is a helpful way to move forward. What small step can you take in the next week to move towards each of the three goals you listed above?]

[Activity
Today, share one of your goals with a loved one, a friend a colleague or family member. Tell them what step you will take towards achieving those goals in the upcoming week. Public commitments like these are great drivers of positive change.]

Activity 6 – Purpose
Aim: The aim of this activity to help participants understand purpose and its interaction with values and life-goals. Participants will be encouraged to create a life purpose statement.
Text: 312 words

[During the past days we have been working on identifying sources of meaning, what we stand for, our values and have looked at small goals we want to achieve. Now let's combine this all in an overarching long-term achievement you wish to reach. An achievement that you are passionate about and are highly committed to. Or in other words: your purpose in life.]

[Purpose is a really important part of life and helps direct your behaviour towards important goals. Notice that there is a difference between purpose and goals. A Goal is something which we strive to achieve. Purpose is the reason for achieving the goal.]

[Think of the following example: James might decide his purpose in life is to care for people, his purpose may lead to the goal of studying at university to become a nurse. In this way our purpose influences the goals we need to achieve.]

[This short exercise will help you to think more deeply about your purpose in life. Read the following questions and reflect on them throughout the day. Provide an answer in the box below each question.]

[Questions
Over the past few days you have written your three top values, and a life-goal that aligns with each of these values. When considering your values, what matters most to you, and your life-goals, can you have a go at writing down a purpose for your life in 1 to 2 sentences? This is what we call a purpose statement. Give it a go below.]
[Activity
Once you have come up with you purpose statement write it out and put it somewhere you will see it every day. Think of your bathroom door, your mirror, your office. Anywhere that you frequently visit. This will remind you of your goals and values and will promote a sense of meaning, purpose and wellbeing in your life.]

Activity 7 – Conclusion and integration
Aim: The aim of this activity is to summarise the program and to guide participants to integrate their new knowledge of values, goals, and purpose into a complete concept of meaning in life.
Text: 397

[Welcome to the final day of your meaning and purpose program! We hope it's been beneficial for you and got you thinking about the meaning of your life. Today we will recap what you have covered throughout this program and give you a final activity to tie it all together.

This program has focused on a simple framework of meaning in life and was designed to provide practical steps to help you grow a sense of meaning and purpose in your life.]

[To summarise, comprehension and purpose are the building blocks of meaning in life.

Comprehension is about understanding yourself, the world, and your place in the world and purpose is a long-term aspiration that you are passionate about.

As we learnt in days 5 and 6, it is important to understand the central values in your life and how they align with your life-goals.

It is important to develop a harmony between values, life-goals, and purpose, and to understand how they integrate together to give you a sense of meaning in life.]

[We hope that this framework of meaning in life and the understandings that you have gained from this program will encourage you to pursue a bigger sense of meaning and purpose in your life into the future. But remember: this is just the start of your journey to meaning in life.

Our final exercise is to integrate the work we have done throughout this program.]

Questions
[Do you have a vision for what your life might look like five years in the future? In your dream where are you, what are you doing, and who are you with? Let the work you have done on your values, life-goals, and purpose guide your response to the question. Write as much or as little as you'd like below.]

[Now let's think of a way to send this dream to yourself in a year. Perhaps send an email to yourself that will not be sent until a year's time. Perhaps you can print out the dream and put it in a box that you will not open for a year. Ask a loved one to hold on to it for a year, and give it back to you. Get as creative as you want.]

[Now the ball is in your court to make sure you will make this aspiration happen.
Thank you for your participation – *display outro page and post survey.*

8.5. Study 5. Improving the wellbeing and resilience of health services staff via psychological skills training

RESEARCH NOTE

Improving the wellbeing and resilience of health services staff via psychological skills training

Joep van Agteren[1,2]* , Matthew Iasiello[1,3] and Laura Lo[1]

Abstract

Objective: Health services staff work in a stressful environment, which can negatively impact their mental health and wellbeing, and as a result can affect psychosocial and professional functioning. The implementation of resilience training aims to provide staff with basic psychological skills to improve mental health outcomes. The aim of the current pre-post study was to determine the short-term effects of group-based resilience training on clinical and non-clinical medical staff's (n = 40) mental health outcomes.

Results: The study showed statistically significant improvements in resilience ($r = 0.51$, $p = 0.02$) and wellbeing ($d = 0.29$, $p = 0.001$) from before to 1 month after the training. Participants with the lowest wellbeing and resilience scores at start of the training showed higher effect sizes compared to those with highest wellbeing and resilience scores, ($r = 0.67$ compared to $r = -0.36$ for wellbeing scores and $d = 0.92$ compared to $d = 0.24$ for resilience scores); differences that point to particular impact of the training for people with the lowest baseline values. No significant changes in psychological distress as a result of depression, anxiety and stress were found. Brief implications of the findings for mental health and wellbeing interventions in the health services are discussed.

Keywords: Resilience intervention, Positive mental health, Psychological skills training, Wellbeing, Positive psychology intervention, Wellbeing and resilience program, Resilience

Introduction

Health services staff, both clinical and non-clinical, operate in high stress environments, which are often under-resourced and under strain. This environment negatively impacts their mental health and wellbeing, with a substantial body of literature indicating high levels of stress and burnout, indicators of low wellbeing, as well as more serious symptoms pointing to mental illness in this occupational group [1–8]. The adverse consequences of stress, burnout, overall low wellbeing and mental health on individuals are well known and include diminished physical and psychosocial functioning [9, 10]. Additionally, these outcomes can result in higher rates of absenteeism [11]

and when on the job, can lead to reduced professional functioning and presenteeism [12]. This in turn can lead to lowered quality of care [13] for patients that receive treatment by health professionals with low wellbeing and mental health issues. For instance, major medical errors, a leading cause of preventable death [14], increase with higher rates of burnout and depressive symptoms [7].

Pro-actively addressing positive mental health, being defined as high levels of wellbeing and the ability to function fully [15, 16], by providing basic psychological skills training to health services staff, is an intervention health service organisations can implement as a primary prevention strategy for the general workforce staff [17]. Furthermore, they can implement it as a targeted intervention focusing on staff who display low levels of wellbeing and resilience (hereafter referred to as low baseline wellbeing and resilience), as this population is at most risk of developing mental illness in the future [18, 19].

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The current study aimed to establish the short-term effects of group-based resilience training on mental health outcomes, with the purpose of establishing local baseline data and determining preliminary effectiveness in changing wellbeing and resilience, and indicators of mental distress due to depressive symptoms, anxiety and stress. A secondary focus was determining the effect of baseline wellbeing and resilience scores on effect sizes of each respective outcome. The training was hypothesized to lead to improvements in wellbeing and resilience, and reductions in mental distress, with results expected to be particularly profound for those with lowest levels of baseline wellbeing and resilience.

Main text
Methods
Participants and setting
Participants were clinical and non-clinical staff working within a major public healthcare provider in Adelaide, Australia. Adult (18+) participants could self-select or were appointed by managers to participate in a resilience project. The project consisted of 2 days of resilience training, delivered in three groups of between 50 and 60 participants facilitated by three professional trainers. Each participant was given a positive mental health assessment prior to and 1 month after the training, resulting in an individual personalised report, which was provided to the participant immediately after completing the assessment. One hundred and sixty staff undertook the training, of which 40 staff (25%) provided consent to study their training data and provided data for two measurement time-points (baseline and 1 month after the training).

The resilience training was an adaptation of the Tech-Werks Resilience Training Program (http://www.technologywerks.com and http://www.4-9-north.com) and was delivered by experienced professional trainers. The training consisted of 10 skills (see Table 1) originating from best-practice positive psychology approaches and evidence-based methods for improving wellbeing and resilience [20, 21]. The impact of the intervention has been successfully demonstrated in a range of settings including with workers on the brink of retrenchment and older aged carers [22].

The PERMA-profiler [23] was used to measure wellbeing. It is a validated measurement of overall wellbeing or flourishing, and correlates highly with other measures of subjective wellbeing and life satisfaction [24]. Resilience was assessed using the Brief Resilience Scale (BRS) [25], which measures the outcome of being resilient to stressful events; a focus that makes the tool different from measures that capture resilience as a trait, or capture the resources required for resilience to occur [26]. Scores that are lower than 3.00 on the BRS indicate low resilience, while scores between 3.00 and 4.30 indicate normal resilience. Scores higher than 4.30 indicate high resilience. Mental distress as a result of mood problems, anxious feelings and stress was measured using the Depression Anxiety Stress Scale 21 item (DASS-21) [27, 28]. The DASS-21 is a widely used screening tool for mental distress, which has widely accepted cut-off scores per domain, where normal ranges are indicated by scores up to 9 for depression, 7 for anxiety and 14 for stress, with higher scores indicating potential disorder ranging from mild and moderate to severe and extremely severe.

Table 1 Overview of 10 skills taught in the resilience training

Meaning making	Learn to cognitively appraise challenges and failures in a healthy and productive way through a focus on meaning
Event-thought-reaction connections	Increase awareness of how thoughts drive reactions to events, and determine if thoughts and reactions are helping individuals work towards their goals, act upon their values, improve their performance and strengthen their relationships
What's most important	Increase individual awareness of what influences unproductive reactions (emotional and/or physical) that may interfere with their performance, goals or relationships
Balance your thinking	Help individuals cognitively appraise situations in an accurate manner that is based upon evidence
Cultivating gratitude	Build optimism, positive emotions and resilience by bringing ongoing attention to gratitude as a cognitive process
Mindfulness	Teach individuals to regulate their attention in a focused, open and non-judgemental manner
Interpersonal problem solving	Teach individuals the elements to address interpersonal problems in a respectful manner with healthy and productive emotional expression, and use of compromise
Active constructive responding	Increase awareness of communication patterns and responses that maintain, strengthen, and cultivate positive and important relationships
Capitalising on strengths	Increase individual awareness of theirs and others personal strengths, and how to apply strengths across all life domains
Values based goals	Increases individual awareness of their values, and how to translate these values into actions and goals

Statistical analyses were performed using IBM SPSS 25. Depending on the data distribution, paired t-tests or Wilcoxon signed-rank tests being performed to determine between time differences. Effect sizes were estimated using Cohen's d for parametric techniques, and r for non-parametric distributions, where Cohen's rules of thumb for interpretation of the effect sizes were used; small effect $d = 0.2$ and $r = 0.1$, medium effect $d = 0.5$ and $r = 0.3$, large effect $d = .8$ and $r = 0.5$ [29]. To assess the influence of baseline differences on training effectiveness, scores were dichotomised. For resilience the official cut-off criteria to demonstrate "low resilience' of scores less than 3.00 were used to place participants into the low resilience group, with all other scores being placed in the high resilience group. As the PERMA-profiler does not come with cut-off scores, participants were divided into high and low baseline wellbeing by using the median wellbeing scores at baseline.

Results

Forty participants with a mean age of 44.68 (sd = 9.83) were included in the study. Thirty out of forty (75%) participants were female, with the majority of the sample (65%) having a college, university or post-graduate qualification.

The study found statistically significant improvements in wellbeing ($p = 0.001$) and resilience ($p = 0.02$), with small to moderate effect sizes found for the overall sample, see Table 2 for pre- and post-scores, and effect sizes. After dichotomising baseline wellbeing scores, those with low median baseline wellbeing scores demonstrated higher effect sizes for wellbeing ($r = 0.67$) compared to those with high baseline wellbeing scores ($r = -0.36$). Similarly, those with low baseline resilience scores demonstrated higher effect sizes for resilience from pre to post training ($d = 0.92$), compared to those with high baseline resilience scores (d = 0.24).

For the overall sample, no significant improvements in mental distress due to mood problems, anxiety and stress were found. There were only a low number of participants demonstrating baseline distress values that would enable change to be detected. Only eight out of 40 participants reached the threshold for mild mental distress due to mood problems, nine for anxiety problems, and eleven for stress. This was particularly the case for depression and anxiety scores, with the majority of participants scoring a zero or two, the two lowest possible scores, for depression (68%) and anxiety (55%).

Discussion

The current study found significant positive effects of group-based training on wellbeing and resilience for general (clinical and non-clinical) staff working in the medical sector, particularly for those with the lowest baseline values. The large majority of participants in this study demonstrated no baseline mental distress values that were susceptible to change, thereby leading to an inability to determine the impact of the training on mental distress.

Improving the wellbeing of health services staff can be beneficial for both staff and patient, as poor wellbeing is associated with reduced clinical care capacity [13, 30], and is a risk factor for developing mental illness in the short and long-term [19, 31, 32]. Capacity-building interventions such as the one studied here are particularly effective for those with lower levels of wellbeing, and results found by this study strengthen the argument that they should be considered as options to strengthen the mental health and wellbeing of health professionals, either as a preventative solution, or as a method to reach health professionals who are at-risk. This is particularly important in light of the challenges and stigma surrounding mental illness help-seeking in the medical sector [3, 33–35]. Despite methodological limitations

Table 2 Outcome data for main mental health parameters pre and post (1-month) intervention for all participants (n = 40)

Variables	Baseline				1 month follow-up				p	*d/r*
	Mean	**SD**	**Median**	**IQR**	**Mean**	**SD**	**Median**	**IQR**		
Wellbeing	7.37	1.13	7.63	1.53	7.74	1.27	7.97	1.38	0.001**	$r = 0.51$
Resilience	3.41	0.88	3.50	1.35	3.67	0.91	3.83	1.40	0.02*	$d = 0.29$
Depression	4.80	6.97	2.00	6.00	4.95	8.09	2.00	6.00	0.82	$r = 0.04$
Anxiety	4.50	6.19	2.00	4.00	4.35	5.94	4.00	6.00	0.95	$r = 0.01$
Stress	10.80	7.55	10.00	10.00	9.35	7.95	4.00	10.00	0.14	$r = 0.24$

IQR interquartile range, *SD* standard deviation, *d* Cohen's d (effect size estimate for variables with a parametric distribution), *r* correlation (effect size estimate for variables with a nonparametric distribution)

* Significant at p = 0.05 level

** Significant at p = 0.01 level

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(e.g. lack of a randomised controlled design, low sample size), the current study's positive results strengthen the existing evidence for the utility of positive mental health interventions for health services staff [36], and provide useful insights into local baseline data.

Limitations

- The lack of a randomised controlled design prevents the cause-effect relation between the wellbeing and resilience intervention and mental health outcomes to be made.
- Only short-term effects were studied, there is a need for long-term follow-ups.
- The majority of participants did not show high enough psychological distress symptoms to positively change, making it impossible to determine the potential impact of the training on indicators of psychological distress in this study.
- The absence of information regarding staff's role within the organisation prevents generalisations from being made to specific roles (e.g. are nurses more receptive to training than psychologists).
- Using the median-split to create categories of 'high' and 'low' wellbeing, in the absence of clear cut-off scores, is a limitation and warrants caution when interpreting the findings.

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Competing interests
The authors declare that they have no competing interests.

Availability of data and materials
The dataset generated and analysed during the current study are available from the corresponding author on reasonable request.

Consent for publication
Not applicable.

Ethics approval and consent to participate
This study has ethics approval obtained by the Flinders University Social and Behavioural Research ethics committee (ethics approval code PN 7891-002). Prior to the study participants signed a consent form to enable their training data to be studied.

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8.6. Study 6. A systematic review and meta-analysis of psychological interventions to improve mental wellbeing

Check for updates

A systematic review and meta-analysis of psychological interventions to improve mental wellbeing

Joep van Agteren [1,2 ✉], Matthew Iasiello [1,2,3], Laura Lo[1], Jonathan Bartholomaeus[1,4,5], Zoe Kopsaftis [6,7,8], Marissa Carey[1] and Michael Kyrios [1,2,9]

Our current understanding of the efficacy of psychological interventions in improving mental states of wellbeing is incomplete. This study aimed to overcome limitations of previous reviews by examining the efficacy of distinct types of psychological interventions, irrespective of their theoretical underpinning, and the impact of various moderators, in a unified systematic review and meta-analysis. Four-hundred-and-nineteen randomized controlled trials from clinical and non-clinical populations ($n = 53,288$) were identified for inclusion. Mindfulness-based and multi-component positive psychological interventions demonstrated the greatest efficacy in both clinical and non-clinical populations. Meta-analyses also found that singular positive psychological interventions, cognitive and behavioural therapy-based, acceptance and commitment therapy-based, and reminiscence interventions were impactful. Effect sizes were moderate at best, but differed according to target population and moderator, most notably intervention intensity. The evidence quality was generally low to moderate. While the evidence requires further advancement, the review provides insight into how psychological interventions can be designed to improve mental wellbeing.

Literature investigating 'positive' states of mental health or states of mental wellbeing has proliferated[1]. Traditionally, these subjective interpretations of wellbeing are placed in the context of 'hedonic' and 'eudaimonic' wellbeing, or the search for pleasure and happiness compared to striving for optimal psychological functioning and self-realization. These two aspects of wellbeing are operationalised by two streams of research. One stream focuses on subjective wellbeing[2], studying affect and life satisfaction; the other stream focuses on psychological wellbeing[3], and includes areas such as meaning or purpose and positive relationships. More than 40 years of observational and interventional research has linked high mental wellbeing to improvements in health, development and longevity as well as other outcomes[4].

For example, improvement in mental wellbeing over a 10-year period is associated with reducing the risk of developing mental illness by up to 8.2 times in people without mental illness[5,6] and with improving the chance of recovery in people with mental illness[7,8]. Similarly, good mental wellbeing is predictive of recovery from physical illnesses[4]—for instance, in the case of acute coronary syndrome, even when accounting for the impact of depression and anxiety[9]. This is notable in light of the growing body of scientific literature demonstrating that states of mental wellbeing can be seen as independent from states of mental illness, despite their overlap and interrelation. A recent scoping review[10] identified more than 80 peer-reviewed studies that supported the notion that 'indicators' or 'states' of mental wellbeing can occur regardless of the presence or diagnosis of mental illness, that both constructs have common but

also differential antecedents, that both needed to be assessed using dedicated scales, and that psychological interventions can lead either to improvements in both mental wellbeing and indicators of illness, or to changes in only one of the domains. A visualization of this relationship is displayed in Fig. 1.

This evidence is first increasingly elevating mental wellbeing as a therapeutic route to disease prevention as well as clinical and personal recovery[11,12]. Second, it points to the utility of addressing mental wellbeing in both clinical and non-clinical populations. This research direction paves the way for systematic implementation of interventions and therapeutic approaches that focus on (1) the promotion of mental wellbeing as its own essential outcome regardless of the presence of physical or mental illness; and (2) mental wellbeing as a complementary target when interventions that are based on traditional therapeutic approaches do not have the desired effect—for example, if they do not lead to clinically meaningful changes or do not resonate with the individual patient[13]. Interventions that target symptoms of mental illness and those that target mental wellbeing can focus on shared processes—for example, reducing rumination or building a sense of purpose—but can also focus on differential antecedents or target areas—for example, guilt or hopelessness for mental illness or personal growth for wellbeing. As a consequence, psychological or behavioural interventions, defined as activities or groups of activities aimed to change behaviours, feelings and emotional states[14], can lead to improvements in either mental wellbeing or mental illness, or both. While existing evidence syntheses point to the potential utility of psychological interventions, our current

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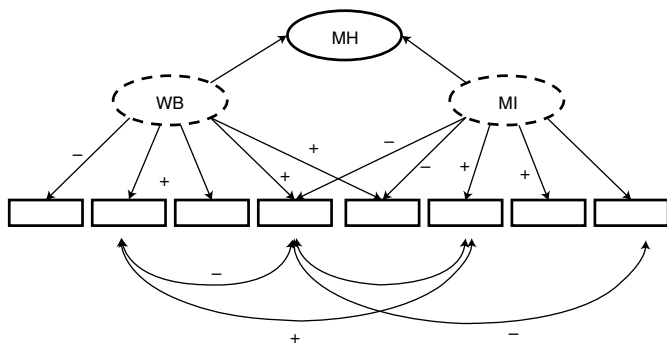
Fig. 1 | Simplified relationship between outcomes of mental health and indicators of illness and wellbeing. Schematic of the relationship between scores on outcomes measures of mental wellbeing (MW) and mental illness (MI)(represented by dashed ovals) that are influenced by distinct and shared factors (represented by the rectangles), jointly acting to determine the 'latent' mental health (MH) factor (represented by a solid oval). The + and – symbols represent hypothetical positive and negative relationships, respectively.

understanding of the impact of the complete landscape of psychological interventions has traditionally been obstructed for a number of reasons.

The first reason relates to the traditional separation of research on and practice in wellbeing and mental illness[11,15,16]. The main body of research investigating the impact of psychological interventions on wellbeing stems from the field of positive psychology, and looks at positive psychological interventions (PPIs). These are defined as "treatment methods or intentional activities that aim to cultivate positive feelings, behaviours, or cognitions"[17]. Several systematic reviews have been conducted to determine the effects of PPIs on wellbeing and its sub-components, which show that PPIs typically have a small effect on outcomes of wellbeing[17–21]. PPIs, however, comprise only a very limited subset of psychological approaches and typically do not address focus areas of traditional psychological interventions, such as rumination and worry. Although previous reviews investigating the efficacy of psychological interventions on wellbeing have included the evidence from other non-PPI interventions such as mindfulness and meditation[18,22], syntheses to date have largely ignored the ability of well-known or more traditional therapeutic approaches to improve wellbeing. A review by Weiss and colleagues[18] is a notable exception, as they investigated the impact of psychological interventions in general on outcome measures of psychological wellbeing, but excluded the large body of studies that use popular subjective measures of wellbeing, such as the Satisfaction With Life Scale (SWLS) or measures of positive affect such as the Positive and Negative Affect Schedule (PANAS)[23,24].

As PPIs, by definition, traditionally neglect to focus on maladaptive behaviours and thoughts, there is a considerable evidence gap regarding the impact of other psychological interventions. For instance, the impact of interventions derived from cognitive therapy, cognitive behavioural therapy (CBT), acceptance and commitment therapy (ACT), those using individual techniques such as behavioural activation or interventions stemming other psychological streams such as humanistic psychology have not yet been extensively mapped[25]. Interventions stemming from different therapeutic paradigms can target a variety of underlying processes related to mental health and wellbeing. To use an analogy: cancer can be addressed using a variety of techniques—for example, surgery, chemotherapy, radiation therapy and hormone therapy, among others[26]. Canvassing the state of scientific evidence on psychological interventions that target areas other than positive states is useful for

practitioners and developers of interventions who aim to look at diversifying their array of useful interventions or techniques.

Second, there has been considerably less focus on determining the impact of different types of psychological interventions in building mental wellbeing in clinical populations. There is a need to synthesize the research on the efficacy of psychological interventions to build wellbeing of populations that suffer from physical illness, both acute and chronic, as mental health status has an important role in disease management and treatment[13,27]. Simply looking at relieving symptoms of depression or anxiety in those with a physical illness is inadequate as it ignores a substantial proportion of patients who do not have clinical symptoms of common mental disorder, but are having suboptimal mental health. Similarly, there is a need to look at the impact of interventions on patients who demonstrate symptoms of clinical mental illness. Recent research has again looked at the impact of PPIs in improving mental wellbeing in clinical mental health populations[19], but systematic reviews on the impact on wellbeing by interventions based on more traditional paradigms such as CBT are limited; approaches that are far more readily used and accepted in clinical settings. These approaches have had their large empirical evidence base synthesized for mental illness—for example, the article by Hofmann and colleagues[28]—but not yet for their impact on mental wellbeing. An exception is the work by Brown and colleagues[29], who explored the impact of ACT-based interventions in web-based formats, thereby leaving the impact of other modalities on mental wellbeing unanswered.

Third, interpreting results of existing independent syntheses poses challenges as a result of their methodological differences. For instance, as mental wellbeing is a broad concept with differing definitions[30], it is important to synthesize studies that have used similar subjective measurement methods to measure wellbeing[31]. The inclusion of psychological distress or generic quality-of-life scales as a proxy for mental wellbeing outcomes will lead to different conclusions than if only measures of mental wellbeing are included. Similarly, the use of differing search criteria and statistical procedures for meta-analysis leads to reviews on similar topics coming to different conclusions[21]. Finally, the use of differing criteria for study quality between reviews makes it difficult to assess the quality of different reviews and the overall quality of the evidence presented in meta-analyses. For instance, systematic reviews typically include a measure of study quality such as risk of bias[32], but do not typically include quality estimates on the evidence of the overall meta-analysis[33]. Not all meta-analyses are equal and the absence of quality estimates on meta-analyses can lead to inaccurate conclusions being made regarding the utility of interventions.

Expenditure on healthcare and mental healthcare is growing, posing serious challenges for governments around the world[34]. Psychological interventions to build mental wellbeing can have a vital role in reducing the pressure and burden of illness via stepped or integrated care models, in addition to simply building the wellbeing of individuals (itself an important outcome)[35]. Determining the state of the scientific literature on how varying psychological interventions can contribute to building wellbeing is a necessary step to start empowering stakeholders to implement much-needed reform. It can arm researchers and mental health advocates in their call for a larger focus and innovation in the prevention of mental illness to reduce the burden on mental healthcare systems[36–38]. It can empower practitioners to explore a broader range of evidence-based treatment solutions depending on each client and their mental or physical health status, which can be a vehicle for treatment engagement[39]. It can inform mental health policy makers to further explore mental wellbeing as an outcome and consider different psychological interventions into their policy. Finally, it can stimulate discussion and new research among the scientific and professional community, enabling greater sophistication in research to further understand how to improve mental wellbeing in an evidence-based manner.
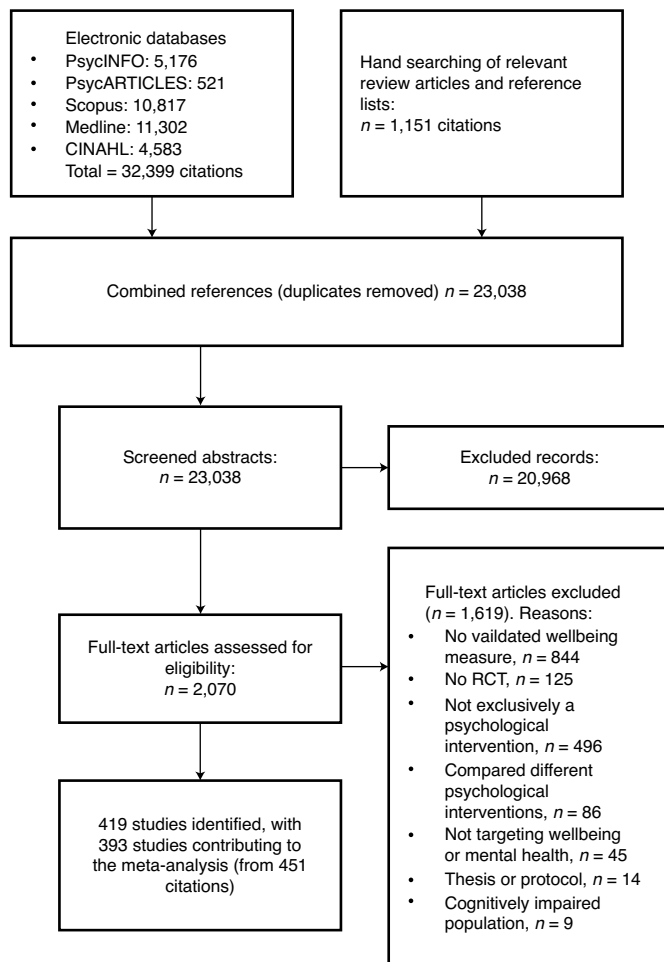
Fig. 2 | Study PRISMA flow diagram. PRISMA flow diagram describing the different phases of this systematic review.

This systematic review and meta-analysis aimed to create a clear synthesis of the impact of different types of psychological interventions on mental wellbeing, irrespective of their theoretical foundation, and establish the differential impact of these types of interventions in clinical and non-clinical populations. The primary outcome was the impact on mental wellbeing in general, with a secondary aim to explore differences in impact of psychological intervention types on outcomes of hedonic and eudaimonic wellbeing. It further considered the impact of various important methodological moderators. It considered intervention-specific moderators, including type of intervention, intensity of the intervention and mode of delivery. It considered study-specific moderators such as the impact of the control group, assessment follow-up and study quality. It also considered population-specific moderators by splitting the results for the general population, those with a mental illness and those with a physical illness. Finally, it aimed to shed light on the overall quality of the evidence provided in the meta-analyses and to discuss the implications of the evidence for future research and mental healthcare delivery in practice.

Results

Study sample and design characteristics. This review identified 419 studies that met the inclusion criteria, see Fig. 2 for the PRISMA flow diagram summarizing the study selection process. Out of these 419 studies, 393 provided sufficient information to be included in the final quantitative analysis. The total participant pool consisted

of a combined $n = 53,288$ participants, $n = 41,491$ from the general population (274 studies), $n = 5,712$ from populations with a mental illness (61 studies) and $n = 6,085$ from populations with a physical illness (58 studies). Sample sizes of studies ranged between $n = 13$ and $n = 3,070$. Most studies were conducted in the United States (120), Australia (33), the Netherlands (30), the UK (26), Iran (25) and China (21), with a total of 42 Western and non-Western countries contributing to the evidence base (Supplementary Information).

The majority of studies looked at multi-component PPIs followed by singular PPIs (singular intervention techniques or activities that stemmed from positive psychology), mindfulness-based interventions and interventions based on cognitive therapy or CBT principles. Table 1 provides an overview of the identified interventions; the grouping of studies is explained in the Methods. The interventions were delivered in a number of different formats of modality, the most prominent being technology-driven interventions ($n = 23,784$) followed by group settings ($n = 18,574$) and individual face-to-face delivery methods ($n = 9,031$), with the remainder using a combination of these formats. An overview of the exact outcome measures used in studies can be found in Table 2.

Risk of bias. The complete summary of risk of bias for each study is presented in Supplementary Fig. 4. Overall, we noted a high level of 'unclear' risk of bias, which was the result of insufficient reporting of randomization procedures and a failure to report whether randomization was conducted under blind and independent circumstances. Due to the nature of the interventions and/or the designs chosen (for example, waitlist-control conditions), blinding of personnel and participants was often not conducted or was not reported. Attrition was typically reported, but a moderate number of articles did not report adequate CONSORT statements or had uneven drop-out between groups. Furthermore, the large majority of studies did not publish a protocol or register the studies on trial registries, making it difficult to assess reporting bias. These relatively high rates of omission in methodology and high risk of bias led to downgrading of the evidence quality for the large majority of the included intervention types.

Impact of interventions on overall wellbeing. The impact of intervention type on overall mental wellbeing for each population type is presented in Fig. 3; specific effect sizes and other outcome data for the intervention types presented below are summarized in Table 3. Results are described below for the main intervention types included in the meta-analysis on overall wellbeing. Sub-analyses for subjective and psychological wellbeing are presented in Supplementary Figs. 1 and 2, and Supplementary Tables 3 and 4. Any distinct intervention type that could not be meta-analysed (for example, because there were insufficient studies available) is described in Supplementary Table 6.

ACT interventions. A significant positive small to moderate effect on overall wellbeing was found for ACT-based interventions compared with control groups in the general population alone. The evidence quality for ACT-based interventions in the general population population was downgraded to low as a result of the aforementioned problems with risk of bias, in addition to the wide confidence interval spans between a small and a moderate effect (g of 0.2 and 0.5), implying that the effect size estimate in the population differs from the one found in this review. No significant result was found for ACT-based interventions in physically ill populations. The evidence quality for this meta-analysis, however, was very low. This was the result of problems related to risk of bias, a wide confidence interval (ranging between no effect and a moderate effect) and the fact that the analysis was underpowered. There were insufficient studies available to be included in the meta-analysis for mentally ill populations.

Table 1 | Intervention types that were included in the systematic review, with studies being grouped with the different intervention types on the basis of the description of the intervention as provided in the original manuscripts

Intervention	Description of intervention	Studies
ACT interventions	Interventions based on ACT. The large majority of interventions involved multi-session interventions using ACT-based techniques, which typically focus on creating hope and building commitment to change, acceptance instead of control, and cognitive diffusion. Other interventions include ACT-based self-help books.	83–101
Compassion interventions	Interventions focusing on increasing compassion to others, for instance by interacting with another person in a supportive or considerate way. Typically, participants are asked to reflect on the compassionate behaviours at regular intervals. These can be single interventions or can be delivered as multi-component programmes that include loving kindness meditation.	102–113
Cognitive therapy or CBT interventions	Interventions based on CBT, which typically are multi-session and target maladaptive thinking patterns, developing coping skills, emotional regulation and cognitive reappraisal, as well as improvement of positive emotions and goal setting. Other formats include self-help books and websites. When offered in a physically ill population, focus is often placed on symptom or pain management and coping, together with addressing comorbid mental health symptoms.	114–162
Expressive writing	Participants are asked to write about trauma, adversity, stressful or negative events, typically over a period of time. Instructions may focus on how the event related to the life of the participant, what coping methods they used and whether these were successful.	95,108,154,163–175
Mindfulness interventions	Interventions that are solely focused on mindfulness or meditation. Interventions can be one-off or consist of multiple sessions. Techniques used include diaphragmatic breathing, mind–body scan and mindful imagery. Subtypes of interventions are mindfulness-based cognitive therapy, mindfulness-based stress reduction and mindful self-compassion.	91,106,120,123,133, 146,176–263
Multi-theoretical interventions	Interventions combining two or more clear psychological paradigms into one intervention, with no clear 'main' paradigm focus. Typically involves a cognitive therapy- or CBT-based focus with PPIs and/or mindfulness, but can include other paradigms such as ACT-based or interpersonal therapy-focused. Typically involves group interventions of higher intensity.	132,135,154,164,239, 254,264–311
PPIs, multi-component	A combined package of largely or solely positive psychology exercises, typically bundled into a programme delivered over an extended period of time. Includes positive psychotherapy, a clinical therapy that utilizes positive psychology interventions, such as focusing on using strengths, gratitude visits, active constructive response, counting blessings and savouring. Includes wellbeing therapy.	123,132,145,156, 184,198,241, 244,290–292, 312–372
PPI, singular	Individual activities or exercises stemming from positive psychology or interventions that focus only on building on positive construct—that is, not combining different positive psychological exercises. A number of key PPIs are described in more detail below.	
Best possible selves/ optimism	Participants are instructed to imagine a future life, and what it will ideally look like. They typically focus on different domains per period (for example, day or week) and often gain insight into the domains at the start of the intervention. Example domains are: love, hobbies, employment, physical and mental health. Other interventions focusing on optimism are grouped under this classifier.	42,104,373–394
Character strengths	Participants do a strengths assessment (for example, values in action character strengths) and use their top strengths in a new way, as a one-off or over a period of time. Suggestions are typically provided to explain how strengths can be used. Variations of this task are included (for example, set goals in relationship to best or preferred strengths).	42,113,340,360, 391,395–404
Gratitude	Participants are asked to reflect on experiences, events or people they are grateful for. May involve expressing gratitude to other people.	42,57,113,249,327,360,374, 376,382,383,390–393, 396,399,403,405–429
Pleasurable experiences	Participants are asked to reflect on or think about experiences that were fun, amusing or joyful, or that are bringing happiness to their life.	166,188,318,319,413
Three good things	Participants are asked to write or think about three good things that happened over a period (typically reflecting back on the same day) and reflect on why those things occurred. The activity is typically repeated for a number of days.	42,113,360,375, 378,381,391,396, 400,403,415,430–433
Other PPIs	A variety of different takes on the PPIs mentioned above were further tested, including acts of novelty and acts of kindness, gift of time, savouring interventions, meaning making, humour interventions and alternate forms of character strength interventions.	56,132,318,319,360, 374,384,396, 397,422,431–448
Reminiscence interventions	Interventions that focus on reviewing past experiences. Includes life review therapy focusing on integration of difficult life events from the past, development of agentic life stories and retrieval of specific positive memories.	169,172,305,400, 431,449–466
Other	A range of other interventions were tested which could not be added into the meta-analysis, as the review did not find sufficient studies to be included as a distinct type. Interventions include assertiveness training, behaviour activation, behavioural experiments, benefit-finding interventions, communication skills training, couples interventions, emotional awareness and expression therapy, forgiveness skills training, goal setting, interpersonal psychotherapy, narrative exposure therapy, parenting styles, emotion management, psychoeducation, rational emotive therapy, stimulus control training, social skill building, supportive group therapy, core transformation therapy, spiritual counselling, storytelling, positive memories, problem solving and self-affirmations.	118,126,128,137,144,164, 166,232,278,350,397, 398,431,432,434,436, 445,460,467–499

Table 2 | Outcome measures used to capture mental states of wellbeing by included studies

Wellbeing type	Measure	Studies
SWB	Satisfaction with Life Scale (SWLS)[23]	57,83,96,97,99,105–107,113,115–117,124,126,127,136,138,147,156,158–160,163, 168,170,172,179,183,187,188,192,195,197,201,208,209,216,218,221–223,230, 233,238,241,254,256–263,267,269,271,273,274,278,282,286,287,289, 291,292,295,298,306,308,310,322,323,325,329–331,336,339–341,344,353, 359,363,367,371,373–376,383,387,390,393,397,398,405–407,411,413–415,418,419, 426–428,431,435,437,438,440,441,446,451,454,461,468,479,480,487,489, 492–496,500
SWB	Satisfaction with Life Scale for Children (SWLS-C)[501]	140
SWB	Temporal Satisfaction with Life Scale (TSWLS)[502]	389
SWB	Subjective Happiness Scale (SHS)[501]	102,106,198,241,249,262,320,322,327,365,383,384,388,414,418, 425,427,431,441,446,447,461,468,471,491,500
SWB	WHO-5 Wellbeing Index (WHO5)[503]	91,94,146,151,161,199,237,239,244,245,248,253,254,265,275,285,296, 309,347,361,366,455,467,484,497
SWB	Authentic Happiness Index or Steen Happiness Index (AHI)[504]	42,56,103,104,114,318,332,360,391,396,397,399,400,403,404,417,432,433,443
SWB	Life Satisfaction Index - A, Z, Third Age (LSIA)[505]	125,134,305,449,450,453,455,458,464,466,470,474
SWB	Students Life Satisfaction Scale (SLSS)[506]	131,231,313,333
SWB	Brief Multidimensional Students Life Satisfaction Scale (BMSLSS)[507]	118,333,335,370,391,392,410,429
SWB	Subjective Wellbeing Scale (SWBS)[508]	93,203
SWB	Personal Wellbeing Index—Adult Scale (PWI-A)[509]	372,398
SWB	Affectometer 1 and 2 (AM1)[510]	144,175
SWB	Index of General Affect and Index of Wellbeing (IGA)[511]	483
SWB	Life Satisfaction Questionnaire (LiSat9)[512]	212
SWB	Life Satisfaction Questionnaire (LiSat11)[513]	206,477
SWB	Memorial University of Newfoundland Scale of Happiness (MUNSH)[514]	456,460
SWB	Subjective Authentic–Durable Happiness Scale (SA-DHS)[515]	214,251
SWB	SPF-Index Level Scale (SPF-IL)[516]	270
SWB	Types of Positive Affect Scale (TPAS)[517]	165
SWB	Chinese Happiness Inventory (CHI)	518
PWB	Psychological Wellbeing Scale (PWBS)[3]	84,93,109,116,136,200,211,218,220,229,238,243,246,271,279, 302,306,311,317,328,330,343,350,356,358,416,475,490,519,445
PWB	Oxford Happiness Inventory (OHI)[520]	128,232,242,247,325,329,338,358,413,457,469,481,486,488
PWB	Flourishing Scale (FS)[521]	183,184,225,266,293,366,386,411,480,495
PWB	*Questionario sul Benessere Psicologico* (QBP)[522]	314
PWB	The Eudemonic Wellbeing Scale (EWBS)[523]	227
Affect	Positive and Negative Affect Scale (PANAS)[24]	90,101,105,108,111,112,116,120,123,126,129,130,132,133,137,139, 149,154,155,162,164,166–168,171–174,176–178,181–183,190,200, 204,205,222,226,228,233,235,236,240,245,250,252,255,258, 261,268,269,272,274,277,280,282,298,306,307,311,312,321, 325,330–332,334,336,341,346,349,353,359,362,365,367,368, 372,375,377,378,381,382,384,386,387,389,394,398,402,414,415, 418,422,423,427,430,436,437,444,452,461,471,473,482,487,489,490,495,498
Affect	Positive and Negative Affect Scale Extended (PANASX)[524]	194,196,412,442,448
Affect	Positive and Negative Affect Scale-Child (PANAS-C)[525]	333,335,370,392,410,429
Affect	Differential Emotions Scale (DES)[526]	174,219,288,315,316,364,499

Continued

Table 2 | Outcome measures used to capture mental states of wellbeing by included studies (continued)

Wellbeing type	Measure	Studies
Affect	Differential Emotions Scale–Modified(mDES)[527]	326,348,433,440
Affect	Scale of Positive and Negative Experience (SPANE)[521]	184,238,289,295,376,391,405,407,426,428,434,480
Affect	Bradburn Affect Balance Scale (BABS)[528]	213,215,216,276,465,478
Affect	Derogatis Affects Balance Scale (DABS)[529]	152,264
Affect	Affectivity Scale (AFFS)[530]	363
Affect	Brief Mood Introspection Scale (BMIS)[531]	145
Affect	Chinese Affect Scale (CAS)[532]	424
Affect	*Mehrdimensionaler Befindlichkeitsfragebogen* (MB)[533]	207
Affect	Affect-Adjective Scale (AAS)[534]	374,420
Affect	The Global Mood Scale (GMS)[535]	193,210
Combined	Bradley's Wellbeing Questionnaire (BWBQ)[536]	476
Combined	Mental Health Continuum—Short Form (MHC-SF)[537]	85,86,88,89,95,96,98,111,132,143,169,202,212,234,265,300,319, 342,349,351,354,355,357,361,391,421,459,462,463,538
Combined	Brief Inventory of Thriving (BIT)[539]	401
Combined	Pemberton Happiness Index (PHI)[540]	185
Combined	Wellbeing Manifestations Measure Scale (WBMMS)[541]	87
Combined	Warwick–Edinburgh Mental Wellbeing Scale (WEMWBS)[542]	92,100,110,129,142,148,153,157,180,186,224,255,281,283,284, 294,297,299,304,369,378,381,472,485
Combined	Short Warwick–Edinburgh Mental Wellbeing Scale (SWEMWBS)[543]	141,150,290,301,313,324,352
Combined	The PERMA Profiler (PERMA)[544]	303
SWB	Life Satisfaction Questionnaire (LSQ)[545]	93

SWB, scales that mainly measure subjective wellbeing; PWB, scales that measure mainly psychological wellbeing; combined, scales that combine subjective and psychological wellbeing constructs.

Compassion interventions. Compassion interventions just failed to find a significant small effect in the general population, as the *P*-value was 0.014, just above the threshold for significance of 0.01 for this review (Methods). This result is influenced by a diminished power of the meta-analysis, which was just below 0.80. The evidence quality was graded as low due to problematic risk of bias and wide confidence intervals. There were insufficient studies available to be included in the meta-analysis for mentally and physically ill populations.

Cognitive therapy- or CBT-based interventions. A significant *P*-value for CBT interventions was found for the general population, but the effect size estimate failed to meet the small-effect threshold. This indicates that on average, cognitive therapy- or CBT-based interventions do not reach a meaningfully beneficial effect on wellbeing in the general population. The evidence quality was rated as moderate, as the large sample increases the confidence of the effect size estimate. No significant impact of CBT was noted for the physically ill population. The evidence quality for this meta-analysis was rated as low. In populations with a mental illness, cognitive therapy- or CBT-based interventions led to clear significant improvements compared with control conditions, reaching a small-to-moderate effect. The evidence quality was moderate for the population with a mental illness.

Expressive writing. Wellbeing was not significantly improved by using expressive writing interventions in the general population, as the *P*-value was 0.019. The evidence quality was low due to issues with risk of bias and the presence of a wide confidence interval.

There were insufficient studies available to be included in the meta-analysis for mentally and physically ill populations.

Mindfulness-based interventions. Mindfulness-based interventions led to significant small-to-moderate improvements in the general and physically ill population and a moderate-to-large effect in cohorts with a mental illness. This demonstrates the significant utility of mindfulness-based interventions in both clinical and non-clinical populations. The evidence quality was high for the general population, as the confidence interval was narrow and the large study count and sample size warranted upgrade of evidence quality. The evidence quality was moderate and low for physically ill and mentally ill cohorts, respectively.

Multi-theoretical interventions. Interventions that deliberately combined multi-theoretical approaches significantly improved mental wellbeing in the general population and the physically ill population. The evidence quality for both meta-analyses was low as a result of imprecision due to wide confidence intervals spanning between no effect and a small effect, as well as the aforementioned risk of bias. There were insufficient studies available to be included in the meta-analysis for cohorts with a mental illness.

PPIs, multi-component. Multi-component PPIs significantly improved wellbeing in the general population, showing small effect sizes. This evidence was graded as high-quality evidence as a result of the large number of studies contributing to this analysis, which counters the limitations and subsequent downgrading related to risk of bias in the included studies. Multi-component PPIs also
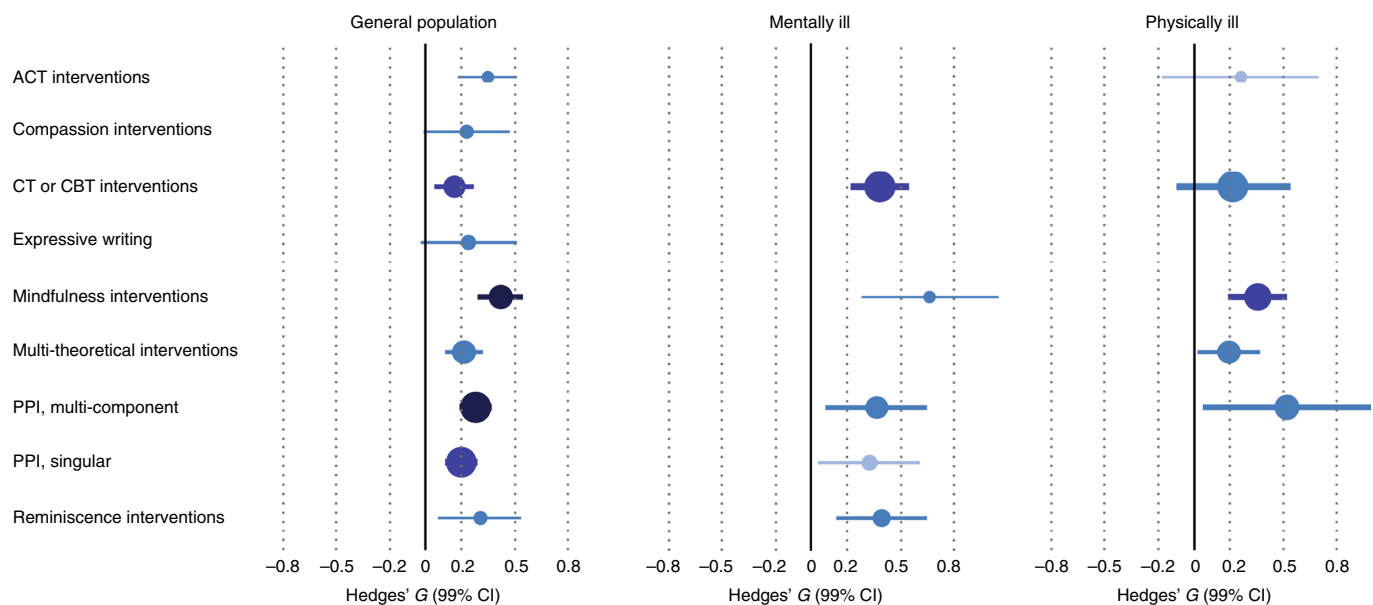
Fig. 3 | Forest plot visualizing the impact of each intervention type on overall wellbeing compared with control conditions split by population type.
Horizontal bars show 99% confidence intervals, with interventions having a significant effect denoted by horizontal bars that do not touch the solid vertical line (the line of no effect). The dashed lines indicate small ($g = 0.2$), moderate ($g = 0.5$) or large ($g = 0.8$) effects. Circle sizes reflect the weight of the overall study. The colours denote the evidence quality, based on grade recommendations[33] for high (dark purple), moderate (purple), low (blue) and very low (light blue) evidence quality. Only intervention types with more than four studies were included in the meta-analysis and were displayed in the forest plot. Specific effect sizes and other statistics applying to this forest plot are presented in Table 3. CT, cognitive therapy.

significantly improved wellbeing in the physically ill cohorts, showing moderate effect sizes. Effect sizes for the general and mentally ill population were small, but significant. However, the evidence quality was graded as low for both clinical populations.

PPIs, singular. The combined effect size of singular PPIs on wellbeing in the general population was small and significant. The total number of studies investigating PPIs in the general population was large and overall the evidence quality was graded as high. There were insufficient studies that investigated the impact of singular PPIs in physically ill populations. The impact of singular PPIs in cohorts with a mental illness was significant, but the evidence quality was very low. This was the result of risk of bias, imprecise effect size estimate and the fact that the analysis was underpowered due to a low combined sample size.

A number of distinct individual PPIs could furthermore be included into their own distinct meta-analyses, which are detailed in the Supplementary Fig. 3 and Supplementary Table 5. In brief, the following PPIs were included in distinct meta-analyses: three good things, best possible selves or other interventions focusing on building optimism, character strength interventions, gratitude interventions and interventions aimed at induces or experiencing pleasure (referred to as pleasurable activities). Only character strength interventions reached a significant positive effect that was meaningful. The evidence quality for all singular PPI meta-analyses was low.

Reminiscence interventions. A significant positive effect on mental wellbeing in the general population was found. Similarly, a small positive effect of reminiscence intervention in cohorts with a mental illness was found. The evidence quality for both outcomes was low as a result of risk of bias and wide confidence intervals.

Impact of moderators on intervention effect on wellbeing. Table 4 summarizes the effect sizes for each moderator of intervention effect on wellbeing. In the general population, all three types of

intervention intensity showed significant impact reaching a small effect size. A trend, however, could be observed showing that higher-intensity interventions led to higher effect sizes, particularly for mentally ill populations and the general population. No such difference was found for physically ill populations, where moderate and high-intensity interventions had similar effects. Low-intensity interventions were not tested in clinical populations.

Group-based interventions reached the highest effect size compared with individual and technology-based interventions in the general and mentally ill populations. For those with a physical illness, interventions delivered using an individual format reached the highest effect size. Whereas the effect size confidence intervals between group formats and the other two formats in the general population did not overlap by much, this was not the case for both clinical populations. This means that the impact of modality in both clinical populations is less clear compared with the general population.

Study-specific moderators. Time to follow-up was associated with an effect on wellbeing scores in the general population, with overall effect sizes decreasing over time for all population types. The significant effect sizes were maintained at the 3-month follow-up period compared to afterwards, before dropping below $g = 0.2$ by the 6-month follow-up. A similar trend could be observed for both clinical populations.

Looking at comparator groups, effect sizes were larger when studies used a waitlist-control or assessment-only design. When studies used a control group that included some form of interaction (for example, a placebo control group), effect sizes were much lower, with effect sizes in the general population dropping below the threshold for a small effect.

Impact of interventions on sub-domains of mental wellbeing. Separate meta-analyses were conducted for hedonic and eudaimonic wellbeing, and are presented in detail in the Supplementary

Table 3 | Outcome of meta-analyses grouped by intervention type across the general and clinical population

Population	Intervention type	Hedges' G	99% CI		P value	Int n	Con n	Total n**	Q	I²	K	Grade	PB	Pow
General population	ACT interventions	0.348	0.18	0.51	0.000	508	365	990	4.84	0.00	7	2	–	0.98
	Compassion interventions	0.230	−0.01	0.47	0.014	538	559	1,097	8.44	5.22	9	2	–	0.76
	Cognitive therapy- or CBT-based	0.162	0.05	0.27	0.000	2,085	2,071	4,156	8.49	0.00	10	3	No	0.97
	Expressive writing	0.240	−0.03	0.51	0.019	703	521	1,274	7.81	0.00	9	2	–	0.87
	Mindfulness interventions	0.420	0.29	0.55	0.000	2,703	2,606	5,613	55.62	0.00	56	4	No	1
	Multi-theoretical interventions	0.215	0.11	0.32	0.000	2,811	2,830	5,714	32.61	0.00	36	2	Yes	1
	PPI, multi-component	0.280	0.19	0.37	0.000	6,354	5,985	12,412	65.16	3.31	64	4	No	1
	PPI, singular	0.200	0.11	0.29	0.000	7,420	4,118	11,935	89.35	18.29	74	3	No	1
	Reminiscence interventions	0.307	0.07	0.54	0.001	575	508	1,083	10.48	0.00	12	2	Yes	0.96
Mentally ill	Cognitive therapy or CBT interventions	0.382	0.22	0.55	0.000	1,121	1,033	2,154	16.81	4.84	17	3	No	1.00
	Mindfulness interventions	0.664	0.28	1.05	0.000	113	136	249	5.09	1.76	6	2	–	0.97
	PPI, multi-component	0.365	0.08	0.65	0.001	426	411	837	13.14	8.66	13	2	Yes	0.98
	PPI, singular	0.325	0.04	0.61	0.004	177	143	320	3.01	0.00	5	1	–	0.47
	Reminiscence interventions	0.392	0.14	0.65	0.000	225	197	422	3.92	0.00	5	2	–	0.82
Physically ill	ACT interventions	0.263	−0.18	0.70	0.121	204	190	394	5.235	23.60	5	1	Yes	0.37
	Cognitive therapy or CBT interventions	0.217	−0.10	0.54	0.078	771	700	1,606	10.55	14.73	9	2	–	0.88
	Mindfulness interventions	0.357	0.19	0.52	0.000	589	590	1,179	13.06	0.47	14	3	No	1.00
	Multi-theoretical interventions	0.196	0.02	0.37	0.000	410	453	863	5.77	0.00	9	2	–	0.46
	PPI, multi-component	0.521	0.05	0.99	0.004	547	441	988	10.85	0.00	15	2	Yes	1

Meta-analysis output corresponding to Fig. 2. Q is Cochrane's Q, a measure of heterogeneity; I² is a measure of heterogeneity; K is number of studies contributing to the meta-analysis; grade is a measure of evidence quality, with 1 indicating very low quality evidence, 2 indicating low quality evidence, 3 indicating moderate quality evidence and 4 indicating high-quality evidence; PB indicates presence of publication bias (yes or no; calculated only where there are 10 studies or more); Int n is intervention sample size; Con n is control group sample size; Pow is a power calculation for meta-analysis. **Total n can deviate from group n as a result of the specific analyses performed and the availability of per-group data; 99% CI, 99% confidence interval.

Information (Supplementary Figs. 1 and 2, and Supplementary Tables 3 and 4). In brief, the large majority of studies used subjective wellbeing outcome measures, with psychological wellbeing outcome measures being used considerably less often. In general, results for subjective (hedonic) wellbeing mirrored the findings for the general mental wellbeing scores, with mindfulness and multi-component PPIs showing the highest significant effect sizes across populations (g ranging between 0.35 and 0.65 for mindfulness and 0.36 and 0.62 for multi-component PPIs, all P=0.000). Other multi-theoretical interventions (g=0.26, P=0.000), singular PPIs (g=0.20, P=0.000) and reminiscence interventions (g=0.34, P=0.000) also significantly improved subjective wellbeing in the general population. Cognitive therapy- or CBT-based interventions only led to significant improvements in wellbeing for cohorts with mental illness (g=0.40, P=0.000)). Multi-theoretical interventions were efficacious in the physically ill populations (g=0.24, P=0.002). While evidence for the efficacy of mindfulness and both types of PPI was high in the general population, the majority of studies were judged to have low or very low evidence quality. Psychological wellbeing could only be included in a meta-analysis examining the impact of multi-component PPIs, showing a small-to-moderate significant effect (g=0.44, P=0.002). No other interventions were tested in sufficient numbers to allow a robust meta-analysis to be conducted.

Discussion

This systematic review aimed to synthesize the current scientific evidence on distinct psychological interventions in both clinical and non-clinical populations in improving mental states of wellbeing, and found that mental wellbeing can be significantly improved using a variety of psychological interventions. Two types of interventions were consistently associated with positive findings across populations, specifically multi-component PPIs and mindfulness-based interventions. Meta-analyses also found that ACT-based interventions, cognitive therapy- or CBT-based interventions, singular PPIs, and interventions focusing on reminiscence were effective. The significance and effect sizes for interventions differed among the

Table 4 | Impact of moderators of intervention impact on overall wellbeing, split into the general population and the two clinical populations (cohorts with a mental illness and those with a physical illness)

Moderator	General population					Mentally ill					Physically ill				
Time	*g*	**99% CI**		*K*	*N*	*g*	**99% CI**		*K*	*N*	*g*	**99% CI**		*K*	*N*
Post	0.276	0.23	0.32	274	41,491	0.440	0.30	0.58	58	6,085	0.352	0.21	0.50	61	5,712
3 month	0.234	0.13	0.33	61	14,237	0.385	0.16	0.61	13	2,303	0.218	0.05	0.39	19	1,532
6 month	0.151	0.06	0.24	38	9,070	0.098	−0.15	0.35	5	686	0.155	0.04	0.27	20	1,968
12 month	0.103	−0.07	0.28	12	4,101	–	–	–	–	–	0.023	−0.17	0.21	5	1,133
Intensity															
Low	0.198	0.13	0.27	80	12,877	–	–	–	–	–	–	–	–	–	–
Moderate	0.294	0.19	0.40	63	7,100	0.261	0.00	0.53	12	1,061	0.397	0.183	0.611	6	333
High	0.321	0.26	0.39	128	21,001	0.551	0.36	0.74	42	4,219	0.367	0.243	0.492	51	5,045
Comparator															
Assessment only	0.342	0.28	0.40	161	25,200	0.462	0.38	0.54	43	4,669	0.418	0.18	0.66	30	3,270
Active or passive comparator	0.184	0.12	0.24	114	16,845	0.228	0.03	0.43	15	1,449	0.248	0.14	0.36	29	2,202
Modality															
Individual	0.238	0.14	0.34	63	6,878	0.421	0.18	0.66	24	1,389	0.422	0.18	0.66	16	764
Online	0.222	0.16	0.28	103	20,263	0.333	0.20	0.47	11	1,470	0.343	0.06	0.63	14	2,051
Group	0.362	0.28	0.44	97	13,730	0.539	0.22	0.85	19	2,004	0.319	0.10	0.54	29	2,840
Quality															
High	0.296	0.18	0.41	38	8,228	0.398	0.21	0.59	18	2,142	0.246	0.09	0.41	17	2,266
Low	0.274	0.23	0.32	239	34,027	0.462	0.27	0.66	40	3,943	0.394	0.19	0.59	44	3,446

Mean effect sizes and range of values are shown. Low intensity refers to interventions that lasted less than a week; moderate-intensity interventions lasted between a week and a month, and high-intensity interventions lasted more than a month. Dashes (–) indicate that insufficient studies were found that contributed evidence for this moderator subgroup.

specific target populations and outcomes studied, while the overall degree of overlap in confidence intervals between intervention types meant no conclusive judgement could be made about the superiority of one type over the other.

The results describing the impact of interventions that originate from positive psychology, tested here with a large number of studies, concur with previous reviews, which have demonstrated positive results from global studies on wellbeing[18–20,40]. We found that PPIs led to small effect sizes, regardless of whether they were tested in clinical or non-clinical populations. The PPIs were used in various different settings such as workforces, schools, the general community and clinical settings, and were offered in various different formats and intensities. This review deliberately split PPIs into multi-component and singular PPIs, to provide better insight into different intervention formats. In this way, the effects of individual building blocks (individual activities and exercises) could be compared with those of complete programmes of PPIs. In line with previous research[41], multi-component PPIs generally showed larger effect sizes compared with singular PPIs, which reached a small effect size at best. This finding is important, as positive psychologists often promote the use of simple, easy-to-perform PPIs as impactful in improving wellbeing[42,43], whereas the results of our review support the use of higher-intensity multi-component programmes over singular activities and exercises. In addition, effect sizes differed amongst singular PPIs. This demonstrates that not all individual PPIs are equal and that attention needs to be paid to which exact singular PPIs should be included as part of multi-component interventions.

The review highlighted that non-PPIs can also significantly improve states of positive mental health. Previous reviews, except the one conducted by Weiss and colleagues[18], generally excluded non-PPIs from their inclusion criteria. The significant impact of non-PPIs is promising for health professionals and other stakeholders who are seeking and proposing new therapeutic avenues to build mental wellbeing. ACT-based interventions were effective in the general population, and the closely related mindfulness-based interventions were effective in the general and mentally ill population, strengthening their appeal for clinicians who wish to offer interventions that focus on building wellbeing in addition to being able to positively impact symptoms of psychological distress[44]. That cognitive therapy- and CBT-based interventions were impactful in improving wellbeing in mentally ill populations, but not in the non-clinical population, adds to the existing evidence base supporting the utility of cognitive therapy and CBT approaches in building mental capacity in the mental healthcare setting, and strengthens the case for CBT models of wellbeing and resilience in clinical populations[45]. As CBT is currently the most empirically supported and practised therapeutic approach[46], these results support practitioners to start looking at implementing wellbeing interventions for their patients using familiar paradigms and therapeutic methods.

Our moderator analysis indicated that improvement in mental wellbeing seems to be related to effort. While the review did not find a clear linear dose–response effect, with more exposure leading simply to better treatment outcomes[47], the results do indicate that more intense interventions seem to lead to more pronounced changes, particularly in the general and mentally ill populations. These results need to be placed in the context of the overlap in confidence intervals between intensities, which means that it is not possible to definitively state that higher-intensity interventions provide superior results. The difference in impact of higher-intensity interventions may also be explained by the way the higher-intensity interventions are structured. They are typically complex, combining a multitude of psychological and behaviour-change elements[48]. Similar to the conclusions by Weiss, et al.[18] in their review on

interventions to build psychological wellbeing, our evidence is consistent with the use of higher-intensity psychological interventions to facilitate the reinforcement of practices in everyday life.

Overall effect sizes were often larger in mentally ill and physically ill populations. The ability of psychological interventions to exert more influence when symptoms of problematic mental health are more sever (that is, surpass sub-clinical levels) is supported[49], but it is important to note that the effect on wellbeing in these populations cannot solely be attributed to severity of clinical distress symptoms, as wellbeing is a state that appears in the absence of psychological distress[10,12]. For instance, recent evidence suggests that most people improve in either wellbeing or psychological distress after receiving psychological interventions that target both outcomes[50]. The difference in effect size found between clinical and non-clinical populations points to a more complex interrelationship between clinical symptoms, distress and levels of wellbeing, as well as their unique and common predictors, and the role of other moderators such as intervention intensity[10,51]. Similarly, the review showed differences in effect sizes between different intervention types within clinical versus non-clinical populations, for example, cognitive therapy- and CBT-based interventions. This highlights the need to further explore the utility of using common therapies to underpin interventions in the general population. Further research on dual-factor models such as the one posited by Corey Keyes[11] and recovery frameworks such as CHIME[52] may in future help to untangle the exact interplay between wellbeing and clinical symptoms and its treatment.

Although the evidence presented in this review includes non-Western populations (mostly from Asia), and includes youth and adult populations, the majority of studies identified in this review come from Western adult populations; a well-documented phenomenon in research, including wellbeing research[53]. Though the evidence may have application in different cultures and ages[40,54], generalizations of the evidence impact beyond the Western and Asian context should be considered with caution. Similarly, the application of interventions in practice will still require further nuancing. The review points to the utility of different interventions at the population level, but it does not determine which individuals benefit most from each intervention, and which conditions need to be met to make them work optimally. Researchers are increasingly calling for personalized approaches to intervention delivery[55]—first, to optimize the impact of the interventions, and second, to determine which factors impact at the individual level as opposed to the group level. Technological advances and maturing of the field of wellbeing science should lead to more traction in the upcoming decade[56–58].

The field of wellbeing science and the evidence quality in syntheses of studies in the field will benefit from improvements in rigour. Factors contributing to the downgrading of the quality of evidence included high rates of unclear and high risk of bias, small sample sizes, lack of published protocols or trial registries, and inconsistent reporting between studies, with a large proportion of studies failing to adhere to standard reporting guidelines such as the CONSORT statement[59]. This made it challenging at times to determine the precise components or the theoretical background of the intervention being studied, or to assess quality indicators such as implementation fidelity. Nevertheless, by taking a rigorous approach to inclusion in our meta-analyses, the review provides considerable high-quality evidence to suggest that application of mindfulness-based interventions and PPIs in particular can be reliably judged to be beneficial in clinical and non-clinical populations.

This systematic review took a broad approach in aiming to synthesize the evidence of all psychological interventions, which involved going through over 23,000 citations and assessing close to 2,000 full-text articles. The search that was constructed for this review was designed to be broad, picking up on any article that made reference to wellbeing, interventions (or synonyms) and mentioned the word 'random' to pick up on randomized controlled designs.

Specific search terms related to intervention types were also used, based on words used in articles identified before starting the review. These terms were not accompanied by an extensive list of synonyms or related constructs, which might have had a small effect on identification of relevant studies. Scanning of existing reviews and reference lists would have helped mitigate against missing studies.

The magnitude of the search was influenced by the incoherent nomenclature surrounding wellbeing[30,60] and mental health research. Findings from this review are closely related to the quality of the current state of the wellbeing literature. This is the most important limitation of this work, as reporting standards varied widely, particularly in writing of titles and abstracts; the first step in screening for reviews. This may have led to relevant studies being excluded, although this was minimized by the screening of studies included in the reference lists. Furthermore, the review was limited by the pragmatic necessity to exclude Masters or PhD theses and grey literature, which can include references to unpublished work, and could therefore potentially result in publication bias.

Nonetheless, the review used a combination of rigorous methodological approaches used in systematic reviewing and meta-analyses, including the use of quality indicators for individual studies, indicators for quality of overall effect of meta-analyses, statistical methods to infer heterogeneity and random effects analysis to counter methodological heterogeneity, drawing on accepted standards in both psychological and medical research methods. By taking a strict approach to inclusion of studies, restricting study designs to randomized control trials, using validated scales of only positive states of mental health to determine (mental) states of wellbeing, excluding all studies with additional components other than psychological interventions and using only peer-reviewed research, the identified evidence base was coherent. Intervention types fell largely within existing classifications or therapeutic approaches, delivery formats were fairly similar and, while heterogeneity in results was present, it was lower than expected.

This review did not include studies that investigated head-to-head comparisons of different types of psychological interventions, which has implications for its conclusions. For instance, studies that simply compare interventions with waitlist-control groups may overestimate effect sizes[61]—this has to be taken into account when interpreting the findings. However, the exclusion of direct comparisons does not affect the meta-analytic results specifically, as data belonging to these studies could not be added to the pool of data. This leaves the investigation of direct comparisons as an opportunity for future evidence syntheses.

It could be argued that the categorization of psychological interventions is not beneficial for deliberations on the effect psychological interventions on wellbeing. Various authors have pointed to problems in distinguishing between positive and negative interventions or outcomes in mental health[16]. They argue that any positive traits can be also be negative and vice versa, and that positive interventions can have a negative impact if specific preconditions have not been met. Similarly, psychological interventions are typically complex[48] and often borrow techniques from other therapeutic paradigms, which makes it difficult to categorize 'pure' interventions and their subsequent impact on outcomes. We used classification of interventions based on their overarching therapeutic background and the description of their components as a necessary starting point to map the breadth of different interventions that can be used to build wellbeing.

Despite current estimates of the burden of mental illness being gross underestimates[62], mental illness is projected to become the largest contributor of disease by 2030. Integration of evidence-based positive mental health interventions within established models of care can be an innovative and cost-effective consideration[63], and can help improve chances of recovery or prevent people from needing care for their mental illness down the line[6,64]. This review points to

various effective psychological interventions that practitioners can consider if they want to address mental states of wellbeing in their care provision. Implementing these interventions can be done safely without interfering with future therapist approaches, can be delivered in group format or via online or telehealth solutions and does not (necessarily) require the need for a clinical or registered psychologist, making it a potentially cost-effective addition to current referral pathways and treatment modalities. It is important to stress the importance of intensity and giving the specific building blocks to interventions considerable thought, as not all intervention components have the same impact. Future research can further stimulate the uptake of these interventions, particularly when it begins to focus more on moderators and preconditions that influence intervention efficacy, which will need to be done in well-powered studies with high reporting standards[43]. For many of the interventions studied here, the evidence quality is in need of improvement, which is particularly important in light of the replication crisis[65]. However, several intervention types (PPIs and mindfulness in particular) are captured well and the need to conduct new (pilot) studies is limited if the sole aim is to determine whether the interventions have an impact. Researchers need to look further to answer important questions, for example, to determine person-to-intervention fit[66] or to improve fidelity of interventions.

Determining the effect of pooled psychological interventions should be only the precursor to determining which intervention components are effective, and in which contexts[67]. Psychological interventions are complex and consist of a lot of different elements, as can for instance be seen in the case of multi-component PPIs, which often include different combinations of individual PPIs. A possible next step is to disentangle interventions into their building blocks, to begin to determine which combination of techniques leads to optimal outcomes. One way to achieve this is by coding interventions via behaviour-change taxonomies, which outline effective components to psychological interventions[68,69]. Although the approach of coding according to taxonomies has its own limitations[70,71], it can bring us a step closer to more effective personalized delivery of wellbeing intervention.

Methods

This systematic review was registered in the PROSPERO International prospective register of systematic reviews with number CRD42018109059. A detailed protocol of the review is provided in the Supplementary Information, with the main methodological considerations discussed below.

Study selection criteria. Studies were eligible for inclusion in this review according to five criteria. First, the studies needed to evaluate a psychological or behavioural intervention only. Second, only experimental studies using a randomized controlled design, including cluster and crossover designs, were eligible for inclusion. Interventions could be compared to (1) assessment only or waitlist, (2) a passive or active control group as long as the control group does not focus on trying to improve mental health, and (3) treatment-as-usual in the case of physical or mental illness. Comparing different psychological interventions types head-to-head was not the focus of this review, as the principle aim was to establish the impact of the independent variable: being in receipt of different types of psychological intervention. Therefore, studies comparing psychological interventions to one another were excluded from the current review. Third, measurement of at least one validated measure of mental wellbeing was required. Studies using single-item wellbeing measures were excluded. Accepted measures for mental wellbeing and psychological distress are presented in Table 2. Fourth, articles written in any language other than English were excluded. Finally, studies investigating populations with cognitive impairment were excluded, as the application of generic intervention psychological interventions in this population was not deemed equivalent; that is, the degree of adaptation was expected to be too high.

Search strategy, study selection and data extraction. The data sources for the current meta-analysis were peer-reviewed journal articles published up to July 2020, as sourced via PsycINFO, PsycARTICLES, Scopus, Medline and CINAHL. The search, constructed by professional research librarians, is current up to July 2020. It was designed to be broad, so it could pick up any psychological intervention or treatment looking at outcomes of positive mental health studied via a randomized control trial; the full search is described in the Supplementary Information part 2,

pages 6 to 10, and an overview of the measures is described in Table 2. In order to pick up any missed studies, existing systematic reviews that arose from the search on related interventions or topics, as well as reference lists of included studies were also screened. Two authors independently screened all titles and abstracts returned from the database search for eligibility and performed the subsequent full-text screen. Disagreements between review authors were resolved through discussion. Inter-rater reliability was calculated for the full-text screen, resulting in a Kappa of 0.85, which indicates very high overall agreement[72]. No contact was made with study authors. Four reviewers extracted data to a custom, standardized form in Microsoft Excel, based on formats used by the authors in previously completed reviews. All extracted data were independently checked by co-authors.

Data synthesis and analysis. Outcome data were standardized to Hedges' *G* (ref. [73]), their 99% confidence intervals, as well as their associated *P*-values, using Comprehensive Meta-Analysis software[74] version 3. Meta-analysis was conducted only in cases where five studies or more were included. Hedges' *G* of 0.2 indicated a small effect, 0.5 indicated a moderate effect and 0.8 indicated a large effect. Effect sizes were deemed significant at the 0.01 level and were conducted using two-tailed tests. A 0.01 level was chosen based on the recommendations of Borenstein et al.[75] to correct for meta-analysis multiplicity[76]. In other words, a correction was applied to compensate for the increased probability of a type II error (falsely rejecting the null hypothesis) by performing a large number of meta-analyses within one study. Where individual studies caused considerable heterogeneity in a meta-analysis (that is, they were an outlier), they were removed from the analysis.

For each of the meta-analyses, a power calculation was performed[77]. An overall effect size on mental wellbeing was calculated for the meta-analysis, as research points to the existence of an overarching wellbeing factor[78]. In order to compare results to previous reviews[17,18,20] and to provide intervention designers with insight into the performance of individual psychological interventions on aspects of hedonic versus eudaimonic aspects of wellbeing, separate scores for subjective and psychological wellbeing were calculated. Table 2 outlines all measures used in the present study and whether they were counted as measures of subjective or psychological wellbeing.

Intervention types were not collapsed into an overarching 'psychological interventions' category, but rather were added as subgroups. Due to the common use of complex multi-component interventions, a posteriori categorization of included interventions was conducted, as described in Table 1. Studies were classified according to the descriptions provided in the papers and the supplementary material to the papers. Interventions were grouped into distinct categories if there was a minimum of two studies for each category. Singular studies were grouped in an 'other' category. Interventions that largely contained techniques or components stemming from a specific therapy (for example, cognitive behavioural therapy) were allocated under the description of that therapeutic approach. Interventions that specifically focused on testing a specific method (for example, goal setting or expressive writing) were classified as interventions based on that type of method. A specific group called 'multi-theoretical interventions' was created for interventions that deliberately combined therapeutic elements or did not provide sufficient information to distinguish between categories.

Interventions were analysed and presented per population group (non-clinical, mentally ill and physically ill). This analysis per intervention was done to justify the considerable differences between intervention implementation for general versus clinical populations and the differences between the psychological interventions.

As it was unlikely that the studies were functionally equivalent (for example, due to differences in exact formats used), the overall effect size was calculated using random effect models[79]. Where multiple intervention or control groups existed within a single study, which would fall within one category of study types as laid out in Table 1, a combined weighted mean effect size was calculated[80,81].

Quality of effect size estimate and included studies. The quality of evidence provided in each meta-analysis was assessed using the five GRADE considerations[33]. GRADE provides an estimate of the quality of combined meta-analyses, as opposed to individual studies. Each meta-analysis is graded for five considerations, with downgrades being made when one of the five considerations has not been adequately met. In brief, the considerations focus on general study limitations (for example, presence of confounders), consistency of effect (that is, heterogeneity in results), imprecision (for example, wide confidence intervals), indirectness (for example, very different populations tested) and publication bias. Based on the considerations, the evidence quality for each meta-analysis can range from very low to high. Forest plots were coloured to reflect the evidence quality showing red (very low quality), orange (low quality), yellow (moderate quality) and green (high quality) colours. In addition to GRADE, the Cochrane risk of bias assessment[32] was used to determine the risk of bias for the included studies. The I^2 statistic and Cochrane's *Q* were calculated to determine the heterogeneity of the results.

Methodological moderators or subgroup analyses. A central aim of the review was to examine the influence of various universal moderators on the effect size of interventions[82]. The first type of moderator was intervention-specific moderators. These included the type of intervention (Table 1) and were used as subgroups to

investigate their differential effect. Furthermore, the review examined the mode of delivery and intensity of the intervention. Delivery mode was split into individual, technology-based and group formats. Intensity was split into interventions lasting up to a week (low-intensity interventions), those lasting between a week and a month (moderate-intensity interventions), and those that lasted more than a month (high-intensity interventions), in line with previous review categorizations[20]. The second type of moderator included study-specific moderators such as the impact of different control group types, assessment follow-up and study quality. Control groups were divided into assessment-only, waitlist-versus-passive or active-comparison groups. Length of follow-up looked at post-intervention (up to one month after the intervention), between 1 and 3 months, between 3 and 6 months, between 6 and 12 months and between 12 and 24 month after the intervention. Study quality was based on risk of bias, where studies scoring four or more low-risk-of-bias categories were deemed high quality. It considered population-specific moderators by splitting the results for the general population, those with a mental illness and those with a physical illness. Finally, it rated the overall quality of the evidence provided and aimed to discuss the implications of the evidence for future research and mental healthcare delivery in practice.

Reporting summary. Further information on research design is available in the Nature Research Reporting Summary linked to this article.

Data availability
The datasets that were used in this review are available from the corresponding author on reasonable request.

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Author contributions

J.v.A.: review methodology, screening of literature, data extraction, risk of bias, meta-analysis and writing. M.I.: review methodology, screening of literature, data extraction, risk of bias and writing. L.L.: screening of literature, data extraction, risk of bias and writing. J.B.: data extraction, risk of bias and writing. Z.K.: risk of bias and writing. M.C.: data extraction and writing. M.K.: input into methodology, focus of review and writing.

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The authors declare no competing interests.

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Behavioural & social sciences study design

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Study description	Systematic review and meta-analysis utilising meta-regression (sub-group analyses)
Research sample	Studies investigating adults and youths in clinical and non-clinical populations. Studies needed to be RCTs, needed to use a validated measure of mental wellbeing and needed to test psychological interventions. Studies focusing on participants with cognitive impairment or studies conducted in another language than English were excluded.
Sampling strategy	The data sources for the current meta-analysis were peer-reviewed journal articles, as sourced via PsycINFO, PsycARTICLES, Scopus, Medline, and CINAHL. The search strategy was devised by professional librarians.
Data collection	All data was sourced via the above mentioned databases. Existing systematic reviews that arose from the search on related interventions or topics, as well as reference lists of included studies were furthermore screened.
Timing	Final search was run in July 2020 with extraction and data-analysis occurring up to 24th of December 2020
Data exclusions	Heteregoneity analyses combined with visual inspection of plots were run to determine the impact of extreme outliers. All studies reporting Cohen's D's of over 2 were generally excluded due to their extreme contribution to heterogeneity, which was profound even though a random effects analysis was run.
Non-participation	not applicable in review
Randomization	The review only included RCTs including crossover and cluster RCTs

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☒	☐ ChIP-seq
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☒	☐ MRI-based neuroimaging

Supplementary information

A systematic review and meta-analysis of psychological interventions to improve mental wellbeing

Supplementary Information to: A systematic review and meta-analysis of distinct psychological interventions to build mental wellbeing.

Part 1: Supplementary data

Table of Contents

1

Summary of included studies – additional data

Supplementary table 1: Frequency of countries in which studies were conducted

Country	Frequency
USA	120
Australia	33
Netherlands	30
UK	26
Iran	25
China	20
Spain	19
Canada	18
Germany	17
Switzerland	15
Hong Kong	14
Ireland	10
Norway	6
Israel	5
New Zealand	5
South Korea	5
Sweden	5
Italy	4
Taiwan	4
Austria	3
Belgium	3
France	3
Japan	3
Malaysia	3
Denmark	2
Finland	2
Singapore	2
Other	15

Supplementary table 2: Characteristics of included studies

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Abbott, 2009	Home-based sales managers in rural and urban Australia Exp n = 12 Con n = 19	RCT	Exp = 40.5 (9.5) Con = 46.0 (10.0)	Organisation Hybrid	Multi-component online resilience program based on cognitive therapy teaching skills in: - emotion regulation - impulse control - optimism - causal analysis - empathy - self-efficacy - reaching out	Waitlist	7 sessions over 10 weeks	AHI	Baseline Post
Ahmad, 2020	University students in Canada Exp 1 n = 37 Exp 2 n = 34 Con n = 38	RCT	Exp 1 = 24.9 (6.4) Exp 2 = 24.1 (5.7) Con = 25.4 (7.3)	University Online	Exp 1 = online virtual mindfulness intervention with videoconferences and discussion forums Exp 2 = online virtual mindfulness intervention only	Waitlist	12 sessions over 8 weeks	SLSS	Baseline Post
Alden, 2013	University psychology students with social anxiety in Canada Exp 1 n = 42 Exp 2 n = 39 Con n = 42	RCT	Overall = 19.6 (3.1)	University Individual	Exp 1: undertaking three kind acts a day Exp 2: completing two safety behaviour experiments for social anxiety	Activity monitoring: - life details - record a minimum of 3 events that occurred during the day	8 sessions over 4 weeks	PANAS	Baseline Post
Algoe, 2016	Adult couples in the USA Exp n = 48 Con n = 46	RCT	Exp = 30.5 (5.7) Con = 29.0 (3.5)	University Individual	Gratitude intervention involving expressing gratitude to spouse	Discuss daily events	4 weeks	SWLS	Baseline Post
Alireza Afshani, 2019	Infertile women in Iran Exp n = 16 Con n = 16	RCT	Not reported	Health Service Group	Self-compassion intervention	No intervention	8 sessions over 8 weeks	PWBS	Baseline Post
Al-Seheel, 2016	Muslim university students in Malaysia Exp 1 n = 18 Con n = 20	RCT	Overall = 21.9 (1.2)	University Individual	Daily secular gratitude journal and a gratitude letter at end of trial	Write about life details	Daily for 16 days	SPANE SWLS	Baseline Post
Antoine, 2020	Couples in France Exp n = 40 Con n = 36	RCT	Exp = 37.5 (11.9) Con = 39.8 (13.9)	Community Group	Multicomponent positive psychology intervention	Waitlist	4 sessions over 4 weeks	SWLS	Baseline Post
Antoni, 2006	Females with non-metastatic breast cancer in the USA Exp n = 74 Con n = 85	RCT	Exp = 49.6 (9.1) Con = 50.8 (9.0)	Health Service Group	Cognitive behavioural stress management (CBSM) techniques with didactics - teaching women to cope better with daily stressors and optimise use of social resources	One day educational seminar	10 sessions over 10 weeks	DABS	Baseline 3 months 6 months

1

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Arango-Lasprilla, 2014	Dementia caregivers in Colombia Exp n = 39 Con n = 30	RCT	Exp = 59.4 (10.8) Con = 55.1 (11.2)	Community Group	CBT intervention aimed at reducing negative feelings in the context of caregiving, including relaxation, positive affirmations and assertiveness training	Educational program of equal intensity	8 sessions over 8 weeks	SWLS	Baseline Post 3 months
Arola, 2020	Older immigrants in Sweden Exp n = 9 Con n = 13	RCT	Exp = 74.0 (3.4) Con = 74.2 (3.4)	Community Group-based	Health promotion program - introducing topics and discussing the relevance of the topic regarding their experiences from everyday life and how it would impact their current resources to manage daily life	No intervention	4 sessions over 4 weeks and a follow up home visit	LiSat-11	Baseline 6 months 12 months
Asl, 2016	Infertile females with mild to moderate depression in Iran Exp n = 15 Con n = 16	RCT	Exp = 32.3 (4.8) Con = 29.3 (5.7)	Health Service Group	Positive psychotherapy focusing on using strengths, gratitude visit, active constructive response, counting blessings, and savouring	Waitlist	6 sessions over 6 weeks	SWLS	Baseline Post
Ataie Moghanloo, 2015	Seven- to 15-year-old diabetic children in Iran Exp n = 17 Con n = 17	RCT	Exp = 10.4 (2.9) Con = 10.6 (3.2)	Health Service Group	Group ACT	No intervention	10 sessions over 10 weeks	SWLS	Baseline Post
Auyeung, 2019	University students in Hong Kong Exp n = 48 Con n = 52	RCT	Exp = 22.9 (3.0) Con = 22.7 (3.7)	University Online	Best possible selves intervention	Writing about past event	Daily exercises over 6 days	FS PANAS	Baseline Post
Azkhosh, 2016	Opiate addicted individuals in Iran Exp n = 16 Con n = 20	RCT	Exp = 27.5 (7.4) Con = 26.7 (7.9)	Health Service Group	Group ACT	Treatment as usual	12 sessions over 12 weeks	PWBS	Baseline Post 3 months
Baker, 2019	Individuals with acquired brain injury or spinal cord injury in Australia Exp n = 15 Con n = 16	RCT	Exp = 49.6 (18.5) Con = 44.7 (17.5)	Health service and home Individual	Therapeutic song writing - create 3 songs reflecting perceptions of past, present and future self	Treatment as usual	12 sessions over 6 weeks	SWLS	Baseline Post 6 months
Barclay, 2009	University students who had experienced unfair treatment from a manager in the USA Exp 1 n = 25 Exp 2 n = 25 Exp 3 n = 25 Con n = 25	RCT	Overall = 22.7 (6.3)	University Individual	Expressive writing Exp 1: focused on emotions Exp 2: focused on thoughts Exp 3: focused on both emotions and thoughts	Writing about a trivial topic	4 sessions over 4 days	SWLS	Baseline Post
Barnes, 2020	Community members in Canada Total n = 4374	RCT	Overall = 33.5 (11.4)	Community Online	Exp 1: 3 good things Exp 2: Positive reinterpretation Exp 3: Signature strengths	Con 1: Early memories Con 2: Early positive memories	Daily over 1 week	SWLS	Baseline Post 3 months

2

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
					Exp 4: Self-compassion Exp 5: Compassionate actions Exp 6: Gratitude Exp 7: Listening to music Exp 8: Letter from your future self				6 months
Bateman, 2019	Families or significant others living with or supporting people with a diagnosis of BPD in England Exp n = 29 Con n = 27	RCT	Exp = 49.0 Con = 53.0	Community Group-based	Mentalization based intervention with support (MBT -FACTS) - Introduction to BPD - Mindfulness and mentalizing - Mentalizing - Mentalizing and empathic validation - Problem-solving and review	Waitlist	5 sessions over 5 weeks	WEMWBS	Baseline Post 3 months
Behrndt, 2019	Informal caregivers of individuals with a cognitive impairment in Germany Exp n = 205 Con n = 154	Cluster RCT	Exp = 59.5 (11.4) Con = 59.3 (11.2)	Community Telephone	Phone counselling focused on: - stress reduction - development of self-management strategies - how to deal with challenging behaviours	Waitlist	3 sessions over 6 months	WHO-5	Baseline Post
Berry, 2012	Family caregivers of people with severe disabilities in the USA Exp n = 60 Con n = 66	RCT	Exp = 56.5 (11.7) Con = 56.7 (13.4)	Community Hybrid	Problem solving intervention, focused on regulating emotional experiences, attending to negative and positive cognitions, brainstorming, and evaluation solutions	Health education	8 sessions over 12 months	SWLS	Baseline Post
Beukes, 2017	Individuals with significant levels of tinnitus distress in the UK Exp n = 63 Con n = 72	RCT	Exp = 56.8 (12.2) Con = 54.3 (13.5)	Community Online	Online cognitive behavioral therapy, including goal setting, a clear structure, active participation, and relapse prevention	Waitlist	16 modules over 8 weeks	SWLS	Baseline Post
Bhayee, 2016	Healthy community dwelling adults in Canada Exp n = 13 Con n = 13	RCT	Overall = 33.3 (4.7)	Community Online	Guided meditation using the Calm application with neuro-feedback	Online math training	Daily for 6 weeks	PANAS	Baseline Post
Bisseling, 2019	Cancer patients with psychological distress in the Netherlands Exp 1 n = 84 Exp 2 n = 78 Con n = 78	RCT	Exp 1 = 52.0 (11.1) Exp 2 = 52.0 (10.2) Con = Not reported	Health Service Exp 1: Group-based Exp 2:Online	Exp 1: Mindfulness-based cognitive therapy Exp 2: Mindfulness-based cognitive therapy delivered online	Treatment as usual	Exp 1: 8 sessions over 8 weeks Exp 2: Access to online program for 8 weeks	MHC-SF	Baseline Post
Black, 2019	Women with substance use disorder (SUD) in the USA	RCT	Exp = 32.4 (9.8) Con = 32.6 (8.4)	Health Service Group-based	Mindfulness - introduction - didactic psychoeducation with discussion	Psychoeducation	12 sessions over 6 weeks	PANAS	Baseline Post

3

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
	Exp n = 100 Con n = 100				- experiential meditation and mindfulness practices - practice of sitting or walking meditation, body scan and or standing stretching - reading				
Boehm, 2011	Anglo- and Asian-American individuals in the USA Exp 1 n = 74 Exp 2 n = 72 Con n = 74	RCT	Overall = 35.6 (11.4)	Community Online	Exp 1: Optimism exercise focusing on their best possible life in the future Exp 2: Gratitude exercise writing letters of appreciation to loved ones	Listing past week's experiences	6 sessions over 6 weeks	SWLS	Baseline Post
Bohlmeijer, 2020	Community sample with moderate wellbeing and moderate symptoms of depression and anxiety in the Netherlands Exp 1 n = 51 Exp 2 n = 52 Con n = 66	RCT	Exp 1 = 47.4 (9.7) Exp 2 = 48.4 (9.9) Con = 50.0 (9.2)	Community Online	Exp 1: Gratitude writing exercises Exp 2: Self-kindness writing exercises	Waitlist	5 daily activities over 6 weeks	MHC-SF	Baseline Post 3 months
Bolier, 2013	Mildly to moderately depressed community dwelling adults who are wellbeing seeking in the Netherlands Exp n = 95 Con n = 119	RCT	Exp= 43.5 (11.7) Con= 42.8 (11.9)	Community Online	Self-help website with therapist support, based on positive psychology principles	Waitlist	6 modules over 2 months	MHC-SF WHO-5	Baseline Post 3 month
Bolier, 2014	Nurses and allied health professionals in the Netherlands Exp n = 82 Con n = 143	Cluster RCT	Exp = 38.0 (12.1) Con = 42.0 (11.4)	Organisation Online	Worker's health surveillance offering screening, tailored feedback and online interventions targeting positive mental health and mental health complaints	Waitlist	Various format depending on tailored intervention	MHC-SF WHO-5	Baseline 3 months 6 months
Boryri, 2019	Primiparous pregnant women in Iran Total n = 180	RCT	Exp 1 = 26.6 (4.8) Exp 2 = 23.7 (4.4) Con = 23.3 (4.2)	Health Service Hybrid	Exp 1: Muscle relaxation Exp 2: Guided imagery	Treatment as usual	2 sessions over 4 weeks with daily at home practice	OHI	Baseline Post
Boselie, 2018	Fibromyalgia patients in the Netherlands Exp n = 56 Con n = 33	RCT	Not reported	Community Online	PP intervention targeting optimism, positive emotions, and self-compassion	Waitlist	4 modules over 8 weeks	PANAS	Baseline Post
Bostani, 2020	University students in Iran Exp 1 n = 50	RCT	Not reported	University Group	Exp 1 = Progressive muscle relaxation Exp 2 = Support group therapy	No intervention	5 daily sessions	OHI	Baseline Post

4

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Bostock, 2019	Exp 2 n = 50 Con n = 50 Healthy employees from two large companies in the UK Exp n = 123 Con n = 106	RCT	Exp = 36.0 (8.3) Con = 35.0 (6.9)	Organisation Online	Mindfulness meditation using the Headspace app	Waitlist	Daily for 45 days	WEMWBS	Baseline Post
Bower, 2015	Breast cancer survivors in the USA Exp n = 35 Con n = 30	RCT	Exp = 46.1 Con = 47.7	Health Service Group	Mindful awareness practices program: - theoretical models of mindfulness, relaxation, mind-body connection - experiential practice of meditation - gentle movement exercises - psychoeducation related to cancer survival	Waitlist	6 sessions over 6 weeks	PANAS	Baseline Post 3 months
Braganza, 2019	Adults from India Exp n = 65 Con n = 64	RCT	Overall = 41.6	University Individual	Core transformation therapy: - tuning into inner experiences to identify an area of difficulty to transform	Waitlist	Single session	BABS	Baseline Post
Brodbeck, 2019	Older adults after spousal bereavement or divorce in Switzerland Exp n = 51 Con n = 47	RCT	Exp = 50.3 (13.3) Con = 53.0 (15.2)	Community Online	Self-help intervention: - psychoeducation - assessment of current situation - fostering positive thoughts and emotions - finding comfort - self-care - accepting memories and pain - unfinished business - creating a new life without the partner - social relationships - redefinition of the relationship to the lost partner	Waitlist	10 sessions over 10 weeks	SWLS	Baseline Post
Bryant, 2020	Online sample of older adults in the USA Exp n = 109 Con n = 93	RCT	Overall = 69.0 (4.2)	Community Online	Identify, contemplate, and savour life lessons	Describe morning routine	Single session	PANAS SWLS SHS	Baseline Post
Buchanan, 2010	General public in the UK Total n = 86	RCT	Overall = 26.0 (6.0)	Community Online	Exp 1: Performing acts of kindness Exp 2: Performing new acts	No intervention	10 sessions over 10 days	SWLS	Baseline Post
Burckhardt, 2015	High school students in Australia Exp n = 111 Con n = 78	Cluster RCT	Female only school A = 13.8 (1.6) Female only school B = 15.6	School Online	PP intervention including making gratitude entries, mindfulness meditations, describing personal stories, and a mindfulness exercise involving taking photos	Completing a non-psychological workbook structured similarly to the intervention	6 hours over 6 weeks	SLSS SWEMWBS	Baseline Post

5

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
			(0.8) Male only school = 14.6 (0.4) Co-ed schools = 12.6 (0.3)						
Burckhardt, 2016	High school students in Australia Exp n = 139 Con n = 128	Cluster RCT	Exp = 16.4 (0.7) Con = 16.3 (0.6)	School Group	PP and ACT intervention focused on values, committed action, contact with present moment, observer-self, acceptance of emotions, and thought diffusion	Pastoral care	16 sessions over 3 months	FS	Baseline Post
Calear, 2016	High school students in Australia Exp 1 n = 137 Exp 2 n = 368 Con n = 334	Cluster RCT	Exp 1 = 15.1 (1.2) Exp 2 = 14.8 (0.8) Con = 14.7 (1.0)	Exp 1: School Exp 2: Health Service Online	Exp 1: Psychoeducation and toolkit for anxiety program (school method) Exp 2: Psychoeducation and toolkit for anxiety program (health service method)	Waitlist	6 sessions over 6 weeks	WEMWBS	Baseline Post 6 months 12 months
Cantarella, 2017	Older adults in Italy Exp n = 16 Con n = 16	RCT	Exp = 69.4 (6.6) Con = 70.6 (6.1)	Community Group	PP intervention focused on Ryff's domains of Psychological Wellbeing in relation to age-related issues	Group discussion of social topics	8 sessions in 8 weeks	QBP	Baseline Post
Carrico, 2015	Homosexual men using methamphetamines in USA Exp n = 12 Con n = 9	RCT	Overall = 41.1 (9.0)	Community Individual	Positive affect regulation program and treatment as usual: - psychoeducation - breathing retraining - breath meditation - problem-focused coping and reasoned action - mountain meditation - loving-kindness meditation	Treatment as usual	12 sessions over 12 weeks	DES	Baseline Post 6 months
Carrico, 2019	Sexual minority men living with HIV and using methamphetamine in the USA Exp n = 49 Con n = 49	RCT	Exp = 43.2 (9.2) Con = 43.2 (8.5)	Community Group	Multicomponent intervention to improve positive affect - psychoeducation - breathing retraining - breath meditation - problem-focused coping and reasoned action - mountain meditation - loving-kindness meditation	Neutral writing exercises	5 sessions over 3 months	DES	Baseline Post 3 months 6 months 12 months
Carrillo 2020 - Study 1	Community sample in Spain Exp 1 n = 24 Exp 2 n = 21 Exp 3 n = 22 Con n = 21	RCT	Overall = 21.6 (3.7)	University Individual	Exp 1: Best past self exercise Exp 2: Best present self exercise Exp 3: Best possible self exercise	Writing about daily activities (past 24 hours)	Daily exercises over 1 week	PANAS TSWLS HM	Baseline Post
Carrillo 2020 - Study 2	Community sample in Spain Exp 1 n = 24	RCT	Overall = 23.3 (5.2)	Community Online	Exp 1: Best past self exercise Exp 2: Best present self exercise Exp 3: Best possible self exercise	Writing about daily activities (past 24 hours)	Daily exercises over 1 week	PANAS TSWLS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
	Exp 2 n = 23 Exp 3 n = 20 Con n = 17								
Casey, 2017	Problem gamblers in Australia Exp 1 n = 60 Exp 2 n = 59 Con n = 55	RCT	Exp 1 = 44.8 (9.0) Exp 2 = 44.1 (10.5) Con = 44.2 (9.5)	Community Online	Exp 1: CBT sessions Exp 2: Gambling monitoring, feedback and support without the CBT	Waitlist	6 sessions over 6 weeks	SWLS	Baseline Post
Castro, 2012	Soldiers returning from Iraq in the USA Exp n = 290 Con n = 252	RCT	Not reported	Military Group	Mental health training module aimed at enhancing mental skills development, adaptation to the stressors of combat, and management of transition from combat to home	No intervention	Single session	SWLS	Baseline 6 months
Cejudo, 2019	Women diagnosed with Fibromyalgia in Spain Exp n = 53 Con n = 51	RCT	Overall = 47.6 (5.9)	Community Group	Mindfulness-based cognitive therapy	Treatment as usual	20 sessions over 20 weeks	SWLS PANAS	Baseline Post 6 months
Cejudo, 2020	Middle and high school students in Spain Exp n = 97 Con n = 90	RCT	Overall = 13.8 (1.6)	School Online	Social-emotional learning program - relationships - assertiveness - self-esteem - decision making - emotional intelligence - addictions - conflict management	Waitlist	28 sessions over 28 weeks	SWLS PANAS	Baseline Post
Celano, 2017	Patients recently hospitalised for depression and suicidal ideation or behaviour in the USA Exp n = 29 Con n = 29	RCT	Exp = 43.2 (17.1) Con = 44.8 (16.4)	Health Service Hybrid	PP intervention: - gratitude for positive events - identifying and using personal strengths - gratitude letter - enjoyable and meaningful activities - leveraging past success - acts of kindness	Cognition-focused control, recalling: - daily activities - events related to health - activities in the mornings or evenings - interactions with others - leisure activities	6 sessions over 6 weeks	PANAS	Baseline Post 3 months
Celano, 2020	Individuals diagnosed with bipolar depression in the USA Exp n = 11 Con n = 9	RCT	Exp = 42.6 (12.8) Con = 48.9 (13.2)	Health Service Telephone	Positive Psychology intervention including gratitude letter, personal strengths, acts of kindness, and best possible self	Recall and write about neutral events	4 exercises over 4 weeks	PANAS	Baseline Post
Cerezo, 2014	Breast cancer patients in Spain Exp n = 87 Con n = 88	RCT	Exp = 50.7 (9.4) Con = 49.4 (9.9)	Community Group	PP intervention focused on improving strengths and enhancing styles of coping	Waitlist	14 sessions over 14 weeks	SWLS AFFS	Baseline Post
Cerna, 2020	Community sample in Chile	RCT	Overall = 30.9	Community Group	Mindfulness-based stress reduction including body scanning using attention and breathing	Waitlist	4 sessions over 4 weeks	MHC-SF	Baseline Post 3 months

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
	Exp n = 27 Con n = 19								
Chambers, 2013	Individuals with prostate cancer in Australia Exp n = 334 Con n = 347	RCT	Exp = 63.3 (7.6) Con = 63.4 (7.5)	Health Service Telephone	Psychoeducation aimed at challenging unhelpful cognitions, adjustment to cancer diagnosis, stress-reduction techniques, and problem-solving skills	Treatment as usual	5 sessions over 5 months	SWLS	Baseline 1 month 12 months 2 years
Champion, 2018	Adults in the UK Exp n = 29 Con n = 33	RCT	Exp = 40.2 (4.1) Con = 38.2 (6.8)	Organisation Online	Mindfulness meditation using the Headspace app	Waitlist	Daily over 1 month	SWLS	Baseline Post
Chancellor, 2015	Engineering firm employees in Japan Exp n = 15 Con n = 17	RCT	Overall = 35.3 (6.7)	Organisation Online	Recount three positive events at work	Employees asked to list work tasks that completed	6 sessions over 6 weeks	SHS	Baseline Post
Chancellor, 2017	Corporate workplace employees in Spain Exp 1 n = 19 Exp 2 n = 35 Con n = 34	RCT	Overall = 35.6 (9.0)	Organisation Online	Exp 1: Pro-sociality intervention, performing acts of kindness for co-workers Exp 2: Receivers of kindness	No intervention	4 weeks	SHS SWLS	Baseline Post 3 months
Cheng, 2016	Depressed caregivers of individuals with Alzheimer's disease in Hong Kong Exp n = 42 Con 1 n = 45 Con 2 n = 42	Cluster RCT	Exp = 56.0 (10.9) Con 1 = 53.0 (10.7) Con 2 = 56.7 (11.1)	Community Group	Benefit- finding intervention, gain-focused reappraisal strategies to find positive meaning and benefits	Con 1: simplified psychoeducation Con 2: standard psychoeducation	8 sessions over 8 weeks	PWBS	Baseline Post
Cheng, 2019	Family caregivers of people with Alzheimer's disease in Hong Kong Exp n = 32 Con 1 n = 34 Con 2 n = 30	RCT	Overall = 51.2 (10.6)	Community Individual	Benefit-finding therapeutic intervention (BFT) including training and exercises for positive reappraisal and benefit-finding	Con 1: simplified psychoeducation Con 2: standard psychoeducation	8 sessions over 4 weeks	PWBS	Baseline Post 6 months 12 months
Cherif, 2020	University students in Africa Exp n = 40 Con n = 35	RCT	Overall = 33.0	University Online	Character strengths - highlight value of strength - how to implement strength - motto related to strength	Motto related to strength	Daily over 24 days	AHI	Baseline Post
Cheung, 2017	Women with metastatic breast cancer in USA Exp 1 n = 10 Exp 2 n = 9 Con n = 11	RCT	Overall = 53.4 (11.2)	Health Service Exp 1: Group Exp 2: Online	Positive affect skills: - positive events - capitalizing - gratitude - mindfulness - positive reappraisal - personal strengths	Interviews without didactic portion or skill practice	Exp 1: 5 sessions over 5 weeks Exp 2: 8 modules over 5 weeks	DES	Baseline Post

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
					- achievable goals - acts of kindness				
Chiang, 2008	Older males in Taiwan Exp n = 36 Con n = 39	RCT	Exp = 78.3 (3.5) Con = 78.0 (3.9)	Community Group	Life Review Therapy: - childhood memories - adolescence - the subject's family - the subject's job - the subject's friends - the greatest thing the subject has accomplished in life	Waitlist	8 sessions over 8 weeks	LSIA	Baseline Post
Chiang, 2020	Older adults from a geriatric institution in China Exp n = 64 Con n = 62	Cluster RCT	Exp = 82.4 (7.7) Con = 80.6 (7.8)	Health Service Group	Mind Training program - strengthen ability to identify mood swings - use talking and listening skills to provide positive feedback - change thinking patterns, learned about thought reframing and challenging negative thinking	Health promotion activities	6 sessions over 6 weeks	CHI	Baseline Post
Cho, 2016	University psychology students in South Korea Exp 1 n = 12 Exp 2 n = 12 Con n = 12	RCT	Overall = 20.1 (1.5)	University Individual	Exp 1: Mindful breathing practices Exp 2: Cognitive reappraisal	No intervention	7 sessions over 7 days	PANAS	Baseline Post
Coelhoso, 2019	Female hospital employees in Brazil Exp n = 116 Con n = 110	RCT	Exp = 35.4 (7.7) Con = 33.8 (7.5)	Organisation Online	Use of mobile-app based on relaxation training, breathing techniques, mindfulness and positive psychology principles	Self-observation app	32 sessions over 8 weeks	WHO-5	Baseline Post
Cohn, 2014	Adults with type 2 diabetes in the USA Exp n = 25 Con n = 17	RCT	Overall = 54.0	Community Online	Positive affect skills: - savouring - gratitude - acts of kindness - positive events - mindfulness - positive reappraisal - self-affirmation - goals	Emotion-reporting waitlist	5 sessions over 5 weeks	DES	Baseline Post
Coker, 2019	Adults with spinal cord injury in the USA Exp n = 37 Con n = 40	RCT	Exp = 48.0 (12.8) Con = 52.0 (15.3)	Community Group	Re-inventing yourself after Spinal Cord Injury - introduction and identifying goals - establish goals - reframing - overcoming barriers - using character strengths - gratitude and maintenance	Waitlist	6 sessions over 6 weeks	SWLS	Baseline Post 3 months 6 months 12 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Cole, 2012	Individuals with metastatic melanoma in the USA Exp n = 14 Con n = 19	RCT	Overall = 54.0 (12.3)	Health Service Group	Secular meditation	Treatment as usual	5 sessions over 4 months	PANAS	Baseline Post 3 months 6 months
Contractor, 2020	Trauma exposed university students in the USA Exp 1 n = 22 Exp 2 n = 21 Con n = 22	RCT	Exp 1 = 22.6 (4.9) Exp 2 = 22.0 (2.9) Con = 23.0 (6.2)	University Individual	Exp 1: Narrating and processing positive memories Exp 2: Writing and processing positive memories	Time-matched neutral writing	2 sessions	PANAS	Baseline Post
Cook, 1991	Elderly nursing home residents in the USA Exp n = 14 Con 1 n = 13 Con 2 n = 14	RCT	Overall = 81.3	Community Group	Reminiscence intervention focused on positive and pleasant experiences	Con 1: Discussing current events Con 2: No intervention	16 sessions over 16 weeks	LSIA	Baseline Post
Cook, 1998	Elderly female nursing home residents in the USA Total n = 36	RCT	Overall = 82.4	Community Group	Reminiscence intervention focused on positive and pleasant experiences	Con 1: Discussing current events Con 2: No intervention	16 sessions over 16 weeks	LSIA	Baseline Post
Coote, 2012	Depressed individuals in the UK Exp n = 26 Con n = 29	RCT	Exp = 53.3 (14.8) Con = 52.0 (11.9)	Community Individual	Self-help, positive goal-focused intervention	Waitlist	5 weeks	PANAS SWLS	Baseline Post
Cousin, 2016	Healthy adults in the UK Exp n = 36 Con n = 39	RCT	Exp = 48.5 (12.8) Con = 49.1 (13.3)	Community Group	Mindfulness-based CBT including guided meditations and activities based on psycho-educational and cognitive behavioral principles	Waitlist	8 sessions over 8 weeks	PANAS X	Baseline Post
Crawford, 2019	Adults with Type 1 or 2 diabetes in Australia Exp n = 21 Con n = 33	RCT	Exp = 53.5 (17.3) Con = 53.9 (15.4)	Community Online	Benefit-finding writing - write about any positive thoughts and feelings about experiences with diabetes	Writing about the use of time	Daily for 3 days	PANAS	Baseline Post 3 months
Cunha, 2019	Adults in Brazil Exp n = 153 Con 1 n = 123 Con 2 n = 134	RCT	Exp = 32.8 (11.4) Con 1 = 32.6 (10.2) Con 2 = 32.8 (10.5)	Community Individual	Writing daily gratitude lists	Con 1: Write about hassles Con 2: Write about neutral events	Daily for 2 weeks	PANAS SHS SWLS	Baseline Post
Dambrun, 2016	University psychology students in France Exp n = 27 Con n = 26	RCT	Overall = 19.2 (1.3)	University Group	Guided body scan meditation	Passive resting	Single session	SA-DHS	Baseline Post
Dambrun, 2019	University psychology students in France Exp 1 n = 31 Con n = 25	RCT	Overall = 19.5 (3.0)	University Individual	Exp 1 = Body scan meditation	Active listening to Grimm Brothers' tale	Single session	SA-DHS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Dandan, 2019	Adults in Switzerland Exp 1 n = 18 Exp 2 n = 18 Con n = 16	RCT	Overall = 44.2 (10.0)	Community Group	Exp 1: Mindfulness based strengths practice Exp 2: Mindfulness-based stress reduction	Waitlist	8 sessions over 8 weeks	WHO-5	Baseline Post 3 months 6 months
Davis, 2004	Patients with right hemisphere cerebral vascular accidents in the USA Exp n = 7 Con n = 7	RCT	Exp = 68.5 Con = 67.5	Health Service Individual	Life review therapy	Watched a neutral video with follow-up discussion	3 sessions over 3 days	LSIA	Post
Davis, 2013	Patients with Fibromyalgia in the USA Exp n = 39 Con n = 40	RCT	Overall = 46.1	Community Online	Mindful socio-emotional regulation intervention focused on regulation of emotions via awareness and acceptance of emotion experiences, the use of mindful awareness skills to make choices that build stronger social bonds, enhancing a sense of belonging and increase enjoyment of social relations	Health education	12 modules over 6 weeks	PANAS	Baseline Post
de Vibe, 2013	University students in Norway Exp n = 140 Con n = 137	RCT	Exp = 23.6 (4.7) Con = 24.0 (5.7)	University Group	Mindfulness-based stress reduction program, focused on psychoeducation, mindfulness skills with home practice	No intervention	7 sessions over 7 weeks	SWBS	Baseline Post
Deane, 2015	Carers of individuals with psychosis in Australia Exp n = 40 Con n = 41	RCT	Overall = 54.0 (10.2)	Community Online	Recovery focused interactive newsletters with activities focused on strengths, values, promoting growth and development with journal writing	Information booklet on psychosis	12 sessions over 12 months	PWBS	Baseline Post
Deng, 2018	Male prisoners in China Exp 1 n = 37 Exp 2 n = 29 Con n = 30	RCT	Exp 1 = 37.0 (9.9) Exp 2 = 34.3 (10.1) Con = 34.9 (9.0)	Prison Hybrid	Exp 1: Blessing-counting diary Exp 2: Gratitude-sharing	Write a short essay and summarise daily	Exp 1: daily for 5 weeks Exp 2: 5 sessions over 5 weeks	SWLS SPANE	Baseline Post
Di, 2016	Individuals with cervical cancer in China Exp n = 49 Con n = 46	RCT	Exp = 46.6 (9.9) Con = 44.5 (9.1)	Health Service Individual	Guided meditation and gratitude intervention	Waitlist	Daily for 4 weeks	PANAS	Baseline Post
Dolev-Amit, 2020	University students in Israel Exp 1 n = 42 Exp 2 n = 21 Con n = 40	RCT	Overall = 23.3 (4.3)	University Online	Exp 1: Journal writing on personal strengths Exp 2: Journal writing on personal weaknesses	Journal writing on neutral events	5 sessions over 5 weeks	PANAS	Baseline Post
Donald, 2020	People living with HIV in the UK	RCT	Exp = 40.9 (11.0) Con = 47.0 (7.8)	Health Service	Mindfulness-based stress reduction	Waitlist	8 sessions over 8 weeks, including a	PANAS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Dong, 2019	Exp n = 8 Con n = 6 Cancer patients with depression in China Exp 1 n = 45 Exp 2 n = 45 Con n = 45	RCT	Overall = 59.1 (8.1)	Group Health Service Telephone	Exp 1 = Reminiscence therapy Exp 2 = Support group	No intervention	whole-day retreat 6 sessions over 6 weeks	MUNSH	Baseline Post
Dowd, 2015	Individuals with self-reported chronic pain in Ireland Exp n = 28 Con n = 37	RCT	Overall = 44.5 (12.3)	Community Online	Mindfulness-based stress reduction integrated with CBT	Chronic pain self-management, including psychoeducation materials on activity pacing, encouragement to be active, and cognitive behavioral skills	12 sessions over 6 weeks	SWLS	Baseline Post 6 months
Dowlatabadi, 2016	Breast cancer patients in Iran Exp n = 16 Con n = 17	RCT	Exp = 36.6 (6.4) Con = 37.2 (4.7)	Health Service Group	Positive psychotherapy: - using abilities - gratitude - active playing - counting gifts - taste with relish/biograph	Treatment as usual	10 sessions over 10 weeks	OHI	Baseline Post
Dowling, 2014	Family caregivers of people with frontotemporal Dementia in the USA Exp n = 12 Con n = 11	RCT	Exp = 59.4 (7.6) Con = 59.7 (9.1)	Community Individual	Positive affect intervention based on life enhancing activities such as positive events, gratitude, mindfulness, positive reappraisal, strengths, and goals	Interview with facilitator without didactic portion or skills practice	5 sessions over 5 weeks	DES	Baseline Post
Dowling, 2019	Post-primary school students in Ireland Exp n = 246 Con n = 251	Cluster RCT	Overall = 15.9 (0.7)	School Group	Social emotional learning program	Treatment as usual	13 sessions over 13 weeks	WEMWBS	Baseline Post
Drewery, 2019	University students in Canada Exp 1 n = 19 Exp 2 n = 17 Con n = 38	RCT	Overall = 18.7 (1.0)	University Exp 1: Online Exp 2: Individual	Exp 1: Write about 3 good things and provide explanation Exp 2: Toolkit with materials and information about coping with stress	Write about early memories or no intervention	Daily over 1 week	PANAS	Baseline Post
Drozd, 2014a	Adults in Norway Exp n = 53 Con n = 59	RCT	Exp= 30.3 (7.2) Con= 30.9 (9.1)	Community Online	PP intervention: - gratitude - acts of Kindness - optimism - coping strategies - living in the present moment - character strengths	Waitlist	13 sessions over 4 weeks	PANAS SHS	Baseline Post 6 month
Drozd, 2014b	Adults diagnosed with HIV and currently on antiretroviral therapy in	RCT	Exp = 47.8 (8.6) Con = 48.6 (10.1)	Health Service	Intervention based on metacognitive therapy and positive psychology	Waitlist	14 sessions across 5 weeks	SWLS PANAS	Baseline Post 3 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
	Norway Exp n = 26 Con n = 30			Online					
Duan, 2019	First year university students in China Exp n = 19 Con n = 19	RCT	Overall = 18.2 (0.6)	University Group	Character strength intervention, including identifying character strengths, character strengths 360 degrees, signature character strengths, and nominate goals	Waitlist	Single session	BIT	Baseline Post
Dvorakova, 2017	First year university students in the USA Exp n = 52 Con n = 53	RCT	Overall = 18.2 (0.4)	University Group	Mindfulness training focused on emotion regulation skills and simple mindfulness techniques	Waitlist	8 sessions over 6 weeks	SWLS	Baseline Post
Eimontas, 2018	Individuals with brief adjustment disorder in Lithuania Exp n = 21 Con n = 68	RCT	Exp = 34.5 (11.5) Con = 31.5 (10.4)	Community Online	Self-help psychosocial intervention based on CBT: - relaxation - time management - mindfulness - coping	Waitlist	30 days access to online material	WHO-5	Baseline Post
Elliott, 2008	Family caregivers of individuals with spinal cord injuries in the USA Exp n = 20 Con n = 13	RCT	Overall = 52.4	Community Hybrid	Problem-solving skills training	Education only	12 sessions over 12 months	SWLS	Baseline Post
Elliott, 2009	Family caregivers of women with disabilities in the USA Exp n = 34 Con n = 39	RCT	Exp = 56.9 (9.6) Con = 58.4 (13.6)	Community Hybrid	Problem-solving skills training	Education only	12 sessions over 12 months	SWLS	Baseline Post
Enrique, 2018	University students and staff in Spain Exp n = 28 Con n = 32	RCT	Overall = 23.8 (3.9)	University Online	Write about best possible self	Write about daily activities	Daily for 15 days	PANAS	Baseline Post 3 months
Fabrizio, 2015	Parents from a community sample in Hong Kong Exp n = 174 Con n = 176	RCT	Exp = 37.2 (5.4) Con = 37.1 (5.1)	Community Group	Effective parenting program to increase use of emotional management strategies and enhance parent-child relationship	Education on family health	4 sessions over 4 weeks	PANAS SHS	Baseline Post 3 months 6 months 12 months
Fegg, 2013	Caregivers of individuals in palliative care in Germany Exp n = 67 Con n = 62	RCT	Exp = 54.3 (13.5) Con = 54.7 (12.9)	Health Service Group	Existential behavioural therapy: - mindfulness - finding meaning - stress management, self-care - personal values	Treatment as usual	6 sessions over 6 weeks	SWLS PANAS	Baseline Post 3 months 12 months
Feicht, 2013	Insurance company employees in Germany	RCT	Exp = 37.6 (7.7) Con = 36.8 (10.4)	Organisation Online	Happiness training focusing on wellbeing, reducing stress, and practicing mindfulness	Waitlist	7 sessions over 7 weeks	WHO-5 FS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Fernandez, 2008	Exp n = 54 Con n = 47 University students and general public in Spain Exp n = 353 Con n = 254	RCT	Overall = 29.0	Community Individual	Expressive narrative writing about a recent local terrorist attack	Writing about a recent social activity	Single session	DES PANAS	Baseline 3 month
Fledderus, 2010	Adults with mild psychological distress in the Netherlands Exp n = 39 Con n = 42	RCT	Overall = 49.0	Community Group	ACT and mindfulness intervention: - acceptance - cognitive diffusion - contact with present moment - self as context - choosing values in different life domains - commitment to choices based on values	Waitlist	8 sessions over 8 weeks	MHC-SF	Baseline Post 3 months
Fledderus, 2012	Community members with mild to moderate depressive symptoms in the Netherlands Exp 1 n = 106 Exp 2 n = 111 Con n = 123	RCT	Exp 1 = 42.6 (11.0) Exp 2 = 42.4 (11.1) Con = 42.5 (11.3)	Community Hybrid	Exp 1: Manual-based ACT supported by extensive email counselling Exp 2: Manual-based ACT with minimal email counselling	Waitlist	9 modules over 9 weeks	MHC-SF	Baseline Post
Flett, 2019	University students in New Zealand Exp 1 n = 67 Exp 2 n =58 Con n = 67	RCT	Overall = 20.1 (2.8)	University Online	Mindfulness meditation Exp 1: Headspace app Exp 2: Smiling mind app	Evernote app	Daily for 10 days	FS	Baseline Post
Francis, 1992	University employees in the USA Exp n = 23 Con n = 18	RCT	Overall = 43.0	Organisation Individual	Expressive writing about personal traumatic experiences	Writing about non-traumatic topics	4 sessions over 4 weeks	PANAS	Baseline Post 3 months
Franklin, 2017	Patients diagnosed with co-occurring substance misuse and mental health disorders in the USA Exp n = 37 Con n = 25	RCT	Exp = 47.0 (9.0) Con = 48.4 (8.9)	Health Service Group	Legacy intervention, focused on the positive aspects of passing one's legacy on to future generations and activities to create legacy	Treatment as usual	10 sessions over 5 weeks	SWLS	Baseline Post
Fredrickson, 2008	Employees from large business software and IT company in the USA Exp n = 102 Con n = 100	RCT	Overall = 41.0 (9.6)	Organisation Group	Loving-kindness meditation focusing on warmth and caring for the self and others	Waitlist	6 sessions over 7 weeks	SWLS PWBS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Freeman, 2014	Individuals with persistent persecutory delusions in the UK Exp n = 15 Con n = 14	RCT	Exp = 41.9 (11.5) Con = 41.5 (13.1)	Health Service Individual	CBT to reduce negative beliefs about the self and boosting positive beliefs	Treatment as usual	6 sessions over 8 weeks	WEMWBS	Baseline Post 6 months
Frieswijk, 2006	Slightly to moderately frail older people in the Netherlands Exp n = 97 Con n = 96	RCT	Exp = 72.9 (6.2) Con = 73.7 (6.2)	Community Individual	Bibliotherapy focused on positive mind frame, goal setting, physical wellbeing, social wellbeing, variety and investment	Waitlist	5 modules over 10 weeks.	SPF-IL	Baseline Post
Froh, 2008	Middle school students in the USA Exp 1 n = 76 Exp 2 n = 80 Con n = 65	Cluster RCT	Overall = 12.2 (0.7)	School Group	Exp 1: Five item gratitude list Exp 2: List daily hassles	No intervention	Daily for 2 weeks	BMSLSS	Baseline Post
Froh, 2009	Middle school students in the USA Exp n = 44 Con n = 45	RCT	Overall = 12.7 (3.5)	School Group	Gratitude letter, writing and delivering to someone that has been especially kind and never properly thanked	Writing about yesterday's activities and feelings	5 sessions over 10 days	PANAS-C	Baseline Post 3 month
Froh, 2014 - Study 2	Elementary school students in the USA Exp n = 44 Con n = 38	RCT	Overall: 9.5 (0.6)	School Group	Weekly gratitude intervention, focusing on intent, cost, and benefit of receiving an intentional act of kindness	Focused on emotionally neutral topics	5 sessions over 5 weeks	BMSLSS PANAS-C	Baseline Post 3 months 6 months
Galante, 2018	University students in the UK Exp n = 257 Con n = 224	RCT	Not reported	University Group	Treatment as usual and mindfulness intervention including mindfulness meditation exercises, periods of reflection and inquiry, and interactive exercises	Treatment as usual	8 sessions over 8 weeks	WEMWBS	Baseline Post
Gallegos 2013	Community dwelling older adults in the USA Exp n = 100 Con n = 100	RCT	Exp = 72.1 (6.7) Con = 73.5 (6.7)	Community Group	Mindfulness-based stress reduction: - mindful movement - sitting meditation - informal meditation - body scan	Waitlist	9 sessions over 8 weeks	PANAS	Baseline Post 6 months
Gambrel, 2015	Couples expecting their first child in the USA Exp n = 32 Con n = 34	RCT	Males = 31.8 Females = 31.6	Community Group	Mindfulness-based relationship education, focused on psychoeducation on couples' experiences in the transition to parenthood and experiential learning related to relational mindfulness	Waitlist	4 sessions over 4 weeks	PANAS	Baseline Post
Gammer, 2020	Postpartum mothers in the UK Exp n = 54 Con n = 81	RCT	Exp = 35.6 (4.2) Con = 34.8 (3.9)	Community Online	Self-kindness-based intervention	Waitlist	6 sessions over 6 weeks	WEMWBS	Baseline Post 3 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Gander, 2013	Adults in Switzerland Exp 1 n = 61 Exp 2 n = 87 Exp 3 n = 73 Exp 4 n = 64 Exp 5 n = 60 Exp 6 n = 55 Exp 7 n = 62 Exp 8 n = 55 Exp 9 n = 42 Con n = 63	RCT	Overall = 44.9 (10.1)	Community Online	Exp 1: Gratitude visit Exp 2: Three good things Exp 3: Signature strengths Exp 4: Three good things over 2 weeks Exp 5: Gratitude visit and three good things Exp 6: Three funny things Exp 7: Counting kindness Exp 8: Gift of time Exp 9: Another door opens	Writing about early memories	Exp 4: Daily for 2 weeks All other groups: Daily over 1 week	AHI	Baseline Post 3 Month 6 Month
Gander, 2016	Adults in German speaking countries in Germany, Switzerland, and Austria Exp 1 n = 200 Exp 2 n = 196 Exp 3 n = 216 Exp 4 n = 181 Exp 5 n = 196 Exp 6 n = 174 Con n = 196	RCT	Overall = 46.1 (11.7)	Community Online	Writing about: Exp 1: Pleasurable experiences Exp 2: Moments of engagement Exp 3: Positive experiences with people Exp 4: Meaningful experiences Exp 5: Daily accomplishments Exp 6: All of the above	Writing about early memories	Daily for 1 week	AHI	Baseline Post 3 Month 6 Month
Gander, 2020	Adults in Germany, Switzerland, and Austria Exp 1 n = 70 Exp 2 n = 57 Con n = 54	RCT	Overall = 40.3 (15.5)	Community Online	Exp 1: Three good things Exp 2: Three funny things	Writing down early memories	Daily for 1 week	AHI mDES	Baseline Post
Garcia-Escalera, 2020	Middle school students in Spain Exp n = 88 Con n = 60	RCT	Overall = 15.1 (1.1)	School Group	Emotional regulation skills - Building and keeping motivation - Getting to know your emotions and behaviours - Introduction to emotion focused behavioural experiments - Being flexible in your thinking - Awareness of emotional experiences - Situational emotion exposures - Maintaining your gains	No intervention	9 sessions over 9 weeks	SWLS-C	Baseline Post 3 months
Garland, 2016	Men with co-occurring substance use and psychiatric disorders in the USA Exp 1 n = 45 Exp 2 n = 48 Con n = 35	RCT	Exp 1 = 37.7 (10.4) Exp 2 = 36.5 (11.2) Con = 38.7 (9.8)	Health Service Group	Exp 1: Mindfulness training, third-wave cognitive-behavioral therapy, and positive psychology Exp 2: CBT	Treatment as usual	10 sessions over 10 weeks	PANAS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Gayner, 2012	Homosexual men living with HIV in Canada Exp n = 66 Con n = 37	RCT	Exp = 42.9 (7.1) Con = 45.5 (6.7)	Health Service Group	Mindfulness-based stress reduction, including mindfulness skills geared towards enhancing awareness of, and relationship to, current experience	Treatment as usual	9 sessions over 8 weeks	PANAS	Baseline Post 6 months
Ghanderharioun, 2016 - Study 1	University students in the USA Exp 1 n = 3 Exp 2 n = 4 Exp 3 n = 3 Con 1 n = 2 Con 2 n = 3	RCT	Range between 18 and 30	University Online	Gratitude intervention delivered in two formats Exp 1: Periodic, notified with inspiring content periodically with smartwatch Exp 2: Contextual, received inspiring content according to contextual cues with smartwatch Exp 3: Exp 2 without smartwatch	No intervention	Access to platform for 2 weeks	PWBS	Baseline Post
Ghanderharioun, 2016 - Study 2	University students and staff in the USA Exp n = 13 Con n = 14	RCT	Range between 18 and 35	University Online	Gratitude intervention delivered in two formats Exp 1: periodic, notified with inspiring content periodically Exp 2: contextual, received inspiring content according to contextual cues	No intervention	Access to platform for 5 weeks	PWBS	Baseline Post
Giannopoulos, 2011	Self-selected online adults predominantly from Australia Exp 1 n = 19 Exp 2 n = 16 Exp 3 n = 17 Exp 4 n = 21 Con 1 n = 16 Con 2 n = 12	RCT	Overall = 33.1 (11.4)	Community Online	Write about: Exp 1: Pleasurable activities Exp 2: Engaging activities Exp 3: Meaningful activities Exp 4: All of the above	Con 1: Writing about daily events Con 2: No intervention	Daily for 1 week	MHC-SF	Baseline Post
Gigantesco, 2015	High school students in Italy Exp n = 176 Con n = 132	Cluster RCT	Exp = 15.2 (1.1) Con = Not reported	School Group	Mental health promotion program: - knowing your emotions - managing your own emotions - using emotions to motivate yourself - recognizing the emotions of other people - managing relationships	No intervention	20 sessions over 20 weeks	SWLS PWBS	Baseline Post
Gluck, 2011	Adults recruited online in Switzerland Exp n = 26 Con n = 17	RCT	Exp = 33.7 (12.7) Con = 37.2 (14.4)	Community Online	Mindfulness training focused on awareness of body sensations and acceptance of upcoming emotions	Waitlist	Daily for 13 days	PANAS	Baseline Post
Goldstein, 2007	Self-selected members from the community in the USA Exp n = 35 Exp n = 38	RCT	Range between 18 and 54	Community Online	Cultivating sacred moments by inducing a state of mindfulness on a daily basis	Writing about daily activities	15 sessions over 3 weeks	SWLS PANAS PWBS	Baseline Post 3 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Graziano, 2014	Individuals with relapsing-remitting Multiple Sclerosis in Italy Exp n = 36 Con n = 34	RCT	Exp = 42.3 (8.5) Con = 38.3 (10.1)	Health Service Group	CBT including: - identify change following diagnosis - life goals - strategies to reach goals and behavior evaluation - management of negative emotions	Information sessions about stem cells, complementary and alternative therapies, and nourishment	4 sessions over 2 months and a follow-up session	PANAS	Baseline Post 6 months
Green, 2006	Adults in Australia Exp n = 25 Con n = 25	RCT	Overall = 42.7	Community Group	Life coaching based on a solution focused cognitive behavioural model and focusing on self-regulation and monitoring of progress to goals	Waitlist	10 sessions over 10 weeks	SWLS PANAS PWBS	Baseline Post
Greer, 2019	Young adults with cancer in the USA Exp n = 16 Con n = 17	RCT	Exp = 25.0 (3.1) Con = 25.0 (2.9)	Community Online	Cognitive behavioural intervention including positive psychology skills	Waitlist	28 sessions over 4 weeks	mDES	Baseline Post
Gregoire, 2018	University students in Canada Exp n = 57 Con n = 42	RCT	Exp = 32.6 (9.6) Con = 30.9 (8.8)	University Group	ACT exercises - values and committed action - acceptance and cognitive defusion process - meditation practices - future proofing	Waitlist	4 sessions over 4 weeks	WBMMS	Baseline Post
Guo, 2020	Pregnant women in China Exp n = 151 Con n = 149	RCT	Exp = 31.4 (5.7) Con = 29.8 (6.2)	Health Service Online	Mindful self-compassion program	Waitlist	36 sessions over 6 weeks	WHO-5	Baseline 3 months 12 months
Hajisabbagh, 2020	Individuals diagnosed with Epilepsy in Iran Exp n = 32 Con n = 35	RCT	Exp = 33.3 (10.4) Con = 34.4 (9.3)	Community Group	Emotional intelligence skills	Training sessions on epilepsy	8 sessions over 8 weeks	OHI	Baseline Post
Hallford, 2016	Young adults from an online recruitment site Exp 1 n = 89 Exp 2 n = 69 Exp 3 n = 79 Con n = 84	RCT	Overall = 26.0 (3.0)	Community Online	Reminiscence intervention Exp 1: problem solving (successful coping experiences) Exp 2: identity (self-defining events contributing to a meaningful and continuous personal identity) Exp 3: bitterness revival (negative or adverse events)	Reflecting on any memory from their past	Single session	PANAS	Baseline Post
Hausmann, 2017	Veterans with osteoarthritis in the USA Exp n = 16 Con n = 17	RCT	Exp = 69.2 (11.3) Con = 66.0 (9.1)	Health Service Hybrid	PP intervention: - three good things - expressing thanks - acts of kindness - making good moments last - increasing pleasant activity	Neutral program: - events that affect them - change your circumstances - early memories - getting organised - planning the future	6 modules over 6 weeks	SWLS PANAS	Baseline Post 3 months 6 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Hausmann, 2018	Veterans with osteoarthritis in USA Exp *n* = 156 Con *n* = 150	RCT	Exp = 64.4 (9.4) Con = 64.1 (8.1)	Health Service Hybrid	Positive psychology program: - gratitude - kindness - recalling and reflecting on positive events - mindfulness - variant of behavioural activation	Neutral program: - recalling events that affected them each day - identify ways they could change their life circumstances - recall early memories - record things they did in the past week - plan their day	6 sessions over 6 weeks	PANAS SWLS	Baseline Post 3 months 6 months
Hazell, 2018	Individuals with a range of diagnoses who were distressed by hearing voices in the UK Exp *n* = 13 Con *n* = 14	RCT	Exp = 39.1 (10.2) Con = 46.0 (13.5)	Health Service Individual	Therapy sessions based on "Overcoming Distressing Voices" CBT self-help book	Waitlist	8 sessions over a maximum of 12 weeks	SWEMW BS	Baseline Post
Hecht, 2018	Individuals with HIV in the USA Exp *n* = 89 Con *n* = 88	RCT	Not reported	Community Group	Mindfulness-based stress reduction course: - body scan - gentle yoga focused on body awareness - sitting meditation	Educational sessions about managing HIV infection	Exp: 9 sessions over 8 weeks Con: 8 sessions over 8 weeks	DES	Baseline 3 months 12 months
Heekerens, 2020	Undergraduate psychology students in Germany Exp *n* = 87 Con *n* = 84	RCT	Overall = 22.4 (5.0)	University Individual	Write about best possible selves and imagine ideal future. Homework assignment to write 3 diary entries about their ideal future focusing on 'study and work', 'love and partnership' and 'leisure and hobbies'	Write about previous day events and imagine previous day. Homework assignment to write 3 diary entries about their previous day	Single session with homework tasks	PANAS SWLS	Baseline Post
Heintzelman, 2020	Community sample in USA Exp 1 *n* = 26 Exp 2 *n* = 40 Con *n* = 67	RCT	Exp 1 = 49.2 (12.0) Exp 2 = 43.3 (14.0) Con = Not reported	Community Exp 1: Individual Exp 2: Online	Multicomponent positive psychology intervention delivered:	Waitlist	12 sessions over 12 weeks	SWLS SPANE	Baseline Post 3 months
Hendriks, 2020	Employees in Suriname Exp *n* = 80 Con *n* = 78	RCT	Exp = 36.3 (10.0) Con = 36.1 (9.4)	Organisation Group	Positive psychology intervention including gratitude, strengths, goal setting, and problem solving	Waitlist	6 sessions over 6 weeks	MHC-SF PANAS	Baseline Post 3 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Henriksson, 2016	Individuals with chronic pain in Sweden Exp *n* = 36 Con *n* = 41	RCT	Exp = 51.2 (9.0) Con = 51.8 (8.0)	Health Service Online	Mindfulness pain-management program including body scans, breathing anchors, and variations of mindful movements	Online discussion forum involving pain-related topics	Weekly introductory sessions and 96 meditations over 8 weeks	LiSat-11	Baseline Post
Hermanns, 2015	Patients with diabetes and subclinical depression in Germany Exp *n* = 93 Con *n* = 88	RCT	Exp = 43.2 (15.0) Con = 43.4 (14.0)	Health Service Group	Diabetes-specific CBT program, focused on replacing dysfunctional attitudes, problem-solving strategies, and successful coping	Diabetes education program, consisting of five lessons on topics such as healthy diet in diabetes, diabetes and exercise, and diabetes and legal issues	5 sessions	WHO-5	Baseline Post 6 months 12 months
Hijazi, 2014	Iraqi refugees in the USA Exp *n* = 38 Con *n* = 21	RCT	Overall = 48.2 (9.0)	Community Individual	Narrative exposure therapy, including psychoeducation, constructing a chronological life narrative, starting with highlights of childhood and then focusing on traumatic experiences during adulthood	Waitlist	3 sessions over 3 weeks	WHO-5	Baseline 3 months 6 months
Hilpert, 2016	Couples in Switzerland Exp *n* = 154 Con *n* = 198	RCT	Overall = 41.3 (9.1)	Community Hybrid	Couple distress prevention program focusing on impact of stress, coping skills, dyadic coping, conflict resolution, and problem-solving strategies	Waitlist	5 sessions over 7 weeks	SWLS SHS	Baseline Post 3 month 6 month
Hirshberg, 2020	Preservice teachers in the USA Exp *n* = 49 Con *n* = 26	Cluster RCT	Overall = 22.0 (0.7)	Organisation Group	Mindfulness-based stress reduction	No intervention	9 sessions over 9 weeks	PANAS	Baseline Post 6 months
Ho, 2016	Community members and their family in Hong Kong Exp *n* = 589 Con *n* = 360	Cluster RCT	Not reported	Community Group	Workshops based around cooking and dining together with family members, covering the five themes of positive psychology: - joy - gratitude - flow - savouring - listening	Waitlist	3 sessions over 4 weeks	SHS	Baseline Post 3 months
Hoeppner, 2019	Adults self-identifying as seeking or being in recovery from problematic substance	RCT	Exp = 51.0 (12.7) Con = 50.7 (12.4)	Community Online	Exp 1: Three good things Exp 2: Savouring Exp 3: Experiencing kindness Exp 4: Reliving happy moments	Con 1: List 3 neutral things that happened during the past 24h Con 2: List 3 hard things	Single session	SHS SWLS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
	used in USA Exp 1 *n* = 66 Exp 2 *n* = 61 Exp 3 *n* = 64 Exp 4 *n* = 60 Exp 5 *n* = 65 Con 1 *n* = 64 Con 2 *n* = 60				Exp 5: Rose, thorn and bud (describe highlight of the date, challenge of the day and something to look forward to)	that happened during the past 24h			
Hofer, 2018	Individuals with moderate levels of stress in Germany Exp *n* = 53 Con *n* = 56	RCT	Exp = 40.9 (6.7) Con = 46.8 (9.7)	Community Online	Self-help book targeting burnout based on ACT principles, techniques, and exercises	Waitlist	6 modules over 6 weeks	MHC-SF	Baseline Post
Hoffman, 2012	Women with breast cancer in the UK Exp *n* = 103 Con *n* = 111	RCT	Exp = 49.0 (9.3) Con = 50.1 (9.1)	Health Service Group	Mindfulness-based stress reduction, including body scan, gentle and appropriate lying and standing yoga-based stretches, sitting meditation, group discussion, didactic teaching, and home practice	Waitlist	9 sessions over 8 weeks	WHO-5	Baseline Post
Hoifodt, 2013	Mildly to moderately depressed primary care patients in Norway Exp *n* = 37 Con *n* = 47	RCT	Exp = 38.3 (12.2) Con = 33.9 (9.9)	Health Service Hybrid	Guided self-help intervention involving web-based CBT program, face-to-face therapist support, and tailor emails between sessions	Waitlist	5 modules over 6 weeks	SWLS	Baseline Post 6 months
Hojjat, 2015	Rural adolescent females with substance abusing parents in Iran Exp *n* = 28 Con *n* = 29	RCT	Exp = 14.1 (0.4) Con = 14.4 (0.3)	School Group	Assertiveness training	Waitlist	8 sessions over 4 weeks	OHI	Baseline 3 months
Howells, 2016	Self-selecting happiness seekers, international sample Exp *n* = 57 Con *n* = 64	RCT	Exp = 39.7 (10.8) Con = 40.9 (10.3)	Community Online	Online learning of basic mindfulness concepts through simple guided mediation (Headspace app)	Engaged in a neutral task using a list-making application called Catch Notes	Daily for 10 days	SWLS FS PANAS	Baseline Post
Huffman, 2011	Inpatients of a cardiac unit in the USA Exp 1 *n* = 9 Exp 2 *n* = 7 Con *n* = 7	RCT	Not reported	Health Service Hybrid	Exp 1: PP intervention involving three good things, gratitude letter, best possible self, and three acts of kindness Exp 2: Meditation-based intervention to reduce anxiety and physical symptoms	Recall and list events that occurred during the previous week	8 sessions over 8 weeks	SHS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Hurley, 2012	Psychology university students in the USA Exp *n* = 94 Con *n* = 99	RCT	Overall = 19.5 (2.1)	University Hybrid	Psychoeducation on positive psychology and savouring the moment intervention	No intervention	Daily over 2 weeks	PANAS X	Baseline Post
Hwang, 2017	University students showing depressive symptoms in South Korea Exp 1 *n* = 8 Exp 2 *n* = 8 Con *n* = 8	RCT	Exp 1 = 23.5 (2.0) Exp 2 = 21.9 (2.2) Con = 22.9 (2.5)	University Individual	Exp 1: Neurofeedback-aided meditation therapy Exp 2: Modified Positive Psychotherapy including signature strengths, best possible future, gratitude journal, acts of kindness, memory building, and basking	No intervention	10 sessions over 5 weeks	FS SPANE	Baseline Post
Hyer, 2008	Veterans with depression in nursing home care in the USA Exp *n* = 13 Con *n* = 12	RCT	Exp = 78.0 Con = 81.0	Community Hybrid	CBT based group and individual intervention to aid participant goal establishment and address barriers to achievement	Treatment as usual	15 sessions over 15 weeks	LSIA	Baseline Post
Innes, 2016	Older adults with subjective cognitive decline in the USA Exp 1 *n* = 30 Exp 2 *n* = 30	RCT	Exp 1 = 60.9 (8.5) Exp 2 = 60.2 (7.2)	Community Individual	Exp 1: Meditation Exp 2: Relaxation music listening	No control	Daily for 12 weeks (84 sessions)	PWBS	Baseline Post 6 months
Ivtzan, 2016	Educators, office workers and meditators from an online sample Exp *n* = 35 Con *n* = 43	RCT	Exp = 41.3 (11.5) Con = 40.3 (11.1)	Community Online	Online mindfulness intervention targeting self-awareness positive emotions, self-compassion, self-efficacy, autonomy, meaning, positive relations, and engagement	Waitlist	8 sessions over 8 weeks	PHI	Baseline Post
Ivtzan, 2018	Permanent citizens in the UK and Hong Kong Exp *n* = 41 Con *n* = 38	RCT	Overall = 31.50 (13.50)	Community Online	Mindfulness based flourishing program - self-awareness - positive emotions - self-compassion - autonomy - self-efficacy - meaning in life - positive relations with others - engagement	Waitlist	8 sessions over 8 weeks	PANAS	Baseline Post

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Jackowska, 2016	Female students or university staff in the UK Exp *n* = 40 Con 1 *n* = 41 Con 2 *n* = 38	RCT	Exp = 26.0 Con 1 = 26.8 Con 2 = 26.0	University Individual	Gratitude intervention, three good things recorded daily in diary	Con 1: Writing about up to three everyday events Con 2: No intervention	Daily for 2 weeks	SWLS FS	Baseline Post
Jansen, 2017	Older adults in Germany Exp *n* = 14 Con *n* = 17	RCT	Exp = 63.3 (8.5) Con = 65.2 (4.7)	Community Group	Mindfulness-based stress reduction: - sitting and walking meditation - body scan exercises - mindfulness communication	No intervention	15 sessions over 8 weeks	MB	Baseline Post
Jarukasemthawee, 2019 - Study 1	University students in Thailand Exp *n* = 52 Con *n* = 45	RCT	Exp = 20.6 (1.3) Con = 20.3 (1.1)	University Group	Eastern philosophy and wisdom mindfulness	Waitlist	8 sessions over 4 weeks	EWBS	Baseline Post
Jaser, 2014	Adolescents diagnosed with type 1 diabetes for at least six months in the USA Exp *n* = 20 Con *n* = 19	RCT	Exp = 15.3 (1.4) Con = 15.0 (1.6)	Health Service Hybrid	Positive psychology exercises in gratitude, self-affirmations, and small gifts designed to improve positive affect	Diabetes education and self-management	8 weeks	PANAS	Baseline 3 months 6 months
Jazaieri, 2014	Adults from the community in the USA Exp *n* = 50 Con *n* = 30	RCT	Exp = 42.0 (11.5) Con = 44.7 (13.1)	Community Group	Compassion cultivation training, including loving-kindness meditation, mindfulness, and emotional experience	Waitlist	9 sessions over 9 weeks	SHS	Baseline Post
Jennings, 2013	School teachers in the USA Exp *n* = 25 Con *n* = 25	RCT	Overall = 26.0	Organisation Hybrid	The CARE program targeting understanding of skills in emotion regulation, mindfulness/stress reduction, and compassion	Waitlist	5 sessions over 3 months	PANAS	Baseline Post
Jensen, 2013	HIV positive with human papillomavirus racial/ethnic minority women in Germany Exp *n* = 46 Con *n* = 26	RCT	Not reported	Health Service Group	Cognitive-behavioral stress management, addressing the common psychosocial sequela of having both HIV and HPV, problem-solving barriers to self-care, and information about safer sex behaviours	Psychoeducational seminar on negative and positive psychological wellbeing	10 sessions over 10 weeks	DABS	Baseline Post 6 months
Johannsen, 2016	Breast cancer patients in Denmark Exp *n* = 46 Con *n* = 61	RCT	Exp = 56.8 (10.0) Con = 56.7 (8.1)	Health Service Group	Mindfulness-based cognitive therapy including formal mindfulness exercises and psychoeducation	Waitlist	8 sessions over 8 weeks	WHO-5	Baseline Post 3 months 6 months

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Johnson, 2016	High school students in Australia Exp *n* = 115 Con *n* = 154	Cluster RCT	Overall = 13.6 (0.4)	School Group	Mindfulness school curriculum	No intervention	8 sessions over 8 weeks	WEMWBS	Baseline Post 3 months
Johnston, 2010	Individuals with chronic pain in New Zealand Exp *n* = 6 Con *n* = 8	RCT	Overall = 43.0	Health Service Hybrid	ACT self-help book	Waitlist	6 session over 6 weeks	SWLS	Baseline Post
Juul, 2020	Patients with stress related problems in Denmark Exp 1 *n* = 19 Exp 2 *n* = 18 Con *n* = 20	RCT	Exp 1 = 46.0 Exp 2 = 41.0 Con = 45.0	Health Service Group	Exp 1: Mindfulness-based stress reduction Exp 2: Stress reduction intervention	Waitlist	8 sessions over 8 weeks	WHO-5	Baseline Post
Karimi, 2019	Family caregivers of people with substance abuse in Iran Exp *n* = 40 Con *n* = 40	RCT	Exp = 35.7 (9.4) Con = 34.8 (9.1)	Health Service Group	Quality of life counselling - CASIO model (circumstance attitude standards of fulfilment importance overall satisfaction)	No intervention	8 sessions	SWLS	Baseline 3 months
Keeman, 2017 - Study 1	University students in New Zealand Exp *n* = 32 Con *n* = 28	RCT	Overall = 21.5 (3.6)	University Online	The Wellbeing Game, based on the 5 Ways to Wellbeing framework	No intervention	Daily over 1 week	SWEMWBS	Baseline Post
Kemeny, 2012	Female schoolteachers in the USA Total *n* = 76	RCT	Overall = 41.1 (10.5)	Organisation Group	Meditation and emotion regulation training	Waitlist	8 sessions over 8 weeks	PANAS	Baseline Post 6 months
Kenny, 2019	Adolescents in Ireland Exp *n* = 132 Con *n* = 175	Cluster RCT	Exp = 16.0 (0.7) Con = 16.2 (1.0)	School Online	Self-management and emotional self-monitoring	No intervention	Daily for 4 weeks	WHO-5	Baseline Post 3 months
Kerr, 2015	Adults currently seeking individual psychological treatment in Australia Exp 1 *n* = 16	RCT	Exp 1 = 46.1 (12.2) Exp 2 = 41.8 (10.5)	Health Service Individual	Exp 1: Gratitude diary and list of five things participants are grateful for Exp 2: Kindness diary and one kind act participants did intentionally	Mood monitoring diary	Daily for 2 weeks	PANAS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
	Exp 2 $n = 16$ Con $n = 15$		Con = 41.5 (10.8)						
Khanna, 2019	School students in India Exp 1 $n = 61$ Exp 2 $n = 64$ Exp 3 $n = 63$ Exp 4 $n = 63$ Exp 5 $n = 60$ Con $n = 61$	Cluster RCT	Overall = 12.7 (1.0)	School Individual	Exp 1: Three good things Exp 2: Gratitude visit Exp 3: Best possible self Exp 4: Signature strengths Exp 5: Signature strengths in a new way	Recalling early memories	Daily for one week	BMSLSS AHI SPANE MHC-SF	Baseline Post
King, 2001	University psychology students in the USA Exp 1 $n = 19$ Exp 2 $n = 22$ Exp 3 $n = 22$ Con $n = 16$	RCT	Overall = 21.0 (3.2)	University Individual	Exp 1: Writing about best possible selves Exp 2: Writing about trauma Exp 3: Writing about trauma and best possible self	Writing about a non-emotional topic	4 sessions over 4 days	SWLS	Baseline Post
Kloos, 2019	Nursing home staff in Netherlands Exp $n = 69$ Con $n = 38$	Cluster RCT	Exp = 39.6 (13.0) Con = 44.7 (10.0)	Organisation Online	Multi-component positive psychology intervention - positive emotions - discovering and using strengths - optimism - self-compassion - resilience - positive relations	No intervention	8 sessions over 8 weeks	MHC-SF	Baseline Post
Knapstad, 2020	Individuals with anxiety and/or mild to moderate depression in Norway Exp $n = 238$ Con $n = 128$	RCT	Exp = 34.6 (11.8) Con = 35.3 (13.1)	Community Individual	Cognitive behavioral intervention including guided self-help and psychoeducation	Treatment as usual	4 sessions over 3 months	SWEMW BS	Baseline Post 3 months
Ko, 2019	Undergraduate students in the USA Total $n = 532$	RCT	Overall = 19.1 (2.5)	University Online	Exp 1: Acts of kindness Exp 2: Acts of kindness and recalling the event Exp 3: Recalling acts of kindness only	No intervention	Exp 1: Single session Exp 2: 2 sessions over 2 days Exp 3: Single session	PANAS SWLS	Baseline Post

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Koay, 2020	University students in Malaysia Exp *n* = 16 Con *n* = 17	RCT	Overall = 21.8 (2.2)	University Online	Gratitude journaling using photography on social media	Posting images on social media related to colour	Daily for 1 week	SWLS	Baseline Post
Koenig Kellas, 2015	University students in the USA Total *n* = 98	RCT	Overall = 20.8 (3.1)	University Group	Storytelling exercise, sharing the story of difficulty, including deepest thoughts, feelings and connecting the story to relationships, identity, past, present, and future	Discussing the day's events	3 sessions over 3 days	SWLS PANAS	Baseline Post
Kögler, 2015	Informal caregivers of palliative patients in Germany Exp *n* = 73 Con *n* = 57	RCT	Exp = 54.5 (13.6) Con = 54.0 (13.2)	Health Service Hybrid	Existential Behavioral Therapy, including formal mindfulness exercises	Treatment as usual	6 sessions over 6 weeks	SWLS	Baseline Post 3 months 12 months
Korte, 2012	Older adults with moderate depressive symptomology in the Netherlands Exp *n* = 92 Con *n* = 89	RCT	Exp = 63.3 (6.2) Con = 63.3 (6.8)	Community Group	Life review therapy, integration of difficult life events from the past, development of agentic life stories, retrieval of specific positive memories	Treatment as usual	8 sessions over 3 months	MHC-SF	Baseline Post 3 months
Kotsou, 2011	Adults in Belgium Exp *n* = 72 Con *n* = 60	RCT	Exp = 38.2 (9.4) Con = 38.9 (11.8)	Community Group	Emotional competence enhancing intervention	Waitlist	2.5 full day sessions	SWLS	Baseline Post 12 months
Kovacs, 2018	Adults with congenital health disease in Canada Exp *n* = 16 Con *n* = 15	RCT	Exp = 33.1 (11.2) Con = 32.5 (12.5)	Community Group	ACHD-CARE program: - education about living with CHD - cognitive-behavioural coping strategies - social interaction and communication skills training	Treatment as usual	8 sessions over 8 weeks	SWLS	Baseline Post 3 month
Koydemir, 2016	University students in Cyprus Exp *n* = 44 Con *n* = 36	RCT	Overall = 18.8 (1.0)	University Online	- Finding and cultivating character strengths - Regulation of emotions and increasing positive emotions - Constructive communication - Decision-making and problem solving, achieving flow - Practicing gratitude	Waitlist	5 modules over 8 weeks	SWLS SHS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Krafft, 2019	University students and community members interested in self-help in the USA and Canada Exp 1 *n* = 24 Exp 2 *n* = 28 Con *n* = 26	RCT	Students overall = 20.2 (3.9) Help-seekers overall = 24.6 (7.9)	Community Online	ACT Exp 1: Simple matrix Exp 2: Complex matrix	Waitlist	Daily use for 4 weeks	MHC-SF	Baseline Post
Krentzman, 2015	Adults in outpatient treatment for alcohol use disorder in the USA Exp *n* = 11 Con *n* = 12	RCT	Exp = 44.5 (10.9) Con = 47.9 (11.1)	Health Service Online	Three good things	Sleep hygiene questions	Daily for 2 weeks	PANAS-X	Baseline Post 3 months
Krieger, 2019	Self-referred adults with high levels of self-criticism in Switzerland Exp *n* = 47 Con *n* = 61	RCT	Exp = 38.0 (12.0) Con = 37.4 (11.0)	Community Online	Mindfulness based compassionate living	Treatment as usual	8 sessions over 8 weeks	SWLS	Baseline Post
Kruizinga, 2019	Adult patients with incurable cancer in Netherlands Exp *n* = 58 Con *n* = 64	RCT	Exp = 61.0 (11.1) Con = 64.0 (9.6)	Health Service Individual	Spiritual counselling to discuss important life events and defined life goals	Treatment as usual	2 sessions	SWLS	Baseline Post 3 months
Kwok, 2016	Primary school children with mild depression in Hong Kong Exp *n* = 34 Con *n* = 34	RCT	Exp = 10.5 (1.5) Con = 10.3 (2.1)	School Group	Hope and gratitude program: - Goal-setting skills - Cultivating a sense of agency - Facilitating design of different pathways to achieve the goal - Promoting self-gratitude - Acknowledging and encouraging the expression of gratitude to others	No intervention	8 sessions over 8 weeks	SWLS	Baseline Post
Lai, 2019	Community dwelling older adults in Hong Kong Exp *n* = 87 Con *n* = 74	Cluster RCT	Exp = 78.0 (7.2) Con = 76.2 (7.7)	Community Individual	Life story intervention, written account of an individual's life	Social program	6 sessions over 6 weeks	LSIA	Baseline Post 3 months 6 months
Lamers, 2015	Adults feeling depressed in the Netherlands Exp 1 *n* = 49 Exp 2 *n* = 52 Con *n* = 55	RCT	Exp 1 = 57.3 (10.4) Exp 2 = 56.9 (7.9) Con = 56.6 (9.1)	Community Individual	Exp 1: Life review focusing on different life themes and their future Exp 2: Daily expressive writing about negative experiences, review of negative experiences and positive experiences, writing to someone close	Waitlist	7 modules over 10 weeks	MHC-SF	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Lan, 2018	Frail older adults in nursing homes in China Exp *n* = 37 Con *n* = 37	RCT	Exp = 83.1 (6.5) Con = 83.5 (6.6)	Community Individual	Life review therapy, using old photographs to prompt memories	Treatment as usual	6 sessions over 6 weeks	LSIA	Baseline Post
Larson, 2005	Spouses of stroke patients in Norway Exp *n* = 46 Con *n* = 46	RCT	Exp = 68.2 (10.4) Con = 66.7 (9.8)	Health Service Group	Support and education program, focused on the nature of stroke, treatment and recovery, the psychological and social effects of stroke, and how to prevent reoccurrence of stroke	No intervention	6 sessions over 6 months	BWBQ	Baseline Post 6 months
Latorre, 2015	Older adult students in Spain Exp *n* = 29 Con *n* = 26	RCT	Exp = 64.2 (7.0) Con = 65.5 (10.0)	University Individual	Life review focusing on early childhood, family, and home, later childhood and adolescence, young adulthood, and older adulthood	Media workshop	6 sessions over 6 weeks	LSIA	Baseline Post
Lau, 2011	Older adults in Hong Kong Exp 1 *n* = 29 Exp 2 *n* = 25 Con *n* = 29	RCT	Overall = 62.7 (7.1)	Community Individual	Exp 1: Recall and write about events that produced gratitude Exp 2: Recall and write about annoying events	Recall and write about important events in life	Single session	CAS	Baseline Post
Lau, 2012	Undergraduate students in Hong Kong Exp 1 *n* = 30 Exp 2 *n* = 30 Con *n* = 30	RCT	Overall = 21.1 (1.4)	University Individual	Exp 1: Recall and write about grateful events Exp 2: Recall and write about annoying events	Recall and write about important life events	Single session	PANAS	Baseline Post
Layous, 2017 - Study 1	University students in the USA Exp 1 *n* = 45 Exp 2 *n* = 47 Exp 3 *n* = 48 Exp 4 *n* = 47 Con *n* = 46	RCT	Overall = 20.0 (2.9)	University Online	Exp 1: General gratitude letter with act of kindness Exp 2: Specific gratitude letter with act of kindness Exp 3: Best possible self with act of kindness Exp 4: Intense positive experience with act of kindness	Writing about what one did last week	Daily for 3 weeks	SWLS AAS	Baseline Post
Layous, 2018	University students in the USA Exp *n* = 69 Con *n* = 70	RCT	Overall = 18.7 (2.2)	University Online	Savouring activity	Writing about what one did last week	4 sessions over 4 weeks	SWLS mDES	Baseline Post
LeBlanc, 2017 - Study 2	General population in the UK Exp *n* = 38 Con *n* = 37	RCT	Exp: 35.7 Con: 37.7	Community Group	Workshops on: - Emotion regulation - Expressive writing - Mindfulness	No intervention	4 sessions over 4 weeks	SWLS PANAS	Baseline Post 12 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
					- Self-talk and cue-controlled progressive muscle relaxation				
Lee, 2010	Self-selecting women in South Korea Exp *n* = 30 Con *n* = 30	RCT	Exp = 41.5 (5.4) Con = 40.4 (6.2)	Community Group	Mindfulness based cognitive therapy, including sitting meditation, body scale, and 3-minute breathing space	Waitlist	8 sessions over 8 weeks	PWBS PANAS	Baseline Post
Leung, 2012	Pregnant women in Hong Kong Exp *n* = 71 Con *n* = 76	RCT	Exp = 31.3 (4.0) Con = 31.2 (4.1)	Health Service Group	Interpersonal psychotherapy based on a family-centred parenting program	Treatment as usual	4 sessions over 4 weeks	SHS	Baseline Post 3 months
Lever Taylor, 2014	University students in the UK Exp *n* = 38 Con *n* = 38	RCT	Exp = 30.5 (10.8) Con = 26.7 (6.8)	University Individual	Mindfulness based cognitive bibliotherapy	Waitlist	8 modules over 8 weeks	SWLS	Baseline Post
Lichter, 1980 - Study 1	Adults in New Zealand Exp *n* = 10 Con *n* = 13	RCT	Not reported	Community Group	15 Dyer principles (pro happy and anti-happy beliefs)	Waitlist	8 sessions over 4 weeks	AM1	Baseline Post 3 months
Lichter, 1980 - Study 2	University psychology students in New Zealand Exp *n* = 25 Con *n* = 23	RCT	Not reported	University Group	Choose and read 3 positive self-statements from list	Waitlist	Daily for 2 weeks	AM1	Baseline Post
Lin, 2019	Nurses in China Exp *n* = 44 Con *n* = 46	RCT	Exp = 32.9 (7.5) Con = 30.2 (6.1)	Organisation Hybrid	Modified mindfulness-based stress reduction	Waitlist	8 sessions over 8 weeks	PANAS	Baseline Post 3 months
Littman-Ovadia, 2014	Adults and university students in Israel Exp *n* = 36 Con *n* = 41	RCT	Overall = 28.1 (6.9)	Community Online	Think and write down three good things waiting for you tomorrow	Think and write down three things waiting for you tomorrow	Daily for 1 week	PANAS SWLS	Baseline Post

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Liu, 2020	Flight attendants in China Exp n = 49 Con n = 49	RCT	Exp = 30.1 (5.8) Con = 28.4 (6.4)	Organisation Group	Loving kindness meditation	Waitlist	5 sessions over 5 weeks	SWLS PANAS	Baseline Post
Lo, 2020	Parents with children showing ADHD symptomology in Hong Kong Exp n = 48 Con n = 42	RCT	Exp = 39.2 (5.7) Con = 40.2 (3.2)	Community Group	Family-based mindfulness program	Waitlist	6 sessions over 6 weeks	WHO-5	Baseline Post
Lokman, 2017	Adults with mild-to-moderate depressive symptoms in the Netherlands Exp n = 97 Con n = 140	RCT	Exp = 42.9 (12.8) Con = 43.7 (13.1)	Community Online	Self-help intervention based on cognitive behavioral techniques, mindfulness, positive psychology and solution-focused therapy	Waitlist	4 sessions over 4 weeks	WEMWBS	Baseline 3 months
Loucas, 2020	Adolescents with anxiety and or depression in England Exp n = 13 Con n = 7	RCT	Exp = 16.6 (0.7) Con = 16.8 (0.8)	Health Service Hybrid	CBT workshop	Treatment as usual	5 sessions over 8 weeks	WEMWBS	Baseline Post
Lu, 2010	Asian and Caucasian university students in the USA Exp 1 n = 30 Exp 2 n = 33 Exp 3 n = 32 Con n = 30	RCT	Overall = 20.0 (2.2)	University Individual	Exp 1: Write about your deepest emotions about your current most stressful experience that has affected you and your life Exp 2: Write about positive and negative consequences of a current most stressful event Exp 3: Combination of exp 1 and 2	Writing about daily events and plans	3 sessions over 1 week	PANAS	Baseline Post 3 months 6 months
Lü, 2013	University psychology students in China Exp n = 16 Con n = 18	RCT	Overall = 20.0 (4.3)	University Group	Positive Psychotherapy focused on: - Three good things - Strengths - Savouring - Gratitude visit - Active-constructive responding	No intervention	16 sessions over 16 weeks	PANAS	Baseline Post
Lumley, 2017	Patients with fibromyalgia in the USA Exp 1 n = 74 Exp 2 n = 69 Con n = 73	Cluster RCT	Exp 1 = 49.0 (11.7) Exp 2 = 48.1 (12.5) Con = 50.3 (12.5)	Community Group	Exp 1: Emotional awareness and expression therapy, based on experiential, psychodynamic, prolonged exposure, expressive writing, and therapeutic rescripting therapies	Fibromyalgia education	8 sessions over 8 weeks	PANAS SWLS	Baseline Post 6 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
					Exp 2: CBT, focused on coping and skills training for pain and symptom management				
Lyubomirsky, 2006 - Study 1	University psychology students in the USA Exp 1 *n* = 20 Exp 2 *n* = 19 Exp 3 *n* = 21 Con *n* = 36	RCT	Overall = 19.9 (3.4)	University Individual	Exp 1: Writing about traumatic life experiences Exp 2: Talking about traumatic life experiences Exp 3: Thinking about traumatic life experiences	No intervention	Daily for 3 days	SWLS PANAS	Baseline Post
Lyubomirsky, 2006 - Study 2	University psychology students in the USA Exp 1 *n* = 24 Exp 2 *n* = 25 Exp 3 *n* = 26 Con *n* = 36	RCT	Overall = 19.5 (2.6)	University Individual	Exp 1: Writing about positive life experiences Exp 2: Talking about positive life experiences Exp 3: Thinking about positive life experiences	No intervention	Daily for 3 days	SWLS PANAS	Baseline Post
Lyubomirsky, 2011	University students in the USA Exp 1 *n* = 111 Exp 2 *n* = 107 Con *n* = 101	RCT	Overall = 19.7 (2.9)	University Online	Exp 1: Expressing optimism through best possible self Exp 2: Expressing gratitude through a gratitude letter	Listing activities over the past week	8 sessions over 8 weeks	SWLS SHS	Baseline Post 6 months
Maatouk, 2018	Nurses in Germany Exp *n* = 52 Con *n* = 55	RCT	Exp = 51.6 (4.7) Con = 52.6 (5.6)	Organisation Group	Successful ageing intervention: - working biography - coping with stress and the concept of mindfulness - selection, optimisation, and compensation sessions	Waitlist	7 sessions over 7 weeks	WHO-5	Baseline Post
Macdougall, 2019	Paralympic athletes in Australia Exp *n* = 9 Con *n* = 9	RCT	Exp = 34.0 (12.0) Con = 31.0 (12.0)	Community Individual	Multicomponent intervention based on mindfulness and acceptance commitment therapy	Waitlist	8 sessions over 8 weeks	SPANE SWLS PWBS	Baseline Post
Mackenzie, 2006	Nurses and nurse aides in long-term and complex continuing care units in Canada Exp *n* = 16 Con *n* = 14	RCT	Exp = 48.6 (6.5) Con = 44.8 (8.2)	Organisation Group	Sessions of mindfulness-based stress reduction supplemented by guided mindfulness exercises for homework	Waitlist	4 sessions over 4 weeks	SWLS	Baseline Post

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Maddock, 2019	Individuals with mild to severe Psoriasis in Ireland Exp *n* = 29 Con *n* = 30	RCT	Exp = 43.5 (17.0) Con = 44.6 (16.4)	Health Service Group	Mindfulness-based cognitive therapy	Treatment as usual	8 sessions over 8 weeks	PWBS	Baseline Post 3 months
Majumdar, 2019	Stroke survivors in England Exp *n* = 25 Con *n* =23	RCT	Exp = 65.3 (11.9) Con = 60.0 (15.6)	Health Service Group	ACT	Treatment as usual	4 sessions over 4 weeks	WEMWBS	Baseline Post 3 months
Mak, 2015	University students and staff in Hong Kong Exp 1 *n* = 58 Exp 2 *n* = 58 Con *n* = 48	RCT	Overall = 22.8 (6.5)	University Online	Exp 1: Health action process approach to enhanced mindfulness, targeting self-efficacy, action planning, coping planning, and recovery Exp 2: Basic mindfulness	Waitlist	Daily for 8 weeks	WHO-5 SWLS	Baseline Post 3 months
Mani, 2019	Patients with breast cancer in Iran Exp *n* = 15 Con *n* = 15	RCT	Exp = 44.4 (6.1) Con = 41.5 (4.8)	Health Service Group	ACT	Non-therapeutic group intervention	8 sessions over 8 months	PANAS	Baseline Post
Manicavasagar, 2014	Adolescents in Australia Exp *n* = 62 Con *n* = 92	RCT	Exp = 15.5 (1.6) Con = 15.3 (1.7)	Community Online	Positive psychology program targeting: - gratitude - optimism - flow - meaning - hope - mindfulness - character strengths - healthy lifestyle - positive relationships	Neutral entertainment-based program	6 sessions over 6 weeks	SWEMWBS	Baseline Post
Manthey, 2016	Self-selected users in Germany Exp 1 *n* = 102 Exp 2 *n* = 104 Con *n* = 116	RCT	Overall = 33.7 (9.6)	Community Online	Exp 1: Writing about best possible selves Exp 2: Practicing gratitude	Writing to-do lists	8 sessions over 8 weeks	SWLS SPANE	Baseline Post
Martinez-Marti, 2010	University psychology students in Spain Exp 1 *n* = 41 Exp 2 *n* = 30 Con *n* = 34	RCT	Overall = 20.7 (1.5)	University Individual	Exp 1: Write about what they feel grateful for Exp 2: Write about hassles	Write about any event during the day	Daily over 2 weeks	PANAS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Martínez-Marti, 2018	University students and self-selected online participants in Spain Exp 1 *n* = 43 Con 1 *n* = 52 Con 2 *n* = 55	RCT	Overall = 32.1 (11.0)	Community Online	Appreciation of beauty	Con 1: Naikan therapy Con 2: Waitlist	3 sessions over 3 weeks	SPANE	Baseline Post
Matvienko-Sikar, 2017	Pregnant women in Ireland Exp *n* = 24 Con *n* = 12	RCT	Overall = 33.9 (3.0)	Community Online	Gratitude diary and guided mindfulness	Treatment as usual	12 sessions over 3 weeks	SWLS	Baseline Post
Mazlomi, 2020	Families of drug abusers in Iran Exp 1 *n* = 20 Exp 2 *n* = 20 Con *n* = 20	RCT	Exp 1 = 39.6 (4.5) Exp 2 = 39.4 (4.6) Con = 40.0 (5.1)	Health Service Group	Exp 1: Positive psychology multicomponent intervention Exp 2: Emotional regulation training	No intervention	8 sessions over 8 weeks	PWBS	Baseline Post 3 months
McConachie, 2014	Support staff of people with intellectual disabilities in Scotland Exp *n* = 47 Con *n* = 40	RCT	Exp = 43.0 Con = 44.0	Organisation Group	ACT and mindfulness-based intervention targeting mindfulness, acceptance of feelings, thoughts and sensations, finding values, and creating goals	Waitlist	2 sessions	WEMWBS	Baseline Post
McGowan 2013	University psychology students with high trait worry in the USA Exp *n* = 23 Con *n* = 23	RCT	Exp = 21.0 (5.0) Con = 18.7 (1.5)	University Individual	Stimulus control training, learning to associate worry with distinct and specific times and locations	Allowing worry to naturally occur, and ignore avoidant thoughts	Daily for 2 weeks	PANAS	Baseline Post
Mei, 2018	Older spouse carers of stroke survivors in China Exp 1 *n* = 24 Exp 2 *n* = 20 Con *n* = 26	RCT	Exp 1 overall = 69.7 (2.4) Exp 2 overall = 70.0 (2.0) Con overall = 69.8 (5.6)	Community Individual	Reminiscence therapy Exp 1: Both couples attended Exp 2: Caregiver only	Waitlist	8 sessions over 8 weeks	SWLS	Baseline Post 3 months
Mi Ra, 2017	Breast cancer survivors in South Korea Exp *n* = 22 Con *n* = 24	RCT	Exp = 49.0 (8.7) Con = 47.9 (7.7)	Health Service Group	Mind subtraction meditation, using elements of attention, awareness, and non-judgemental observation to eliminate negative feelings and mindsets	Self-management education	16 sessions over 8 weeks	SWLS	Baseline Post
Miao, 2019	Psychology night school students in China Exp *n* = 55 Con 1 *n* = 50 Con 2 *n* = 40	RCT	Overall = 27.8 (4.6)	School Individual	Taking photos and writing expressively	Con 1: Taking photos Con 2: No intervention	Daily for 1 week	PANAS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Miller, 2015	Adults in the UK Exp 1 *n* = 17 Exp 2 *n* = 19 Con *n* = 19	RCT	Exp 1 = 38.8 (12.3) Exp 2 = 38.8 (17.3) Con = 31.7 (7.0)	Community Individual	Exp 1: Writing about happiness from prompts Exp 2: Writing about gratitude from prompts	No intervention	Daily over 12 days	OHI SWLS	Baseline Post
Miller, K 2020	Syrian refugee parents in Lebanon Exp *n* = 78 Con *n* = 73	RCT	Not reported	Community Group	Stress management and relaxation techniques	Waitlist	9 sessions over 9 weeks	WEMWBS	Baseline Post
Miller, V 2020	Adolescents in the USA Exp *n* = 60 Con *n* = 60	RCT	Exp = 14.2 (0.9) Con = 14.4 (0.9)	Community Group	Strategies for communication and strength-promoting techniques and for parents of teenagers	No intervention	Single session	FS	Baseline Post
Mistretta, 2018	Research hospital and medical centre employees in the USA Exp 1 *n* = 22 Exp 2 *n* = 23 Con *n* = 15	RCT	Exp 1 = 48.2 (11.6) Exp 2 = 43.7 (14.7) Con = 46.1 (10.5)	Organisation Exp 1: Group Exp 2: Online	Exp 1: Mindfulness-based resilience training Exp 2: Smartphone resilience training	No intervention	Exp 1: 6 sessions over 6 weeks Exp 2: 6 weeks access to app	WHO-5	Baseline Post 3 months
Mitchell, 2009	Online sample of adults in Australia Exp 1 *n* = 17 Exp 2 *n* = 9 Con *n* = 23	RCT	Overall = 37.0 (11.2)	Community Online	Exp 1: Using character strengths in a new way Exp 2: Problem-solving skills	Abbreviated version of Exp 2	3 sessions over 3 weeks	PWI-A SWLS PANAS	Baseline Post 3 months
Moeenizadeh, 2017	Infertile women with depression in Iran Exp *n* = 11 Con *n* = 11	RCT	Exp = 27.5 (3.6) Con = 28.2 (4.3)	Health Service Group	Wellbeing therapy: - identifying instances of well-being - recognizing thoughts and beliefs that interfere with wellbeing	Waitlist	8 sessions over 8 weeks	PWBS	Baseline Post
Mohammadi, 2018	Patients with heart disease in Iran Exp *n* = 30 Con *n* = 28	RCT	Exp = 52.7 (5.0) Con = 52.4 (5.9)	Health Service Group	Optimism training, involving 17 positive psychology exercises	Cardiac health education	8 sessions over 8 weeks	SWLS OHI PANAS	Baseline Post 3 months
Molinari, 2017	Fibromyalgia patients in Spain Exp *n* = 18 Con *n* = 17	RCT	Overall = 51.1 (10.5)	Health Service Hybrid	Write about best possible self	Writing about daily events	12 sessions over 4 weeks	PANAS	Baseline Post 3 months

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Mongrain, 2011	Adults from an online sample in Canada Total *n* = 356	RCT	Overall = 33.6 (11.5)	Community Hybrid	Practicing compassion by interacting positively with one person each day	Writing about early memories	Daily over 1 week	AHI	Baseline Post 3 Month 6 Month
Mongrain, 2012	Adults from an online sample in Canada Exp 1 *n* = 102 Exp 2 *n* = 74 Con 1 *n* = 81 Con 2 *n* = 87	RCT	Overall = 33.0	Community Exp 1: Online Exp 2: Hybrid	Exp 1: Three good things Exp 2: Using signature strengths	Con 1: Writing about early memories Con 2: Writing about early positive memories	Daily over 1 week	AHI	Baseline Post 3 months 6 months
Mongrain, 2016	Adults from international online sample Exp 1 *n* = 93 Exp 2 *n* = 97 Con *n* = 93	RCT	Overall = 32.6 (11.4)	Community Online	Exp 1: Practicing positive emotions Exp 2: Guided mindfulness	Reflecting on the day's events	12 sessions over 3 weeks	SWLS	Baseline Post 3 months
Monteiro, 2020	Postpartum women in Portugal Exp *n* = 191 Con *n* = 176	RCT	Exp = 33 (4.0) Con = 33 (4.4)	Community Online	Cognitive behavioral therapy-based multicomponent intervention	Waitlist	8 modules over 8 weeks	MHC-SF	Baseline Post
Moskowitz, 2017	Patients newly diagnosed with HIV in the USA Exp *n* = 59 Con *n* = 61	RCT	Exp = 35.6 (10.2) Con = 36.5 (9.7)	Community Hybrid	Behavioural and cognitive positive psychology skills designed to increase positive affect	Attention control, focusing on personal stories and concerns	6 sessions over 6 weeks	mDES	Baseline Post 6 months 12 months
Muller A, 2016	Nurses in community hospital in Germany Exp *n* = 31 Con *n* = 27	RCT	Exp = 44.7 (9.4) Con = 42.7 (9.9)	Health Service Group	Intervention addressing stress and wellbeing, smart goal setting, Selection Optimization and Compensation (SOC) model, developing action plans and goals	Waitlist	6 sessions over 9 months	WHO-5	Baseline Post
Muller R, 2016	Individuals with chronic pain and physical disability in the USA Exp *n* = 51 Con *n* = 45	RCT	Exp = 58.9 (11.9) Con = 59.9 (11.7)	Community Online	Four of ten positive psychology interventions, tailored to individual fit. Exercises included kindness, gratitude, savouring, flow, taking care of the body, spirituality, relationships, goals, optimism, and forgiveness	No intervention	56 sessions over 8 weeks	PWI-A PANAS	Baseline Post 3 month

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Murdoch, 2020	Individuals with Parkinson's Disease in Canada Exp *n* = 15 Con *n* = 16	RCT	Exp = 65.5 (9.1) Con = 67.4 (9.8)	Health Service Group	Positive psychology intervention based on hope and personal strengths	Treatment as usual	6 sessions over 6 weeks	MHC-SF	Baseline Post 3 Month
Nadler 2020	Company employees in the USA Exp n = 37 Con n = 65	RCT	Not reported	Organisation Online	Mindfulness-based stress reduction	Waitlist	8 sessions over 8 weeks	PANAS	Baseline Post
Nahlen Bose, 2016	Patients with chronic heart failure in Sweden Exp *n* = 36 Con *n* = 42	RCT	Exp = 71.8 (9.9) Con = 69.0 (8.6)	Health Service Group	Coping effectiveness training: - appraisal and coping strategies - problem focused-coping - emotion focused-coping - challenging negative thoughts - adaptive and maladaptive coping - social support	Treatment as usual	7 sessions over 7 weeks	PANAS	Baseline Post 3 months 6 months 12 months
Nakamura, 2013	Cancer survivors in the USA Exp 1 *n* = 18 Exp 2 *n* = 20 Con *n* = 17	RCT	Exp 1 = 55.4 (9.6) Exp 2 = 50.8 (9.1) Con = 51.6 (10.7)	Health Service Group	Exp 1: Mind-body bridging skills Exp 2: Mindfulness meditation	Sleep hygiene education	3 sessions over 3 weeks	PANAS WHO-5	Baseline Post 3 months
Neece, 2014	Parents of children with developmental delays in the USA Exp *n* = 19 Con *n* = 16	RCT	Exp = 34.2 (8.7) Con = 36.4 (8.4)	Community Group	Mindfulness-based stress reduction: - psychoeducation - mindfulness practice - group discussion and sharing	Waitlist	9 sessions over 8 weeks	SWLS	Baseline Post
Neff, 2013 - Study 2	General population in the USA Exp *n* = 24 Con *n* = 27	RCT	Exp = 51.2 (12.0) Con = 49.1 (11.5)	Community Group	Intervention aimed at self-compassion, mindfulness, core values, emotions and interpersonal relationships	Waitlist	8 sessions over 8 weeks	SHS SWLS	Baseline Post
Nelson, 2014 - Study 1	University psychology students in South Korea Exp *n* = 22 Con *n* = 28	RCT	Overall = 20.7 (1.7)	University Online	Self-affirmation activity, included choosing a value from a list of 15, then writing about why the value is important to them, including personal experiences demonstrating its significance	Write about activities from the previous day	3 sessions over 3 weeks	DES	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Nelson, 2014 - Study 2	University psychology students in the USA Exp *n* = 33 Con *n* = 29	RCT	Overall = 19.2 (1.4)	University Online	Self-affirmation activity, included choosing a value from a list of 15, then writing about why the value is important to them, including personal experiences demonstrating its significance	Write about activities from the previous day	4 sessions over 4 weeks	DES	Baseline Post
Neumeier, 2017	Adult volunteers in Australia Exp 1 *n* = 90 Exp 2 *n* = 85 Con *n* = 128	RCT	Overall = 41.2 (12.3)	Community Online	Exp 1: PERMA-based intervention targeting gratitude, savouring the moment, best selves, acts of kindness, and smiling Exp 2: gratitude program	Waitlist	Daily for 1 week	SHS	Baseline Post
Ng, 2016 - Study 1	Undergraduate students in Singapore Exp *n* = 218 Con *n* = 77	RCT	Overall = 31.0	University Online	Listing three things the participant is grateful for, or acts of kindness they have performed or received	List the meals you have eaten today and describe the food in as much detail as possible	Daily for 1 week	SHS PANAS	Baseline Post
Ng, 2016 - Study 2	University students in Singapore Exp *n* = 118 Con *n* = 98	RCT	Overall = 28.0	University Individual	Best possible selves	Recalled and described the layout of a place they were at earlier (Active control)	3 weeks	SHS PANAS	Baseline Post
Nikrahan, 2016	Heart surgery patients in Iran Exp 1 *n* = 10 Exp 2 *n* = 12 Exp 3 *n* = 10 Con *n* = 12	RCT	Exp 1 = 55.8 (5.3) Exp 2 = 59.2 (11.5) Exp 3 = 54.7 (10.1) Con = 56.9 (6.7)	Health Service Group	Exp 1: enhancing positive feelings, using personal strengths, and finding meaning Exp 2: optimism and gratitude Exp 3: emotion-based CBT	Waitlist	6 sessions over 6 weeks	OHI SWLS	Baseline Post 3 months
Nikrahan, 2019	Patients with coronary artery disease in Iran Exp *n* = 20 Con *n* = 20	RCT	Exp = 56.9 (4.4) Con = 60.4 (6.7)	Health Service Group-based	Wellbeing intervention - psychological factors in cardiovascular health - optimal experiences - environmental mastery - personal growth - purpose in life - autonomy - self-acceptance - positive relations	Health education on cardiovascular illness	8 sessions over 8 weeks	PWBS PANAS	Baseline Post
Noone, 2018	University students in Ireland Exp *n* = 43 Con *n* = 48	RCT	Exp = 20.4 (3.6) Con = 20.7 (3.4)	University Online	Guided meditation delivered through the Headspace application	Unguided breathing exercises	30 sessions over 6 weeks	WEMWBS PANAS	Baseline Post

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Norouzi, 2020	Retired football players in Iran Exp *n* = 20 Con *n* = 20	RCT	Exp = 35.0 (1.9) Con = 34.0 (1.8)	Community Group	Mindfulness-based stress reduction	Group discussion	16 sessions over 8 weeks	PWBS	Baseline Post 3 months
Nwobi, 2018	Adults with HIV and meeting the criteria for high stress, anxiety and depression in Nigeria Exp *n* = 14 Con *n* = 14	RCT	Exp = 45.7 (3.3) Con = 43.6 (3.6)	Health Service Group-based	Cognitive behavioural stress management	No intervention	10 sessions over 10 weeks	SWLS	Baseline Post 3 months
Nyklicek, 2008	Community sample with symptoms of distress in the Netherlands Exp *n* = 29 Con *n* = 28	RCT	Overall = 46.0 (9.9)	Community Group	Mindfulness intervention: - information on relaxation, meditation, and body-mind connections - meditation and yoga practice - problem-solving related to impediments to effective practice	Waitlist	9 sessions over 8 weeks	GMS	Baseline Post
O'Connell, 2016	Participants recruited online Exp 1 *n* = 58 Exp 2 *n* = 59 Con *n* = 26	RCT	Exp 1 = 33.3 (12.07) Exp 2 = 35.3 (13.56) Con = 33.1 (10.84)	Community Online	Exp 1: write gratitude or kindness exercise to a social relation Exp 2: write gratitude or kindness exercise to the self	Listing three things that occurred in the day	Every second day over 1 week	SHS	Baseline Post 3 months
O'Connell, 2017	Convenience sample of adults in Ireland Exp 1 *n* = 39 Exp 2 *n* = 36 Con *n* = 34	RCT	Exp 1 = 26.9 (12.0) Exp 2 = 26.0 (9.6) Con = 28.4 (15.8)	Community Individual	Exp 1: interpersonal gratitude journal Exp 2: reflective behavioural interpersonal gratitude journal	Writing about daily life events	9 sessions over 3 weeks	SWLS SPANE	Baseline Post 3 month
O'Connell, 2018	University students in Ireland Exp 1 *n* = 28 Exp 2 *n* = 30 Con *n* = 30	RCT	Overall = 23.6 (7.8)	University Individual	Exp 1: traditional gratitude journal Exp 2: interpersonal gratitude journal	Write about number of experiences/ interactions that occurred during the day	4 sessions over 2 weeks	SPANE SWLS	Baseline Post
O'Dea, 2020	Community sample of young people in Australia Exp *n* = 80 Con *n* = 82	RCT	Exp = 14.8 (1.0) Con = 14.9 (1.0)	Community Online	Relationship-based intervention based on cognitive behavioral therapy, social learning, help-seeking, and skill development	Waitlist	Access to intervention for 4 weeks	SWEMWBS	Baseline Post 3 months
Odou, 2013	Adult volunteers in Australia Exp 1 *n* = 11	RCT	Overall = 34 (14.0)	Community Online	Exp 1: three good things Exp 2: best possible selves	No intervention	Daily for 1 week	PANAS WEMWBS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
	Exp 2 *n* = 14 Con *n* = 13								
Oei, 2018	Problem gamblers in Australia Exp *n* = 23 Con *n* = 32	RCT	Exp = 49.8 (15.1) Con = 49.0 (13.0)	Community Individual	Self-help CBT manual: - cognitive corrections of erroneous perceptions about gambling - problem-solving skills - relapse prevention	Waitlist	7 chapters over 7 weeks	SWLS	Baseline Post
Oken, 2017	Stressed older adults in the USA Exp *n* = 60 Con *n* = 68	RCT	Exp = 60.2 (7.4) Con = 59.4 (6.3)	Community Individual	Mindfulness meditation: - body scan - sitting meditation - sitting with difficulty - breathing space	Waitlist	6 sessions over 6 weeks	PANAS	Baseline Post
O'Leary, 2015	Adult women in Ireland Exp 1 *n* = 15 Exp 2 *n* = 13 Con *n* = 7	RCT	Overall = 28.4 (6.7)	Community Online	Exp 1: gratitude diary Exp 2: mindfulness diary	Waitlist	12 sessions over 3 weeks	SHS	Baseline Post
Oliver, 2018	Government employees in the UK Exp *n* = 111 Con *n* = 139	RCT	Not reported	Organisation Online	Goal setting and planning intervention: - setting personal goals - visualising achievement - planning to achieve goals	Waitlist	6 modules over 5 weeks	PANAS SWLS FS	Baseline Post
Oman, 2006	Health professionals in the USA Exp *n* = 27 Con *n* = 31	RCT	Not reported	Health Service Group	Mediation: - passage meditation - repetition of Mantra - slowing down - focused attention - training the senses - putting others first - spiritual association - inspirational reading	Waitlist	8 sessions over 8 weeks	SWLS	Baseline Post 3 months 6 months
Osborn, 2020	Secondary school students in Kenya Exp *n* = 50 Con *n* = 53	RCT	Exp = 15.4 (1.2) Con = 15.7 (1.2)	School Online	Intervention based on growth mindset, gratitude, and value affirmation	Study skills active control	Single session	SWEMW BS	Baseline Post

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Otsuka, 2012	Government employees in Japan Exp n = 19 Con n = 19	RCT	Exp = 48.5 (4.6) Con = 48.4 (5.8)	Organisation Individual	Gratitude exercise, recording 5 people to be grateful for over the past week	Writing about daily events	4 sessions over 4 weeks	PANAS SWLS SHS	Baseline Post
Owens, 2013	Elementary school children in the USA Exp 1 n = 22 Exp 2 n = 23 Con n = 17	RCT	Exp 1 = 6.6 (1.3) Exp 2 = 7.8 (2.0) Con = 7.7 (1.5)	School Group	Exp 1: gratitude intervention, involving drawing pictures of things to be grateful for Exp 2: best possible selves intervention, including drawing a picture of a future version the self as happy and engaged	Drawing about an event in the day	Weekly sessions over 4-6 weeks	PANAS-C BMSLSS	Baseline Post
Page, 2013	Government agency workers in Australia Exp n = 14 Con n = 23	RCT	Overall = 39.7 (10.0)	Organisation Group	Working for wellbeing program targeting strengths, goal striving, flow, relationships, and altruism	No intervention	6 sessions over 6 weeks	SWLS PANAS PWBS	Baseline Post 3 month 6 month
Palmer, 2018	Volunteer participants in the USA Exp n = 60 Con n = 60	RCT	Overall = 44.6 (20.7)	Community Individual	Savouring task, re-experience and reflect on a positive event	Reflecting on daily morning routine	Single session	PANAS - X	Baseline Post
Parks, 2013	University students in the USA Exp 1 n = 20 Exp 2 n = 20 Con n = 18	RCT	Not reported	University Individual	Exp 1: positive psychology based self-help book Exp 2: cognitive behavioural self-help book	Recorded naturally-occurring happiness-promoting behaviour	8 weeks	SWLS	Baseline Post 6 months
Perez-Blasco, 2013	Breast-feeding mothers in Spain Exp n = 13 Con n = 8	RCT	Overall = 34.3 (4.7)	Community Group	Mindfulness session with babies in the room using brief mindfulness meditations and meditation at home	No intervention	8 sessions over 8 weeks	SWLS SHS	Baseline Post
Peters, 1977	Corporate employees of a manufacturing firm in the USA Exp n = 54 Con 1 n = 36 Con 2 n = 36 Con 3 n = 52	RCT	Overall = 33.4	Organisation Hybrid	Daily relaxation breaks, participants taught technique for producing the relaxation response	Con 1: Relaxation with no instructions Con 2: Waitlist Con 3: Waitlist	Daily sessions for 12 weeks	BABS	Baseline Post
Peters, 2010	University psychology students in Sweden Exp n = 44 Con n = 38	RCT	Overall = 29.6	University Group	Optimism training using a best possible self-exercise	Thinking about a typical day	Single session	PANAS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Peters, 2013	University students in the Netherlands Exp 1 *n* = 28 Exp 2 *n* = 26 Con *n* = 28	RCT	Exp 1 = 20.8 (2.0) Exp 2 = 25.5 (11.9) Con = 22.2 (5.3)	University Individual	Exp 1: best possible self Exp 2: gratitude	Focusing on the details of every-day occurrences	Daily for 1 week	SWLS	Baseline Post
Peters, 2017	Patients with chronic pain in the Netherlands Exp 1 *n* = 85 Exp 2 *n* = 80 Con *n* = 41	RCT	Exp 1 = 47.5 (13.2) Exp 2 = 48.7 (11.5) Con = 50.6 (10.1)	Community Online	Exp 1: PP intervention Exp 2: CBT intervention	Waitlist	8 sessions over 8 weeks	BMIS	Baseline Post
Pietrowsky, 2012	Patients with major depression or dysthymia in Germany Exp *n* = 9 Con *n* = 8	RCT	Exp = 43.8 (8.8) Con = 34.1 (8.4)	Health Service Individual	Positive psychology intervention using best possible self and three good things	Writing about early memories and the future of mankind	15 sessions over 3 weeks	SWLS PANAS	Baseline Post
Pinniger, 2012	Individuals with self-diagnosed depression in Australia Exp *n* = 16 Con *n* = 29	RCT	Overall = 44.4 (14.3)	Community Group	Mindfulness meditation	Waitlist	6 sessions over 6 weeks	SWLS	Baseline Post
Pinniger, 2013	Individuals with self-declared affective symptoms in Australia Exp *n* = 11 Con *n* = 23	RCT	Overall = 39.5	Community Group	Meditation based on mindfulness teaching	Waitlist	8 sessions over 8 weeks	SWLS	Baseline Post
Poole, 2019	Community sample in Australia Exp *n* = 36 Con *n* = 45	RCT	Con = 39.8 (14.1) Exp = 41.2 (13.3)	Community Online	Activities to create arousal or excitement, including doing something new, going somewhere new, acting spontaneously	Waitlist	4 sessions over 4 weeks	PANAS SWLS	Baseline Post
Pots, 2014	Adults with moderate depressive symptoms in the Netherlands Exp *n* = 72 Con *n* = 71	RCT	Exp = 48.0 (10.6) Con = 47.9 (12.0)	Community Group	Mindfulness-based cognitive therapy: - awareness - acceptance - disengaging from thoughts - focusing on evaluation and integration	Waitlist	11 sessions over 11 weeks	MHC-SF	Baseline Post 3 month
Powell, 2013	Self-recruited users of NHS services in the UK Exp *n* = 557 Con *n* = 1219	RCT	Exp = 40.9 (13.0) Con = 41.4 (13.1)	Community Online	Wellbeing intervention based on CBT principles	Waitlist	5 sessions over 5 weeks	WEMWBS	Baseline Post 3 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Pradhan, 2007	Rheumatoid Arthritis patients in the USA Exp *n* = 31 Con *n* = 32	RCT	Exp = 56 (9) Con = 53 (11)	Community Group	Mindfulness-based stress reduction: - sitting meditation - progressive body relaxation - contemplative walking - gentle yoga	Waitlist	8 sessions over 8 weeks with refresher content over 4 months	PWBS	Baseline Post
Preschl, 2012	Older adults with elevated depressive symptoms in Switzerland Exp *n* = 20 Con *n* = 16	RCT	Exp = 72.5 (4.5) Con = 67.0 (3.1)	Community Hybrid	Life-review therapy inviting participants to think about positive and negative life events	Waitlist	6 sessions over 6 weeks	LSIA WHO-5	Baseline Post
Proyer, 2013	General population in Switzerland Exp 1 *n* = 39 Exp 2 *n* = 44 Con *n* = 53	RCT	Exp 1 = 43.7 (13.3) Exp 2 = 39.2 (13.3) Con = 38.7 (12.0)	Community Group	Exp 1 = Strength intervention focusing on using strengths associated with life satisfaction Exp 2 = Strengths intervention focused on using strengths not associated with life satisfaction	Waitlist	Single session	SWLS	Baseline Post
Proyer, 2014	Older adults in Switzerland Exp 1 *n* = 30 Exp 2 *n* = 44 Exp 3 *n* = 20 Exp 4 *n* = 35 Con *n* = 34	RCT	Overall = 55.6 (5.2)	Community Online	Exp 1: gratitude visit Exp 2: three good things Exp 3: three funny things Exp 4: signature strengths in a new way	Writing about early memories	Daily for 1 week	AHI	Baseline Post 3 Month 6 Month
Proyer, 2015	General population in Switzerland Exp 1 *n* = 167 Exp 2 *n* = 159 Con *n* = 173	RCT	Overall = 46.4 (12.3)	Community Online	Exp 1: using five signature strengths Exp 2: using five lesser strengths	Writing about early memories	Daily for 1 week	AHI SWLS	Baseline Post 3 Month 6 Month
Proyer, 2016	General population in Switzerland Exp *n* = 56 Con *n* = 44	RCT	Overall = 45.7 (12.8)	Community Group	Positive psychology intervention focused on building engagement, pleasure, meaning, and meditation practice	Waitlist	5 sessions over 8 weeks	AHI PANAS	Baseline Post
Punamaki, 2014	Children exposed to major trauma of war in Gaza-Palestine Exp n = 242 Con n = 240	Cluster RCT	Overall = 11.3 (0.7)	School Group	CBT based recovery techniques focused on developing coping skills, empowerment, and emotional regulation	Waitlist	2 months	MHC-SF	Baseline Post 6 months
Puolakanaho, 2020	Employees with burnout in Finland Exp *n* = 80 Con *n* = 73	RCT	Overall = 47	Health service Hybrid	Acceptance and Commitment therapy-based intervention	Treatment as usual	8 sessions over 8 weeks	LSQ PWBS SWBS	Baseline Post 6 months 12 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Quoidbach, 2009	University staff in Belgium Exp 1 *n* = 15 Exp 2 *n* = 16 Con 1 *n* = 18 Con 2 *n* = 57	RCT	Women = 31.2 (10.8) Men = 35.0 (14.8)	Organisation Online	Projecting a positive vision of self in the future: Exp 1 = imaging positive events Exp 2 = imagining negative events	Con 1 = imagining neutral events Con 2 = no intervention	Daily over 2 weeks	SHS	Baseline Post
Radstaak, 2020	Individuals recovered from PTSD in the Netherlands Exp *n* = 29 Con *n* = 35	RCT	Exp = 41.6 (14.4) Con = 38.4 (12.9)	Health Service Individual	Wellbeing therapy	Treatment as usual	6 sessions over 6 weeks	MHC-SF	Baseline Post 3 months 6 months
Rasanen, 2016	Students in Finland Exp *n* = 29 Con *n* = 35	RCT	Overall = 24.3 (3.3)	University Hybrid	ACT including: - clarifying values - taking action - being present - watching one's thinking - awareness and acceptance	Waitlist	7 modules over 7 weeks	MHC-SF	Baseline Post
Rash, 2011	Adults in Canada Overall = 47	RCT	Overall = 22.5 (3.0)	Community Individual	Gratitude reflection and journaling	Memorable event reflection and journaling	8 sessions over 4 weeks	SWLS	Baseline Post
Rattenbury, 1989	Geriatric residents of a nursing home in Canada Total *n* = 24	RCT	Exp 1 = 85 Exp 2 = 83 Con = 87	Community Group	Reminiscence discussion	Discussion of current events and neutral topics	8 sessions over 4 weeks	MUNSH	Baseline Post
Read, 2016	Community sample of carers in Australia Exp *n* = 7 Con *n* = 6	RCT	Overall = 52.8 (14.3)	Community Individual	Single session intervention based on brief behavioural activation treatment for depression including focusing on life values and goal setting	Waitlist	Single Session	WEMWBS	Baseline Post

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Reich, 1989	Disabled and bereaved older adults in the USA Disabled sample Exp *n* = 19 Con 1 *n* = 6 Con 2 *n* = 32 Bereaved sample Exp *n* = 19 Con 1 *n* = 9 Con 2 *n* = 29	RCT	Exp = 70.8 Con = 70.5	Community Group	Life review intervention designed to enhance perceived self-agency.	Placebo contact group	4 sessions over 10 weeks	BABS	Baseline Post 3 months
Reig-Ferrer, 2014	Elderly nursing home residents in Spain Exp *n* = 11 Con *n* = 14	RCT	Overall = 83 (5.0)	Community Group	Relaxation technique involving repeated resting periods in which the mind is free from preoccupations and the body is liberated of all tension	Waitlist	10 sessions over 2 weeks	BABS SWLS	Baseline Post 3 months
Reinke, 1981	Elderly nursing home residents in the USA Exp 1 *n* = 12 Exp 2 *n* = 15 Con *n* = 12	RCT	Overall = 79.5 (10.5)	Community Individual	Friendly visitor program, Exp 1: visitation condition focusing on conversational interaction Exp 2: visitation condition in which the playing of cognitively challenging games supplemented conversation	No intervention	16 sessions over 8 weeks	LSIA	Baseline Post
Renshaw, 2018	University students in the USA Exp *n* = 54 Con *n* = 43	RCT	Overall = 19.8 (2.3)	University Individual	Gratitude intervention, participant directed to think about something they are grateful for	Reflect on something participants had learnt that day	Daily sessions over two weeks	SWLS SHS PANAS	Baseline Post
Rezvan, 2008	Individuals with generalised anxiety disorder in Iran Exp 1 *n* = 12 Exp 2 *n* = 12 Con *n* = 12	RCT	Overall = 20.3 (1.5)	University Individual	Exp 1: CBT Exp 2: CBT and interpersonal therapy	No intervention	8 sessions over 8 weeks	OHI	Baseline Post 12 months
Rini, 2015	Knee or hip osteoarthritis patients in the USA Exp *n* = 58 Con *n* = 55	RCT	Exp = 68.5 (7.7) Con = 66.7 (11.0)	Community Online	Pain coping skills training: - progressive muscle relaxation - activity/rest cycling - pleasant activity scheduling - negative automatic thoughts - coping thoughts - pleasant imagery - problem solving	No intervention	8 sessions over 8 weeks	PANAS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Rivkin, 1999	University students in the USA Total *n* = 77	RCT	Not reported	University Individual	Mental coping visualisation, Exp 1: event visualisation Exp 2: outcome visualisation	No intervention	Single session	AM1	Baseline Post
Roch, 2017	University students in Germany Exp 1 *n* = 25 Exp 2 *n* = 22 Con *n* = 27	RCT	Overall = 22.9 (3.7)	University Group	Exp 1: motivational feedback Exp 2: motivational feedback and congruence enhancement training	No intervention	Single session	SWLS	Baseline Post
Roche, 2017	Hypertension patients in the USA Exp *n* = 14 Con *n* = 10	RCT	Exp = 59.4 (9.9) Con = 54.5 (8.9)	Health Service Group	Himalayan traditional meditation	Lecture on hypertension and healthy lifestyle habits	Exp: 15 sessions over 2 months Con: single session	SWLS SHS	Baseline Post
Roepke, 2015	Online recruited participants Exp 1 *n* = 12 Exp 2 *n* = 11 Con *n* = 29	RCT	Overall = 40.1 (12.4)	Community Online	Exp 1: smartphone app that stimulates goal setting and social support not designed for depression Exp 2: smartphone app that uses game mechanics and is based on CBT and positive psychology, focused on goal setting and social support, designed for depression	Waitlist	Daily for 1 month	SWLS	Baseline Post
Rose, 2014	High school students in Australia Exp 1 *n* = 66 Exp 2 *n* = 64 Con *n* = 80	Cluster RCT	Overall = 12.2 (0.8)	School Group	Exp 1: resourceful adolescent program, incorporates CBT and interpersonal psychotherapy principles Exp 2: peer interpersonal relatedness program, a manualized group program that teaches adolescents basic social skills and complex performance skills	Waitlist	Exp 1: 11 sessions over 11 weeks Exp 2: 9 sessions over 9 weeks	BMSLSS	Baseline Post 12 months
Roth, 2017	Middle school students in the USA Exp *n* = 21 Con *n* = 21	RCT	Range between 11 and 13	School Group	Multicomponent PP intervention, focused on the past, present, and future aspects of emotional well-being	Waitlist	10 sessions over 10 weeks	BMSLSS SLSS PANAS-C	Baseline Post 3 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Rubin, 2020	Bereaved adults in USA Exp *n* = 145 Con *n* = 57	RCT	Exp = 33.3 (10.8) Con = 32.8 (11.2)	Community Online	Expressive writing about a positive memory of the deceased person	Writing about a neutral activity	Single session	PANAS	Baseline Post
Ruini, 2009	High school students in Italy Exp *n* = 104 Con *n* = 98	Cluster RCT	Overall = 14.4 (0.7)	School Group	Wellbeing therapy: - relationship between thoughts and emotions - cognitive restructuring - building Ryff's six domains of psychological well-being	Attention placebo, including group discussions, games and role-playing, and some relaxation techniques	6 sessions over 6 weeks	PWBS	Baseline Post
Ruppert, 2018	General population in the UK Exp *n* = 31 Con *n* = 31	RCT	Not reported	Community Individual	Positive visual reframing, where drawn images of negative experiences and open memories were redrawn and visually reframed to form new positive narratives	Neutral drawing activity	Single session	PANAS WEMWBS	Baseline Post
Sanchez-Hernandez, 2019	Middle school students in the Spain Exp *n* = 47 Con *n* = 30	RCT	Overall = 13.9 (1.0)	School Group	Multicomponent intervention based on psychoeducation, behavioral activation, problems solving, optimism and social skills	Non-intervention control	11 sessions over 11 weeks	WEMWBS	Baseline Post 6 months 12 months
Sanjuan, 2016	Acute cardiac patients in Spain Exp *n* = 50 Con *n* = 43	RCT	Exp = 54.5 (8.7) Con = 54.3 (9.5)	Health Service Group	Cardiac rehabilitation program plus content to improve wellbeing, primarily focused on gratitude activities	Cardiac rehabilitation program, including physical exercise, relaxation, healthy lifestyle, diet, exercise, medication, and stress medication	6 sessions over 6 weeks	PANAS	Baseline 2 weeks
Schoeps, 2019	School teachers in Spain Exp n = 135 Con n = 205	RCT	Overall = 42.6 (9.0)	Organisation Group	Multicomponent intervention focused on assertiveness, conflict resolution, self-esteem and empathy	Received digital material about Social Emotional Learning in classrooms without intervention instructions	7 sessions over 3 months	SWLS	Baseline Post 6 months
Schoeps, 2020	University students in Spain Exp *n* = 39 Con *n* = 57	RCT	Overall = 21.9 (2.6)	University Group	Emotion education program - emotions and group cohesion - perception, assessment and expression of emotions - emotional facilitation - emotional understanding - emotional regulation	Waitlist	7 sessions over 7 weeks	SWLS SPANE	Baseline Post 3 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
					- conflict resolution - empathy and self-esteem				
Schotanus-Dijkstra, 2017	Adults from the general population in Netherlands Exp n = 122 Con = 131	RCT	Overall = 48 (10.9)	Community Hybrid	Self-help PPI book with email support - positive emotions - discovering and using strengths - optimism - hope - self compassion - resilience - positive relations	Waitlist	9 sessions over 9 weeks	MHC-SF	Baseline 3 months 6 months
Schrank, 2016	Convenience sample of adults with psychosis in the UK Exp *n* = 43 Con *n* = 41	RCT	Exp = 43.0 (11.0) Con = 42.0 (11.5)	Health Service Group	WELLFOCUS PPT, aimed at increasing positive experiences, amplifying strengths, fostering positive relationships, and creating a more meaningful self-narrative	Treatment as usual	11 sessions over 11 weeks	WEMWBS	Baseline Post
Seear, 2013	Self-selected adults from larger trial in Australia Exp 1 *n* = 14 Exp 2 *n* = 11 Con *n* = 12	RCT	Overall = 34.0 (14.0)	Community Online	Exp 1: write about new domains of best possible selves each day for 7 days Exp 2: write down and reflect upon three good things each day for 7 days	No intervention	7 sessions for 7 days	WEMWBS PANAS	Baseline Post
Seligman, 2005	International online sample Exp 1 *n* = 80 Exp 2 *n* = 59 Exp 3 *n* = 68 Exp 4 *n* = 66 Exp 5 *n* = 68 Con *n* = 70	RCT	Not reported	Community Online	Exp 1: gratitude exercise Exp 2: three good things Exp 3: focus on personal best Exp 4: use signature strengths in new way Exp 5: identify signature strengths	Writing about early memories	Daily over 1 week	AHI	Baseline Post 3 month 6 month
Seligman, 2006 - Study 1	Mild to moderately depressed participants in the USA Exp *n* = 14 Con *n* = 20	RCT	Not reported	University Group	Group positive psychotherapy targeting using strengths, three good things, obituary, gratitude, active responding, and savouring	No intervention	6 sessions over 6 weeks	SWLS	Baseline Post 3 Month 6 Month 12 month

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Seligman, 2006 - Study 2	Severely depressed participants in the USA Exp *n* = 11 Con *n* = 9	RCT	Not reported	Health Service Individual	Individual positive psychotherapy targeting engagement, signature strengths, forgiveness, gratitude, optimism hope, satisficing, attachment, family strengths, and savouring	Treatment as usual	14 sessions over 12 weeks	SWLS	Baseline Post
Seligman, 2007	University students at risk of depression in the USA Exp *n* = 102 Con *n* = 125	RCT	Not reported	University Group	CBT workshop with ongoing web-based material email coaching	No intervention	8 sessions over 8 weeks	SWLS	Baseline Post 3 months 6 months
Senf, 2013	University students in Malaysia Exp 1 *n* = 40 Exp 2 *n* = 38 Con *n* = 39	RCT	Overall = 20.3 (1.6)	University Individual	Exp 1: signature strengths intervention Exp 2: gratitude-based intervention	No intervention	Daily exercises over 1 week	AHI	Baseline Post
Sergeant, 2011	Community sample from Canada and online Total *n* = 631	RCT	Overall = 36.0 (12.7)	Community Online	Exp 1: gratitude exercise Exp 2: music condition	Recalling early memories	Daily exercises over 1 week	AHI	Baseline Post 3 month 6 month
Sewart, 2019	Individuals who met the diagnostic criteria for mental disorders in USA Exp 1 *n* = 45 Exp 2 *n* = 35 Con *n* = 31	RCT	Overall = 28.3 (6.7)	Community Individual	Exp 1 = CBT Exp 2 = ACT	Waitlist	12 sessions over 12 weeks	PANAS	Baseline Post 6 months 12 months
Shaghaghi, 2019	Midwives in Iran Exp *n* = 17 Con *n* = 30	Cluster RCT	Exp = 36.9 (9.7) Con = 31.8 (5.1)	Organisation Group	Multicomponent positive psychology intervention based on the PERMA framework	Waitlist	8 sessions over 8 weeks	PWBS	Baseline Post
Shapira, 2010	Community sample in Canada Exp 1 *n* = 327 Exp 2 *n* = 322 Con *n* = 353	RCT	Overall = 34	Community Online	Exp 1: use self-compassionate writing when experiencing distress Exp 2: imagine optimistic future and elaborate on how it came about	Writing about early memories	Daily exercises over 1 week	AHI	Baseline Post 1 month 3 Month 6 Month
Shapiro, 2005	Health professionals in the USA Exp *n* = 18 Con *n* = 20	RCT	Range between 18 and 65	Organisation Group	Mindfulness-based stress reduction: - sitting meditation - body scan - hatha yoga - three-minute breathing space	Waitlist	8 sessions over 8 weeks	SWLS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Shapiro, 2011	University students in the USA Exp *n* = 15 Con *n* = 15	RCT	Overall = 18.7 (1.3)	University Group	Mindfulness-based stress reduction: - sitting meditation - body scan - hatha yoga - three-minute breathing space	Waitlist	8 sessions over 8 weeks	PANAS SWLS	Baseline Post 3 months 12 months
Sheldon, 2002	University psychology students in the USA Exp *n* = 36 Con *n* = 42	RCT	Not reported	University Hybrid	Teaching strategies to attain goals and reflect on meaningfulness of the goals	No intervention	2 sessions over 2 weeks	PWBS PANAS	Baseline Post
Sheldon, 2006	University psychology students in the USA Exp 1 *n* = 21 Exp 2 *n* = 23 Con *n* = 23	RCT	Not reported	University Individual	Exp 1: expressing gratitude Exp 2: visualizing best positive selves	Thinking about the details of the current day	Single session	PANAS	Baseline Post
Shin, 2020	Community samples from the USA, Taiwan, and India. USA sample: Exp 1 *n* = 101 Exp 2 *n* = 95 Con *n* = 111 Taiwan sample: Exp 1 *n* = 36 Exp 2 *n* = 36 Con *n* = 39 India sample: Exp 1 *n* = 136 Exp 2 *n* = 151 Con *n* =144	RCT	USA = 33.7 (9.7) Taiwan = 40.5 (7.9) India = 20.2 (2.5)	Community Online	Exp 1 = write a gratitude letter to themselves for a kind act they had done for themselves Exp 2 = write a gratitude letter to themselves for a kind act that had done for someone else	Neutral writing exercise	Single session	AAS	Post
Shirani, 2019	Elderly adults in Iran Exp *n* = 36 Con *n* = 36	RCT	Range 60-75	Health Service Group-based	Education on stress management and interpersonal relationships	Neutral topic group discussion	9 sessions over 9 weeks	SWLS	Baseline Post 3 months
Shoshani, 2016	High school students in Israel Exp *n* = 1082 Con *n* = 1255	Cluster RCT	Overall = 13.5 (0.7)	School Group	Classroom based program targeting the PERMA elements on gratitude, flow, kindness, compassion, and mindfulness	Waitlist	15 sessions over 30 weeks	SWLS PANAS	Baseline Post 12 month
Shoshani, 2017	Pre-school children in Israel Exp *n* = 160 Con *n* = 155	Cluster RCT	Overall = 4.5 (0.9)	School Group	Positive education program focused on positive emotions, engagement, achievement, and positive relationships	Waitlist	160 sessions over 32 weeks	PANAS-C MBSLSS	Baseline Post

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Simkiss, 2013	Parents with young children in the UK Exp *n* = 125 Con *n* = 115	RCT	Not reported	Community Group	Universal parenting skills program, focused on managing emotions, improving relationships, building self-confidence and self-esteem	Waitlist	10 sessions over 10 weeks	WEMWBS	Baseline Post 6 months
Smeets, 2014	Female university psychology students in the Netherlands Exp *n* = 27 Con *n* = 22	RCT	Overall = 20.0 (1.3)	University Group	Self-compassion intervention aimed at increasing awareness of own suffering and teaching informal self-compassion techniques	Active control focusing on time management skills	3 sessions over 3 weeks	SWLS PANAS	Baseline Post
Smith, 2016	Custodial grandmothers in the USA Total *n* = 223	RCT	Overall = 58.4 (8.2)	Community Group	Exp 1: behavioural parenting program Exp 2: cognitive behavioural coping program	Information only condition	10 sessions	PANAS	Baseline Post
Smith, 2019	Older adults in USA Exp 1 *n* = 95 Exp 2 *n* =129 Con *n* = 79	RCT	Overall = 68.1 (6.3)	Community Online	Exp 1 = Savouring life lessons Exp 2 = reflecting on negative aspects of aging	No intervention	Single session	SWLS SHS	Baseline Post
Sodani, 2019	Female university students in Iran Overall *n* = 50	RCT	Overall = 24.8	University Group	Life skills exercises including problem solving, communication skills, and critical thinking	Non-intervention control	13 sessions over 13 weeks	PWBS	Baseline Post
Sommers-Spijkerman, 2018	Adults with low to moderate levels of wellbeing in the Netherlands Exp *n* = 107 Con *n* = 106	RCT	Exp = 52.8 (9.8) Con = 52.9 (10.2)	Community Hybrid	Psychoeducation information and exercises based on compassion-focused therapy with email guidance	Waitlist	7 sessions over 7 weeks	MHC-SF PANAS	Baseline Post 3 months
Soucy, 2018	Community members in Canada Exp *n* = 20 Con *n* = 20	RCT	Overall = 32.5	Community Telephone	Behavioral activation to re-engage individuals with depression in activities that they consider enjoyable, to promote feelings of pleasure or accomplishment	Waitlist	4 sessions over 8 weeks	SWLS PANAS	Baseline Post
Spek, 2013	Adults with an autism spectrum disorder in the Netherlands Exp *n* = 20 Con *n* = 21	RCT	Exp = 44.4 (11.1) Con = 40.1 (11.0)	Health Service Group	Mindfulness intervention: - mindful eating - body scan - home practice - sitting meditation - psychoeducation	Waitlist	9 sessions over 9 weeks	GMS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Spence, 2007	Self-selecting participants in Australia Exp 1 n = 21 Exp 2 n = 22 Con n = 17	RCT	Exp 1 = 37.9 (10.3) Exp 2 = 35.8 (9.9) Con = 42.4 (10.6)	Community Exp 1 = Individual Exp 2 = Group	Exp 1 = professional coaching using cognitive-behavioral, solution-focused coaching framework Exp 2 = peer coaching focused on goal striving and action plan development	Waitlist	Exp 1 = 10 sessions over 10 weeks Exp 2 = one day workshop and 10 sessions over 10 weeks	SWLS PWBS	Baseline Post
Stallman, 2019	University students with self-reported elevated distress levels in Australia Exp n = 25 Con n = 25	RCT	Overall = 28.8 (11.1)	University Online	Strengths focused coping plan	Waitlist	1 month access of online program	WHO-5	Baseline Post
Steinhardt, 2008	College students in the USA Exp n = 30 Con n = 27	RCT	Range between 18 and 53	University Group	Psychoeducational intervention: - transforming stress into resilience - taking responsibility - focusing on empowering interpretations - creating meaningful connections	Waitlist	4 sessions over 4 weeks	PANAS	Baseline Post
Strachowski, 2008	Older patients with depression and cardiovascular risk in the USA Exp n = 19 Con n = 21	RCT	Exp = 62.4 (7.1) Con = 62.1 (5.7)	Community Individual	CBT intervention: - stress management - relaxation techniques - goal setting - addressing core beliefs	Waitlist	10-16 sessions over 16 weeks	PANAS	Baseline Post
Suldo, 2014	Middle school students in the USA Exp n = 20 Con n = 20	RCT	Overall = 11.4 (0.6)	School Group	Group-based positive psychology interventions targeting gratitude, character strengths, optimistic explanatory style, and hopeful goal-directed thinking	Waitlist	10 sessions over 10 weeks	MBSLSS PANAS-C	Baseline Post 6 Month
Sullivan, 2019	Older adults transitioning to long term care in USA Exp n = 41 Con n = 52	RCT	Overall = between 81 and 82	Community Group-based	Story sharing based around pleasant childhood stories, profession or vocation story, wishlist or ambition story, funny or strange story, or a heart-warming tale or love story.	Treatment as usual	Twice a week for 3 weeks	FS SWLS SPANE	Baseline Post
Tagalidou, 2019	University students in Austria Exp 1 n = 28 Exp 2 n = 34 Exp 3 n = 18 Con n = 26	RCT	Overall = 24.9 (8.2)	University Online	Exp 1 = three funny things Exp 2 = three good things Exp 3 = coping humour	Early memories	Daily for 1 week	AHI	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Taghvaienia, 2020	Female teachers in Iran Exp *n* = 26 Con *n* = 26	RCT	Exp = 61.8 (13.3) Con = 63.5 (12.3)	Community Group	Positive psychotherapy including forgiveness, strengths, positive emotions, hope, optimism, and positive relationships.	Non-intervention control	10 sessions over 10 weeks	PWBS OHI	Baseline Post
Tak, 2014	Secondary school students in the Netherlands Exp *n* = 634 Con *n* = 707	Cluster RCT	Exp = 14.0 (0.5) Con = 13.9 (0.6)	School Group	Based on Penn State program covering CBT principles and coping, decision-making, and problem solving	No intervention	16 sessions over 16 weeks	SLSS	Baseline Post 6 months 12 month 18 Month 24 Month
Tavakoli, 2009	International university students in the USA Exp 1 *n* = 28 Exp 2 *n* = 26 Exp 3 *n* = 24 Con *n* = 30	RCT	Overall = 25.0	University Hybrid	Exp 1: group assertiveness training Exp 2: private expressive writing Exp 3: combined assertiveness and expressive writing	Waitlist	Exp 1: 2 sessions over 2 weeks Exp 2: 3 sessions over 1 week Exp 3: 5 sessions over 2 weeks	PANAS	Baseline Post
Taylor, 2017	Treatment seeking individuals presenting with clinically impairing symptoms of anxiety/depression in the USA Exp *n* = 16 Con *n* = 12	RCT	Exp = 29.8 (12.2) Con = 29.0 (12.0)	Health Service Individual	Positive activity intervention including: - psychoeducation - noticing and amplifying positive events - counting gratitude - acts of kindness - meaningful activities - using strengths - affirming values - building optimism - investment in relationships	Waitlist	10 sessions over 10 weeks	PANAS SWLS	Baseline Post

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Terides, 2018	Individuals seeking online treatment for symptoms of anxiety and/or depression in Australia Exp *n* = 65 Con *n* = 75	RCT	Exp = 46.3 (12.6) Con = 43.2 (12.8)	Community Online	iCBT course covering psychoeducation and skills related to cognitive restructuring, behavioural activation, graded exposure, and relapse prevention.	Waitlist	5 sessions over 8 weeks	SWLS	Baseline Post
Thompson, 2015	Individuals with epilepsy and mild to moderate depressive symptoms in the USA Exp *n* = 52 Con *n* = 56	RCT	Overall = 41.2	Health Service Hybrid Telephone and Online	Manualised intervention designed to increase knowledge about depression, monitoring, challenging, and changing of thoughts, coping and relaxing, attention and mindfulness, focusing on pleasure, reinforcement, and preventing relapse	Treatment as usual	8 sessions over 8 weeks	SWLS	Baseline Post
Tol, 2020	Female refugees in Uganda Exp *n* = 283 Con *n* = 330	Cluster RCT	Exp = 30.9 (10.3) Con = 31.0 (11.4)	Community Group	Acceptance and commitment therapy-based intervention	Treatment as usual	5 sessions over 5 weeks	WHO-5	Baseline Post 3 months
Tovote, 2014	Patients with diabetes and depression in the Netherlands Exp 1 *n* = 29 Exp 2 *n* = 29 Con *n* = 27	RCT	Exp 1 = 49.8 (13.3) Exp 2 = 54.6 (11.3) Con = 54.7 (10.5)	Health Service Individual	Exp 1: mindfulness-based cognitive therapy Exp 2: cognitive-based therapy	Waitlist	8 sessions over 8 weeks	WHO-5	Baseline Post
Trompetter, 2014	Chronic pain patients in the Netherlands Exp *n* = 82 Con 1 *n* = 79 Con 2 *n* = 77	RCT	Exp = 52.9 (13.3) Con 1 = 52.3 (11.8) Con 2 = 53.2 (12.0)	Community Online	Exp 1: ACT Exp 2: expressive writing	Waitlist	9 modules over 12 weeks	MHC-SF	Baseline Post 3 months
Troop, 2013	University students in the UK Exp *n* = 23 Con *n* = 23	RCT	Overall = 25.8 (9.3)	University Individual	Expressive writing focusing on life in the future, imagining everything has gone as well as it possibly could and that participants had achieved everything they wanted.	Review of a recent book or film	Single session	TPAS	Baseline Post
Tsivos, 2015	Mothers with postnatal depression in the UK Exp *n* = 14 Con *n* = 13	RCT	Exp = 30.7 (5.8) Con = 26.7 (6.2)	Health Service Individual	Positive parenting self-help book: - positive parenting - responding to your baby - survival skills - partner support - routines	Treatment as usual	8 sessions over 8 weeks	OHI	Baseline Post 3 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Tunariu, 2017	School children in the UK Exp *n* = 165 Con *n* = 189	RCT	Range between 11 and 12	School Group	iNEAR program: - positive identity - emotional intelligence - uncertainty and existential ethics - uncertainty and growth and wellbeing	Waitlist	7 sessions	WEMWBS	Baseline Post
van der Spek, 2017	Cancer survivors in the Netherlands Exp 1 *n* = 50 Exp 2 *n* = 49 Con *n* = 47	RCT	Exp 1 = 58.6 (10.7) Exp 2 = 55.5 (9.6) Con = 57.3 (10.4)	Health Service Group	Exp 1: meaning-centred group psychotherapy Exp 2: supportive group psychotherapy	No intervention	8 sessions over 8 weeks	PWBS	Baseline Post 3 months 6 months
van Dijk, 2017	Medical students undertaking clinical clerkships in the Netherlands Exp *n* = 73 Con *n* = 68	Cluster RCT	Exp = 23.7 (1.9) Con = 23.3 (1.8)	Organisation Group	Mindfulness-based stress reduction focused on automatic behaviours, perceptions, boundaries, stress, communication, and work-life balance	No intervention	8 sessions over 8 weeks	MHC-SF LiSat9	Baseline 3 month 6 months 12 months 24 months
Vieten, 2008	Women in the second and third trimesters of pregnancy in the USA Exp *n* = 13 Con *n* = 18	RCT	Overall = 33.9 (3.8)	Health Service Group	Mindfulness intervention involving three approaches to cultivate mindfulness: - breath awareness and contemplative practices - guided body awareness meditation and mindful hatha yoga - presentation of psychological concepts that incorporate mindfulness	Waitlist	8 sessions over 8 weeks	PANAS - X	Baseline Post 3 months
Visckovich, 2020	University students in Australia Exp *n* = 310 Con *n* = 364	RCT	Overall = 26.9 (8.8)	University Online	Acceptance and commitment therapy-based intervention	Waitlist	4 modules over 4 weeks	MHC-SF SWLS	Baseline Post
Waelde, 2017	Older female dementia family caregivers in the USA Exp *n* = 16 Con *n* = 15	RCT	Overall = 59.6 (11.9)	Community Exp = Group Con = Telephone	Inner resources meditation: - mindfulness meditation - breath-focused imagery - mantra repetition mindfulness	Support and psychoeducation telephone conversations	Exp: 9 sessions over 8 weeks with booster session after 4 weeks Con: 6 sessions over 12 weeks	SWLS	Baseline Post

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Walker, 2014	University students with mild depressive symptoms in the USA Exp 1 *n* = 22 Exp 2 *n* = 21 Exp 3 *n* = 21 Con *n* = 22	RCT	Overall = 20.7 (2.5)	University Individual	Exp 1: CBT Exp 2: CBT with an interpersonal element Exp 3: Positive Psychology exercises	Waitlist	At least 4 hours over 2 weeks	PANAS MHC-SF	Baseline Post
Wang, 2014	University students in the USA Exp *n* = 38 Con *n* = 36	RCT	Overall = 24.0 (8.2)	University Individual	Engaging in generous acts at least two times a week and reflection/writing about the experiences	Writing daily in a diary on any topic	10 sessions over 5 weeks	SWLS	Baseline Post
Wang, 2017	Elderly adults with depressive symptoms in China Exp *n* = 100 Con *n* = 125	Cluster RCT	Range between 50 and 80	Community Group	Recovery program: - introduction to depression and self-management - relaxation techniques - emotion regulation - problem solving - sleep hygiene education - nutrition and exercise education	Waitlist	7 sessions over 7 weeks	WHO-5	Baseline Post
Watkins, 2015	University psychology students in the USA Exp 1 *n* = 42 Exp 2 *n* = 47 Con *n* = 40	RCT	Not reported	University Online	Exp 1: recall of pride blessings Exp 2: recall of gratitude blessings	Memory placebo	Daily for 1 week	SWLS PANAS	Baseline Post
Weber 2019	Employed adults in Germany, England, and Northern Ireland Exp n = 210 Con n = 322	RCT	Overall = 40.6 (11.2)	Organisation Online	Multicomponent intervention including stress recovery, cognitive re-evaluation, and positive psychology techniques	Waitlist	7 modules over 4 weeks	WEMWB S	Baseline Post
Weiss, 2020	Individuals experiencing loneliness, mental or physical illness, and low socioeconomic status in	RCT	Exp = 59.0 Con = 61.0	Community Individual	Positive psychology program using principles of self-determination theory	Treatment as usual (two homecare visits)	2-6 home visits over 3 months	MHC-SF	Baseline Post 6 months

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
	the Netherlands Exp *n* = 40 Con *n* = 39								
Wellenzohn, 2016a	Community dwelling participants from Switzerland Exp 1 *n* = 151 Exp 2 *n* = 164 Exp 3 *n* = 176 Exp 4 *n* = 165 Exp 5 *n* = 162 Con *n* = 166	RCT	Overall = 47.4 (11.6)	Community Online	Exp 1: three funny things Exp 2: recounting funniest thing Exp 3: counting funny things Exp 4: applying humour Exp 5: solving stressful situation in a humorous way	Writing about early memories	Daily for 1 week	AHI	Baseline Post 3 Month 6 Month
Wellenzohn, 2016b	Online participants of a positive psychology intervention in Switzerland Exp 1 *n* = 180 Exp 2 *n* = 189 Exp 3 *n* = 160 Con *n* = 166	RCT	Overall = 47.5 (12.2)	Community Online	Exp 1: three funny things Exp 2: three funny things in future Exp 3: three funny things in the past	Writing about early memories	Daily for a week	AHI	Baseline Post
Westerhof, 2018	Older adults in residential care in the Netherlands Exp *n* = 42 Con *n* = 39	RCT	Overall = 84.2 (8.5)	Community Individual	Autobiographical memory intervention to improve positive memory retrieval	Unstructured contact with a volunteer	5 sessions over 8 weeks	MHC-SF	Baseline Post 6 months
Westerhof, 2019	Aging adults with lighter to moderate depressive symptoms in the Netherlands Exp 1 *n* = 13 Exp 2 *n* = 14 Con *n* = 12	RCT	Overall = 53.8 (8.4)	Community Online	Exp 1 = Life review therapy with online counselling Exp 2 = Life review therapy with online peer support	Waitlist	6 sessions over 12 weeks	MHC-SF	Baseline Post 3 months 12 months
Weytens, 2014	University students in Belgium Exp 1 *n* = 28 Exp 2 *n* = 16 Exp 3 *n* = 35	RCT	Exp 1 = 22.5 (3.1) Exp 2 = 22.3 (1.7) Con = 22.1 (2.4)	University Group	Exp 1: positive emotion regulation Exp 2: loving kindness meditation	Waitlist	6 sessions over 6 weeks	SHS SWLS	Baseline Post

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Wicksell, 2008	Adults with chronic pain and whiplash-associated disorders in Sweden Exp *n* = 11 Con *n* = 9	RCT	Exp = 48.2 (7.8) Con = 55.1 (11.2)	Community Individual	CBT and ACT, including: - pain education - values - acceptance and diffusion	Waitlist	10 sessions over 8 weeks	SWLS	Baseline Post 3 months
Wilner Tirpak, 2019	Individuals with heterogeneous anxiety disorders in the USA Exp 1 *n* = 88 Exp 2 *n* = 91 Con *n* = 44	RCT	Overall = 31.1 (11.0)	Community Group	CBT Exp 1 = unified protocol (targets patterns with core skills) Exp 2 = single disorder	Waitlist	12 weeks for individuals with principle diagnosis of panic disorder. Other participants had 16 weeks treatment	PANAS	Baseline Post
Wing, 2006	University students and community members in Australia Exp 1 *n* = 58 Exp 2 *n* = 62 Con *n* = 55	RCT	Overall = 40.3 (16.0)	Community Individual	Exp 1: writing about intensely positive experiences cued for emotion regulation Exp 2: writing about intensely positive experiences without any cues	Writing about neutral topic	3 sessions over 3 days	SWLS	Baseline Post
Wingert 2020	Undergraduate students in the USA Exp n = 21 Con n = 29	RCT	Exp = 19.4 (1.8) Con = 18.5 (0.9)	University Group	Mindfulness-based strength practice	Non-intervention control	8 sessions over 8 weeks	PERMA	Baseline Post
Wong, 2016	University students in China Exp *n* = 33 Con *n* = 32	RCT	Exp = 20.7 (1.4) Con = 20.3 (1.4)	University Individual	Participants asked to write about event that was painful, or they felt bad or judged themselves, then instructed to use an accepting and self-compassionate attitude to process the experience	Write about neutral topic	3 sessions over 3 days	PANAS	Baseline Post 3 months
Woodworth, 2017	General population in Australia Exp 1 *n* = 17 Exp 2 *n* = 24 Exp 3 *n* = 11 Con *n* = 20	RCT	Overall = 43	Community Online	Exp 1: using signature strengths Exp 2: three good things Exp 3: gratitude visit	Writing about early memories	Daily for 1 week	AHI	Baseline Post 3 month 6 month
Xie, 2019	Rural dwelling older adults with mild - moderate depression in China Exp *n* = 37 Con *n* = 36	RCT	Exp = 72.0 (3.9) Con = 71.9 (3.7)	Community Group	Behavioural activation including activity monitoring, scheduling, and modification, CBT, and regular care	Treatment as usual	8 sessions over 8 weeks	OHI	Baseline Post 3 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Xu, 2019	First year medical students in China Exp *n* = 39 Con *n* = 48	RCT	Exp = 19.5 (1.7) Con = 20.2 (2.4)	University Group	Wellbeing therapy - introduction - write down events of wellbeing in terms of Ryff's wellbeing scale - discern thoughts and beliefs leading to interpretation of wellbeing - discuss in group and reinforce positive exercises - reflection	List early memories to share in class	5 sessions over 5 weeks	PWBS	Baseline Post 3 months
Yamada, 2010	Community dwelling older adults in Japan Exp *n* = 30 Con *n* = 33	RCT	Exp = 72.3 (4.7) Con = 72.6 (4.3)	Community Group	Model of Human Occupation-based program: - reflection on occupational lives - meeting personal occupational needs	Standard care including craft-based activities and casual conversation	15 sessions over 15 weeks	LSIA	Baseline Post
Yousefi, 2015	Elderly women attending a day-care elderly centre in Iran Exp *n* = 14 Con *n* = 14	RCT	Exp = 66.2 (7.4) Con = 64.3 (5.3)	Community Group	Narrative group reminiscence therapy: - major decisive events of life - family life - career or major life work and personal interests - stress experiences - loves and hates - beliefs on the meaning and goals of life	Group discussion of a topic selected at the start of each session	6 sessions over 3 weeks	OHI	Baseline Post
Zarifsanaiey, 2020	Diabetic patients in Iran Exp *n* = 68 Con *n* = 68	RCT	Exp = 48.3 (11.8) Con = 49.5 (8.2)	Health Service Group	Mindfulness-based intervention	Non-intervention control	8 sessions over 8 weeks	OHI	Baseline Post
Zautra, 2008	Patients with Rheumatoid Arthritis in the USA Exp 1 *n* = 50 Exp 2 *n* = 44 Exp 3 *n* = 43	Cluster RCT	With recurrent depression Exp 1 = 46.2 (12.7) Exp 2 = 51.0 (10.7) Con = 51.4	Health Service Group	Exp 1: CBT focused on pain management Exp 2: Mindfulness and emotion regulation therapy for pain management	Education on Rheumatoid Arthritis and related themes	8 sessions over 8 weeks	PANAS	Baseline Post 6 months

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Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
			(13.9) Without recurrent depression Exp 1 = 57.3 (15.3) Exp 2 = 56.1 (13.5) Con = 52.4 (13.0)						
Zemestani, 2020	Pregnant women with comorbid depression and anxiety in Iran Exp n = 15 Con n = 18	RCT	Exp = 28.6 (3.0) Con = 30.5 (4.2)	Health Service Group	Mindfulness-based cognitive therapy	No intervention	8 sessions over 8 weeks	PWBS	Baseline Post
Zeng, 2019	General population, university staff and students in China, Hong Kong and Taiwan Exp n = 41 Con n = 41	RCT	Overall = 27.6 (10.1)	University Group	Meditation practice cultivating appreciative joy	Waitlist	4 sessions over 4 weeks	SWLS	Baseline Post
Zhang, 2014	Female university students in China Exp 1 n = 10 Exp 2 n = 10 Con n = 11	RCT	Overall = 22.1 (1.0)	University Group	Exp 1: forgiveness skills training Exp 2: interpersonal skills training	Waitlist	6 sessions	IGA	Baseline Post
Zhang, 2016	Patients with mild depression in China Exp n = 32 Con n = 30	RCT	Exp = 48.3 (17.5) Con = 55.4 (15.3)	Health Service Group	CBT including: - introduction to CBT - examine mood, listen to other's problems and challenges - identify causes of own anxious and depressive emotions - self-regulation of anxious and depressive emotions - future planning	Treatment as usual	12 sessions over 12 weeks	LSIA	Baseline Post 12 months

Author	Participants/Country	Design	Age, mean (SD)	Setting	Intervention	Control/comparator	Intensity	Outcomes	Follow-up
Zhou, 2012	Community dwelling older adults in China Exp *n* = 59 Con *n* = 66	Cluster RCT	Exp = 69.8 (6.6) Con = 69.2 (7.1)	Community Group	Reminiscence therapy: - self introduction - recalling old songs - sharing old photos - recalling happy moments during growth period - recalling lifetime achievements - future expectations	Health education: - mental health standards for elderly - mental health care - frequent mental health problems	Exp: 6 sessions over 6 weeks Con: 3 sessions over 6 weeks	BABS	Baseline Post
Ziemer, 2019	Female college students, in USA Exp 1 *n* = 51 Exp 2 *n* =50 Con *n* = 51	RCT	Exp 1 = 18.9 (0.2) Exp 2= 19.2 (0.2) Con = 19.1 (0.2)	University Online	Exp 1 = Self compassion writing Exp 2 = Expressive writing	Writing about daily events	3 sessions over 3 weeks	PANAS	Baseline Post
Zilcha-Mano, 2016	Pregnant women in Israel Exp *n* = 36 Con 1 *n* = 23 Con 2 *n* = 18	RCT	Overall = 28.7 (3.7)	Community Individual	Mindful attention to mood and physicality with structured diary entry	Con 1 = exposure to stories of negative pregnancy experiences Con 2 = no intervention	Exp = daily over 2 weeks Con 1 = 7 sessions over 2 weeks	PANAS SWLS	Baseline Post
Zolnierczyk-Zreda, 2016	Middle level managers affected by organisational restructuring in Poland Exp *n* = 72 Con *n* = 72	RCT	Overall = 39.4 (8.4)	Organisation Group	Mindfulness-based stress reduction: - sitting meditation - body scanning - mindful bodywork	Waitlist	8 sessions over 8 weeks plus one day session	BABS	Baseline Post

Note: Exp = experimental group. Con = control group. RCT = randomized controlled trial. Exp n = experimental group sample sizes. Con n= control group sample sizes. Please refer to table 2 in article for a full overview of all measures and their acronyms.

Meta-analysis Results – additional data tables and forest plots

Supplementary figure 1: Subjective Wellbeing Forest Plot
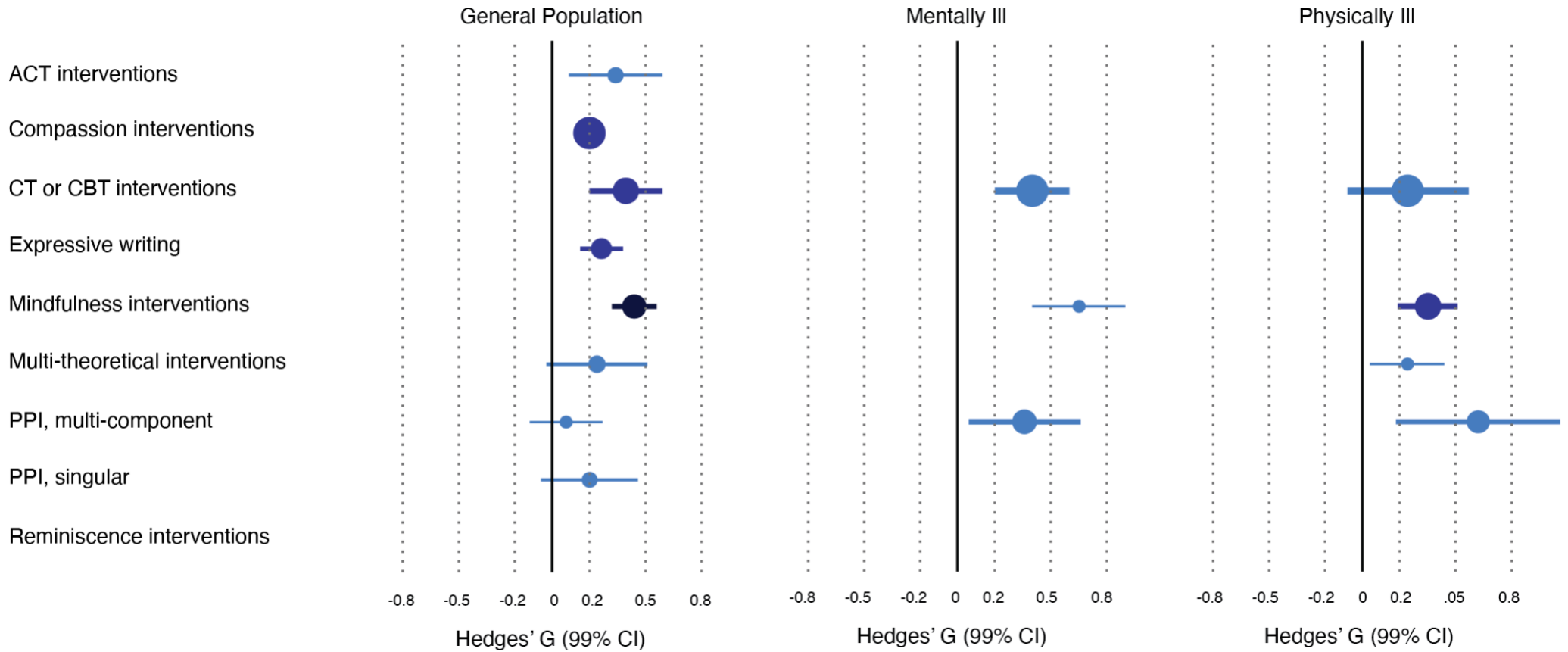
Supplementary figure 1. Forest plot visualizing the impact of each intervention type on subjective well-being compared to control conditions. Interventions that do not cross the middle line were significant. Larger circles indicate a larger weight of the overall study. The colors denote the evidence quality based on Grade recommendations [1] for high (dark purple colour), moderate (purple colour), low (blue colour) and very low (light blue colour) quality of the evidence. Only intervention types with more than 5 studies included are added in the meta-analysis. Specific effect sizes and other statistics applying to this forest plot can be found in supplementary table 3.

Supplementary table 3: Subjective Wellbeing Outcome Table

Population	Intervention Type	Hedges G	99% CI		P value	Int n	Con n	Total n**	Q	I²	K	Grade	PB	Pow
General population	Compassion interventions	0.201	-0.06	0.46	0.047	484	479	963	7.74	9.61	8	2	-	0.55
	CT or CBT based	0.075	-0.12	0.27	0.320	360	343	703	6.40	0.00	10	2	No	0.43
	Expressive Writing	0.240	-0.03	0.51	0.019	703	521	1,274	7.81	0.00	9	2	-	0.87
	Mindfulness interventions	0.440	0.32	0.56	0.000	2,206	2,178	4,430	49.30	0.00	53	4	No	1.00
	Multi-theoretical interventions	0.264	0.15	0.38	0.000	1,339	1,219	2,631	23.62	2.60	24	3	No	1.00
	PPI, multi-component	0.395	0.20	0.59	0.000	3,219	2,827	6,046	20.90	9.08	20	3	Yes	1.00
	PPI, singular	0.200	0.12	0.28	0.000	7,287	4,040	11,724	87.30	19.81	71	3	No	1.00
	Reminiscence interventions	0.340	0.09	0.59	0.000	533	469	1,002	9.18	0.00	11	2	Yes	0.98
Mentally ill	CT or CBT interventions	0.401	0.20	0.60	0.000	699	686	1,385	11.32	0.00	13	2	No	1.00
	Mindfulness interventions	0.652	0.40	0.90	0.000	213	236	449	6.00	0.06	7	2	-	1.00
	PPI, multi-component	0.359	0.06	0.66	0.002	403	385	788	11.88	7.47	12	2	Yes	0.96
Physically ill	CT or CBT interventions	0.243	-0.08	0.57	0.054	771	700	1,606	10.70	15.85	10	2	No	0.95
	Mindfulness interventions	0.352	0.19	0.51	0.000	597	596	1,193	13.98	0.00	15	3	No	1.00
	Multi-theoretical interventions	0.242	0.04	0.44	0.002	373	413	786	7.10	1.47	8	2	-	0.64
	PPI, multi-component	0.621	0.18	1.06	0.000	558	451	1,009	11.12	0.00	14	2	Yes	1.00

Note. Meta-analysis output corresponding to Figure 2. Q= Cochrane's Q, a measure of heterogeneity. I²= I squared, a measure of heterogeneity. K= number of studies contributing to the meta-analysis. Grade = measure of evidence quality, with "1" indicating very low quality evidence, "2" indicating low quality evidence, "3" indicating moderate quality evidence and "4" indicating high quality evidence. PB = presence of publication bias, yes/no. Publication bias calculation is only conducted in case of 10 studies or more. Int n = intervention sample size; con n = control group sample size. Pow = power calculation for meta-analysis.**Total n can deviate from group n as a result of the specific analyses performed and the availability of per group data.

Supplementary figure 2: Psychological Wellbeing Forest Plot
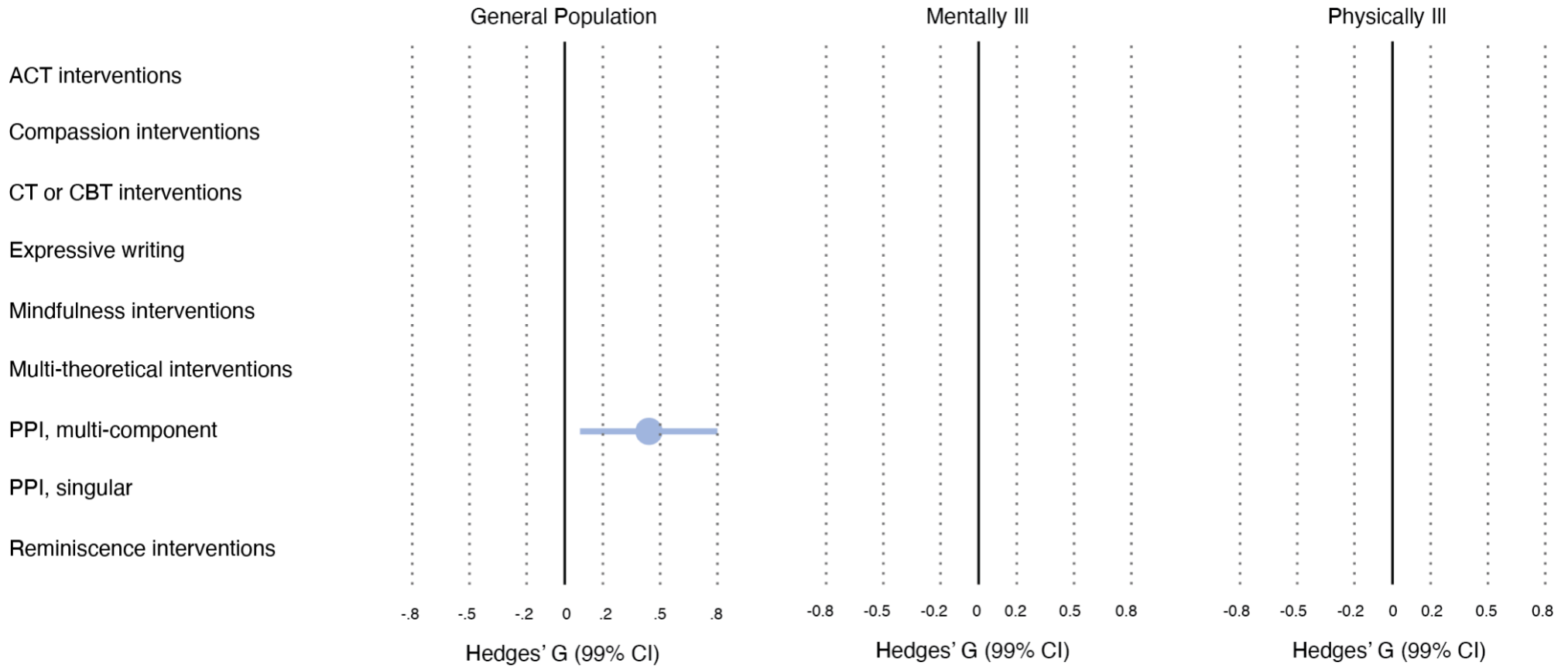
Supplementary figure 2. Forest plot visualizing the impact of each intervention type on psychological well-being compared to control conditions. Interventions that do not cross the middle line were significant. The colors denote the evidence quality based on Grade recommendations [1] for high (dark purple colour), moderate (purple colour), low (blue colour) and very low (light blue colour) quality of the evidence. Specific effect sizes and other statistics applying to this forest plot can be found in supplementary table 4.

Supplementary table 4: Psychological Wellbeing Outcome Table

Population	Intervention Type	Hedges G	99% CI		P value	Int n	Con n	Total n**	Q	I²	K	Grade	PB	Pow
General population	PPI, multi-component	0.441	0.08	0.80	0.002	190	203	393	5.13	2.57	6	1	-	0.88

Note. Meta-analysis output corresponding to Figure 2. Q= Cochrane's Q, a measure of heterogeneity. I²= I squared, a measure of heterogeneity. K= number of studies contributing to the meta-analysis. Grade = measure of evidence quality, with "1" indicating very low quality evidence, "2" indicating low quality evidence, "3" indicating moderate quality evidence and "4" indicating high quality evidence. PB = presence of publication bias, yes/no. int n = intervention sample size; con n = control group sample size. **Total n can deviate from group n as a result of the specific analyses performed and the availability of per group data.

Supplementary figure 3: Singular PPIs Forest Plot
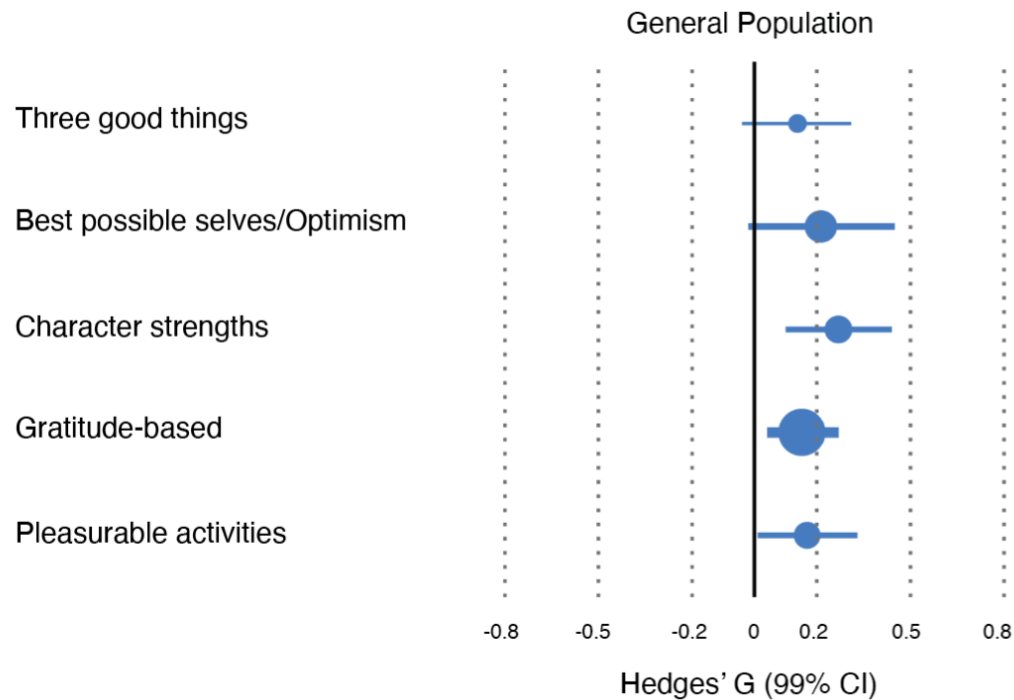
Supplementary figure 3. Forest plot visualizing the impact of individual Positive Psychological Interventions (PPI) type on general wellbeing compared to control conditions. Interventions that do not cross the middle line were significant. Larger circles indicate a larger weight of the overall study. The colors denote the evidence quality based on Grade recommendations [1] for high (dark purple colour), moderate (purple colour), low (blue colour) and very low (light blue colour) quality of the evidence.. Only intervention types with more than 5 studies included are added in the meta-analysis. Specific effect sizes and other statistics applying to this forest plot can be found in supplementary table 5.

Supplementary table 5: Singular PPIs Outcome Table

Population	Intervention Type	Hedges G	99% CI		P value	Int n	Con n	Total n**	Q	I²	K	Grade	PB	Pow
General population	3 Good Things	0.138	-0.04	0.31	0.045	498	392	890	6.54	0.00	10	2	No	0.21
	BPS/Optimism	0.213	-0.02	0.45	0.018	643	589	1,483	16.82	10.81	16	2	No	0.83
	Character Strengths	0.269	0.10	0.44	0.000	554	601	1,155	10.28	2.68	11	2	No	0.91
	Gratitude	0.152	0.04	0.27	0.001	1,810	1,525	3,481	32.28	3.97	32	2	No	0.90
	Pleasurable activities	0.169	0.01	0.33	0.005	562	533	1,095	3.38	0.00	6	2	-	0.44

Note. Meta-analysis output corresponding to Figure 2. Q= Cochrane's Q, a measure of heterogeneity. I²= I squared, a measure of heterogeneity. K= number of studies contributing to the meta-analysis. Grade = measure of evidence quality, with "1" indicating very low quality evidence, "2" indicating low quality evidence, "3" indicating moderate quality evidence and "4" indicating high quality evidence. PB = presence of publication bias, yes/no. int n = intervention sample size; con n = control group sample size. **Total n can deviate from group n as a result of the specific analyses performed and the availability of per group data.

Supplementary table 6: Brief narrative description of other included studies

Intervention Type	Narrative Description
Assertiveness Training	Hojjat, 2015 did not find a significant improvement in wellbeing Tavakoli, 2009 found a significant improvement in wellbeing
Behaviour Activation	Read, 2016 did not find a significant improvement in wellbeing Soucy, 2018 found a significant improvement in wellbeing Xie, 2019 found a significant improvement in wellbeing
Behavioural Experiments	Alden, 2013 did not find a significant improvement in wellbeing
Benefit-finding interventions	Cheng, 2016 found a significant improvement in wellbeing Crawford, 2019 found a significant improvement in wellbeing Hoeppner, 2019 did not find a significant improvement in wellbeing Tagalidou, 2019 found a significant improvement in wellbeing
Couple Interventions	Hilpert, 2016 did not find a significant improvement in wellbeing for males, but did find one for females
Emotional Awareness and Expression Therapy	Lumley, 2017 did not find a significant improvement in wellbeing
Forgiveness Skills training	Zhang, 2014 found a significant improvement in wellbeing
Friendly Visitation	Reinke, 1981 found a significant improvement in wellbeing
Goal-setting	Coote, 2012 did not find a significant improvement in wellbeing Oliver, 2018 found a significant improvement in wellbeing Muller R, 2016 did not find a significant improvement in wellbeing Roepke, 2015 did not find a significant improvement in wellbeing Sheldon, 2002 did not find a significant improvement in wellbeing
Interpersonal Psychotherapy	Leung, 2012 did not find a significant improvement in wellbeing Rezvan, 2008 found a significant improvement in wellbeing
Narrative Exposure Therapy	Hijazi, 2014 found a significant improvement in wellbeing
Parenting styles	Fabrizio, 2015 found a significant improvement in wellbeing Tsivos, 2015 did not find a significant improvement in wellbeing Simkiss, 2013 did not find a significant improvement in wellbeing Smith, 2016 Impact of the intervention on wellbeing was not statistical evaluated
Emotion Management	Hajisabbagh, 2020 found a significant improvement in wellbeing Mazlomi, 2020 found a significant improvement in wellbeing
Psychoeducation	Arola, 2020 found a significant impact in wellbeing Larson, 2005 did not find a significant improvement in wellbeing
Rational Emotive Therapy	Lichter, 1980 did not find a significant improvement in wellbeing
Stimulus Control training	McGowan, 2013 did not find a significant improvement in wellbeing
Social Skill Building	Rose, 2014 did not find a significant improvement in wellbeing
Supportive Group Therapy	Bostani, 2020 did not find a significant improvement in wellbeing Dong, 2019 did not find a significant improvement in wellbeing van der Spek, 2017 found a significant improvement in aspects of psychological wellbeing
Core Transformation Therapy	Braganza, 2019 did not find a significant improvement in wellbeing
Spiritual Counselling	Kruizinga, 2019 did not find a significant improvement in wellbeing
Story Telling	Koenig Kellas, 2015 did not find a significant improvement in wellbeing
Problem Solving	Berry, 2012 did not find a significant improvement in wellbeing Elliott, 2009 did not find a significant improvement in wellbeing Elliott, 2008 did not find a significant improvement in wellbeing Mitchell, 2009 did not find a significant improvement in wellbeing
Self-affirmations	Lichter, 1980 (study 2) found a significant improvement in wellbeing Nelson, 2014 did not find a significant improvement in wellbeing

Risk of Bias for included studies

Supplementary figure 4: Summary of Risk of Bias profiles of included studies.
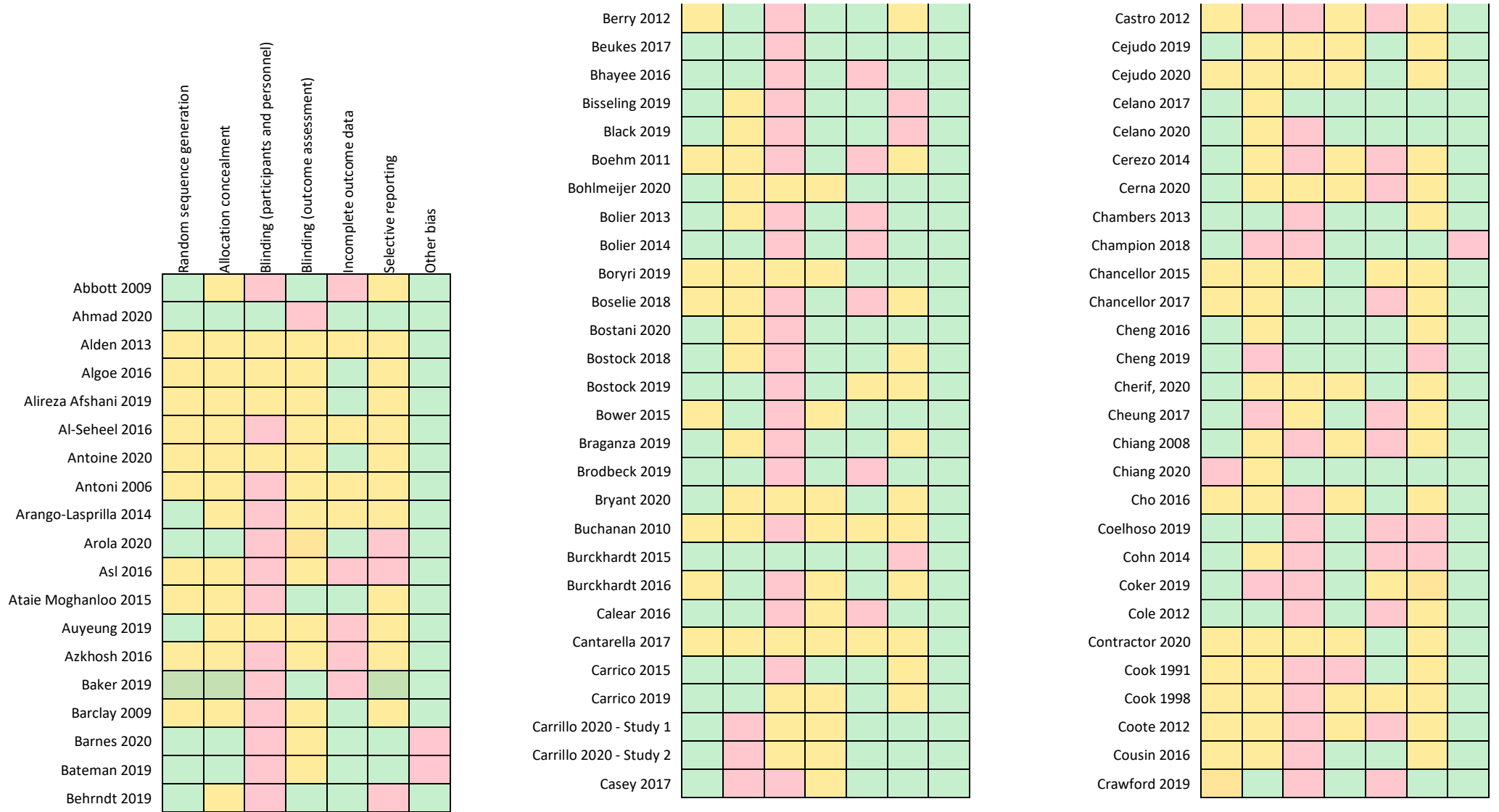
Cunha 2019	🟩	🟥	🟩	🟩	🟥	🟩	🟩
Dambrun 2016	🟨	🟨	🟨	🟨	🟨	🟨	🟩
Dambrun 2019	🟨	🟨	🟨	🟨	🟩	🟨	🟩
Dandan 2019	🟥	🟨	🟥	🟩	🟩	🟨	🟩
Davis 2004	🟩	🟨	🟨	🟥	🟩	🟨	🟩
Davis 2013	🟩	🟩	🟩	🟩	🟩	🟩	🟩
de Vibe 2013	🟩	🟩	🟥	🟩	🟩	🟩	🟩
Deane 2015	🟩	🟩	🟥	🟩	🟩	🟨	🟩
Deng 2018	🟨	🟨	🟥	🟨	🟩	🟨	🟩
Di 2016	🟩	🟩	🟥	🟩	🟩	🟨	🟩
Dolev-Amit 2020	🟨	🟨	🟨	🟨	🟥	🟨	🟩
Donald 2020	🟩	🟨	🟥	🟥	🟥	🟨	🟩
Dong 2019	🟩	🟩	🟨	🟩	🟩	🟨	🟩
Dowd 2015	🟩	🟩	🟥	🟨	🟥	🟨	🟩
Dowlatabadi 2016	🟨	🟨	🟥	🟨	🟥	🟨	🟩
Dowling 2014	🟨	🟨	🟨	🟨	🟩	🟨	🟩
Dowling 2019	🟩	🟩	🟥	🟨	🟩	🟥	🟩
Drewery 2019	🟨	🟨	🟥	🟨	🟩	🟨	🟩
Drozd 2014a	🟩	🟨	🟥	🟩	🟨	🟩	🟩
Drozd 2014b	🟨	🟨	🟥	🟨	🟨	🟩	🟩
Duan 2019	🟩	🟨	🟨	🟩	🟥	🟨	🟩
Dvořáková 2017	🟩	🟨	🟥	🟩	🟩	🟨	🟩
Eimontas 2018	🟩	🟨	🟥	🟩	🟥	🟨	🟩
Elliott 2008	🟩	🟨	🟥	🟨	🟥	🟨	🟩
Elliott 2009	🟩	🟥	🟥	🟨	🟩	🟨	🟩
Enrique 2018	🟩	🟩	🟥	🟩	🟩	🟩	🟩
Fabrizio 2015	🟩	🟩	🟥	🟥	🟩	🟨	🟩
Fegg 2013	🟩	🟩	🟥	🟩	🟩	🟨	🟩
Feicht 2013	🟩	🟩	🟥	🟩	🟥	🟨	🟩
Fernandez 2008	🟨	🟨	🟨	🟨	🟨	🟨	🟩
Fledderus 2010	🟩	🟩	🟥	🟨	🟩	🟩	🟩
Fledderus 2012	🟩	🟨	🟥	🟩	🟩	🟩	🟩

Flett 2019	🟩	🟥	🟥	🟩	🟩	🟥	🟩
Francis 1992	🟩	🟨	🟥	🟩	🟩	🟥	🟩
Franklin 2017	🟨	🟨	🟨	🟨	🟥	🟨	🟩
Fredrickson 2008	🟨	🟨	🟥	🟩	🟥	🟨	🟩
Freeman 2014	🟩	🟩	🟥	🟩	🟩	🟩	🟩
Frieswijk 2006	🟩	🟥	🟥	🟨	🟥	🟨	🟩
Froh 2008	🟨	🟥	🟨	🟨	🟨	🟥	🟩
Froh 2009	🟨	🟨	🟥	🟨	🟩	🟨	🟩
Froh 2014	🟨	🟨	🟩	🟨	🟨	🟨	🟩
Galante 2018	🟩	🟩	🟥	🟩	🟨	🟨	🟩
Gallegos 2013	🟥	🟨	🟥	🟨	🟨	🟨	🟩
Gambrel 2015	🟩	🟨	🟥	🟩	🟩	🟨	🟩
Gammer 2020	🟩	🟩	🟨	🟩	🟥	🟩	🟩
Gander 2013	🟨	🟨	🟥	🟩	🟥	🟨	🟥
Gander 2016	🟩	🟨	🟨	🟩	🟨	🟨	🟩
Gander 2020	🟩	🟨	🟨	🟨	🟩	🟨	🟩
Garcia-Escalera 2020	🟩	🟩	🟨	🟨	🟩	🟨	🟩
Garland 2016	🟩	🟩	🟥	🟩	🟩	🟨	🟩
Gayner 2012	🟩	🟩	🟥	🟥	🟨	🟨	🟩
Ghandarioun 2016 - Study 1	🟨	🟨	🟨	🟨	🟨	🟥	🟩
Ghandarioun 2016 - Study 2	🟨	🟨	🟨	🟨	🟨	🟥	🟩
Giannopoulos 2011	🟨	🟨	🟨	🟨	🟨	🟨	🟩
Gigantesco 2015	🟨	🟨	🟥	🟩	🟥	🟨	🟩
Gluck 2011	🟩	🟥	🟥	🟩	🟩	🟩	🟩
Goldstein 2007	🟨	🟨	🟨	🟩	🟨	🟨	🟩
Graziano 2014	🟩	🟨	🟨	🟩	🟩	🟨	🟩
Green 2006	🟨	🟨	🟥	🟨	🟩	🟨	🟩
Greer 2019	🟩	🟨	🟨	🟨	🟥	🟥	🟩
Gregoire 2018	🟩	🟩	🟥	🟨	🟥	🟨	🟩
Guo 2020	🟩	🟩	🟨	🟨	🟩	🟨	🟩
Hajisabbagh 2020	🟨	🟨	🟨	🟨	🟩	🟨	🟩
Hallford 2016	🟨	🟨	🟨	🟩	🟩	🟨	🟩

Hausmann 2017	🟩	🟩	🟥	🟥	🟩	🟨	🟩
Hausmann 2018	🟥	🟩	🟩	🟩	🟩	🟥	🟩
Hazell 2018	🟩	🟩	🟥	🟥	🟩	🟩	🟩
Hecht 2018	🟩	🟩	🟥	🟥	🟩	🟨	🟩
Heekerens 2020	🟨	🟨	🟨	🟥	🟥	🟨	🟩
Heintzelman 2020	🟨	🟨	🟨	🟨	🟩	🟩	🟩
Hendriks 2020	🟩	🟩	🟥	🟩	🟩	🟥	🟩
Henriksson 2016	🟩	🟨	🟥	🟩	🟥	🟨	🟩
Hermanns 2015	🟨	🟩	🟥	🟩	🟥	🟥	🟩
Hijazi 2014	🟩	🟩	🟥	🟩	🟩	🟩	🟩
Hilpert 2016	🟥	🟨	🟨	🟩	🟩	🟨	🟩
Hirshberg 2020	🟩	🟨	🟥	🟩	🟥	🟩	🟩
Ho 2016	🟩	🟩	🟥	🟨	🟥	🟩	🟩
Hoeppner 2019	🟨	🟨	🟨	🟩	🟨	🟨	🟩
Hofer 2018	🟩	🟨	🟥	🟩	🟩	🟥	🟩
Hoffman 2012	🟩	🟩	🟥	🟩	🟩	🟨	🟩
Hoifodt 2013	🟩	🟥	🟥	🟩	🟥	🟥	🟩
Hojjat 2015	🟩	🟨	🟥	🟨	🟩	🟨	🟩
Howells 2016	🟩	🟩	🟩	🟩	🟥	🟨	🟥
Huffman 2011	🟨	🟨	🟨	🟩	🟩	🟨	🟩
Hurley 2012	🟨	🟨	🟥	🟩	🟨	🟨	🟩
Hwang 2017	🟩	🟨	🟥	🟨	🟩	🟨	🟩
Hyer 2008	🟨	🟨	🟥	🟩	🟩	🟨	🟩
Innes 2016	🟩	🟩	🟥	🟩	🟩	🟨	🟩
Ivtzan 2016	🟩	🟩	🟥	🟩	🟥	🟨	🟩
Ivtzan 2018	🟩	🟨	🟨	🟩	🟥	🟨	🟩
Jackowska 2016	🟩	🟨	🟨	🟨	🟩	🟨	🟩
Jansen 2017	🟨	🟨	🟥	🟨	🟥	🟨	🟥
Jarukasemthawee 2019 - Study 1	🟩	🟨	🟥	🟨	🟥	🟨	🟩
Jaser 2014	🟨	🟨	🟨	🟨	🟨	🟨	🟩
Jazaieri 2014	🟩	🟨	🟥	🟨	🟩	🟨	🟩
Jennings 2013	🟨	🟨	🟥	🟩	🟩	🟨	🟩

Jensen 2013
Johannsen 2016
Johnson 2016
Johnston 2010
Juul 2020
Karimi 2019
Keeman 2017 - Study 1
Kemeny 2012
Kenny 2019
Kerr 2015
Khanna 2019
King 2001
Kloos 2019
Knapstad 2020
Ko 2019
Koay 2020
Koenig Kellas 2015
Kogler 2015
Korte 2012
Kotsou 2011
Kovacs 2018
Koydemir 2016
Krafft 2019
Krentzman 2015
Krieger 2019
Kruizinga 2019
Kwok 2016
Lai 2019
Lamers 2015
Lan 2018
Larson 2005
Latorre 2015

Lau 2011
Lau 2012
Layous 2017 - Study 1
Layous 2018
LeBlanc 2017 - Study 2
Lee 2010
Leung 2012
Lever Taylor 2014
Lichter 1980 - Study 1
Lichter 1980 - Study 2
Lin 2019
Littman-Ovadia 2014
Liu 2020
Lo 2020
Lokman 2017
Loucas 2020
Lu 2010
Lü 2013
Lumley 2017
Lyubimirsky 2006 - Study 2
Lyubomirsky 2006 - Study 1
Lyubomirsky 2011
Maatouk 2018
Macdougall 2019
Mackenzie 2006
Maddock 2019
Majumdar 2019
Mak 2015
Mani 2019
Manicavasagar 2014
Manthey 2016
Martinez-Marti 2010

Martínez-Marti 2018
Matvienko-Sikar 2017
Mazlomi 2020
McConachie 2014
McGowan 2013
Mei 2018
Mi Ra 2017
Miao 2019
Miller 2015
Miller K 2020
Miller V 2020
Mistretta 2018
Mitchell 2009
Moeenizadeh 2017
Mohammadi 2018
Molinari 2017
Mongrain 2011
Mongrain 2012
Mongrain 2016
Monteiro 2020
Moskowitz 2017
Muller A 2016
Muller R 2016
Murdoch 2020
Nadler 2020
Nahlen Bose 2016
Nakamura 2013
Neece 2014
Neff 2013 - Study 2
Nelson 2014 – Study 1?
Nelson 2014 – Study 2
Neumeijer 2017

Ng 2016 – Study 1?
Ng 2016 – Study 2
Nikrahan 2016
Nikrahan 2019
Noone 2018
Norouzi 2020
Nwobi 2018
Nyklicek 2008
O'Connel 2016
O'Connell 2017
O'Connell 2018
O'Dea 2020
Odou 2013
Oei 2018
Oken 2017
O'Leary 2015
Oliver 2018
Oman 2006
Osborn 2020
Otsuka 2012
Owens 2013
Page 2013
Palmer 2018
Parks 2013
Perez-Blasco 2013
Peters 1977
Peters 2010
Peters 2013
Peters 2017
Pietrowsky 2012
Pinniger 2012
Pinniger 2013

Poole 2019
Pots 2014
Powell 2013
Pradhan 2007
Preschl 2012
Proyer 2013
Proyer 2014
Proyer 2015
Proyer 2016
Punamaki 2014
Puolakanaho 2020
Quoidbach 2009
Radstaak 2020
Rasanen 2016
Rash 2011
Rattenbury 1989
Rawlett 2019
Read 2016
Reich 1989
Reig-Ferrer 2014
Reinke 1981
Renshaw 2018
Rezvan 2008
Rini 2015
Rivkin 1999
Roch 2017
Roche 2017
Roepke 2015
Roepke 2018
Rose 2014
Roth 2017
Rubin 2020

Ruini 2009
Ruppert 2018
Sanchez-Hernandes 2019
Sanjuan 2016
Schoeps 2019
Schoeps 2020
Schotanus-Dijkstra 2017
Schrank 2016
Seear 2013
Seligman 2005
Seligman 2006 - Study 1
Seligman 2006 - Study 2
Seligman 2007
Senf 2013
Sergeant 2011
Sewart 2019
Shaghaghi 2019
Shapira 2010
Shapiro 2005
Shapiro 2011
Sheldon 2002
Sheldon 2006
Shin 2020
Shirani 2019
Shoshani 2016
Shoshani 2017
Simkiss 2013
Smeets 2014
Smith 2016
Smith 2019
Sodani 2019
Sommers-Spijkerman 2018

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Supplementary figure 4. Risk of Bias was based on the standard Cochrane methodology. Green colors indicate low risk of bias, yellow colors indicate unclear risk of bias, red colors indicate high risk of bias. All references are mentioned in the references below.

Part 2. Protocol to "Psychological interventions to build positive mental health; a systematic review and meta-analysis"

Contents

Introduction

The current document describes the protocol used for the systematic review "Psychological interventions to build positive mental health; a systematic review and meta-analysis". The systematic review has been registered on PROSPERO (CRD42018109059). Please note: this protocol is not extensively referenced, and the background and rationale are kept at a minimum in order to improve readability and place emphasis on the methodology used for the review.

Focus of existing review

The existing review aims to determine which psychological interventions are efficacious in improving positive mental health, irrespective of their theoretical foundation; and irrespective of their target population. In other words, this review sets out to create a clear synthesis of the scientific evidence on randomized controlled trials that look at the effect of psychological interventions on positive mental health, looking at both adult and youth studies, and studies in healthy and sick populations. This review is designed to serve intervention designers, researchers, and clinicians as an all-encompassing meta-analysis of psychological intervention efficacy on range of positive mental health and mental illness outcomes, with consideration of methodological moderators. Specifically, the current study firstly reviews the impact of psychological interventions on positive mental health outcomes [2], including subjective well-being, psychological well-being, positive and negative affect, as well as indicators of psychological distress, including symptoms of depression, anxiety, and stress. It secondly assesses the impact of a range of important methodological moderators such as follow-up length, intervention intensity, control group type and mode of delivery on intervention effect sizes. Thirdly it looks at the overall quality of the evidence provided and aims to discuss the implications of the evidence for future research and mental healthcare delivery.

Review Methodology

Study Selection Criteria

Studies will be evaluated for inclusion in the current meta-analysis on the basis of five criteria.

Criteria 1: The intervention must be a psychological or behavioral intervention

The studies must be testing the impact of a psychological or behavioral intervention, defined as activities or groups of activities aimed to change behaviors, feelings and emotional states. This can be individual intervention activities or components (e.g. practice self-affirmations) or multi-component interventions that combined multiple activities or components (e.g. interventions that combine various techniques based on Acceptance and Commitment therapy or ACT [3] with theoretical origins of either positive [4] or more "traditional" psychological paradigms such as Cognitive Behavioral Therapy (CBT)[5].

The main focus of these interventions needs to lie in changing behaviors, feelings and emotional states. Interventions that include clear physical components (e.g. physical activity, nutrition, or pharmacological intervention) will be excluded as the effect of the psychological component cannot be isolated. Interventions which include small components of psychoeducation on the beneficial role of components other than psychological interventions will however be eligible for inclusion. Yoga and related activities that focus on increasing mindfulness (e.g. Tai Chi) will be excluded, as the diversity between the types of exercises is too great to determine which interventions incorporate heavy versus light physical exercise.

Self-management interventions for physical illness will be excluded, as the focus lies on disease management as opposed to improving mental health and well-being.

Criteria 2: The design needs to be randomized

A study will be included only if it utilizes an experimental randomized design, where participants are randomized into one or more intervention groups (with an active psychological intervention) versus one or more control or comparison groups. Cluster and cross-over randomized designs will be eligible for inclusion. The comparison group cannot be a different active psychological intervention. For instance, a study testing a CBT-based intervention versus an ACT based intervention will be excluded. The comparator needs to be:

- **assessment only**: the control group only receives the measurement-component, which is conducted at similar intervals as the intervention group
- **waitlist**: the control group receives the same measurement component as the intervention group, but will receive access to the intervention after the measurement component is completed
- **treatment-as-usual (TA**U) in the case of physical or mental illness, where the psychological intervention is compared to TAU or the psychological intervention is added to TAU in the intervention group
- **Passive control group:** the control group receives an activity to do that typically last a similar amount of time as the intervention group, but does not try and isolate the active component of the psychological intervention
- **Active control group:** the control group receives an activity to do that typically last a similar amount of time as the intervention group, which has the purpose of isolating the active component of the intervention group, i.e. everything is the same other than the active component.

Criteria 3: The study needs to use a validated scale to assess well-being

Despite the consensus that the absence of illness does not simply equate to good mental health, a clear universal definition of well-being remains to be generally accepted. As such, different theories, descriptions, measurement approaches and interventions have been developed to investigate the 'vague' and broad notion of well-being, which has contributed to problems in synthesizing the current state of evidence for the effectives of interventions on building wellbeing [6]. In order to ensure that the studies measure positive mental health, they need to use validated scales that measure either subjective wellbeing[7], psychological wellbeing[8] or components of both. As affect is an integral component of subjective wellbeing, measures of affect will be included in the calculation of the overall effect on subjective wellbeing.

Studies that only reported single-items measures of these constructs, used modified versions of validated scale or used scales that were not clearly validated were excluded. While this is expected to lead to exclusions of studies that still target positive mental health, particularly in the case of modest modifications to existing scales, the author team decided to take a conservative approach to ensure comparison between studies on positive mental health could be reliably made in light of the large inconsistencies between definitions of well-being that are being used in the lay and academic world.

Supplementary table 7. Accepted measures of well-being and positive mental health for the review

SWB	Satisfaction with Life Scale	SWLS	[9]
SWB	Subjective Happiness Scale	SHS	[10]
SWB	WHO-5 Well-being Index	WHO5	[11]
SWB	WHO-10 Well-being Index	WHO10	[12]
SWB	Authentic Happiness Index (Steen Happiness Index)	AHI	[13]
SWB	Life Satisfaction Index - A, Z, Third Age	LSIA	[14]
SWB	Students Life Satisfaction Scale	SLSS	[15]
SWB	Brief Multidimensional Students Life Satisfaction Scale	BMSLSS	[16]
SWB	Subjective Wellbeing Scale	SWBS	[17]
SWB	Personal Well-being Index - Adult Scale	PWI-A	[18]
SWB	Affectometer 1 and 2	AM1	[19]
SWB	Index of General Affect & Index of Well-being	IGA	[20]
SWB	Life Satisfaction Questionnaire	LiSat9	[21]
SWB	Memorial university of newfoundland scale of happiness	MUNSH	[22]
SWB	Subjective Authentic-Durable Happiness Scale	SA-DHS	[23]
SWB	SPF-Index Level Scale	SPF-IL	[24]
SWB	Types of Positive Affect Scale	TPAS	[25]
SWB	Children's Happiness Scale	CHS	[26]
PWB	Psychological Wellbeing Scale	PWBS	[27]
PWB	Oxford Happiness Inventory	OHI	[28]
PWB	Flourishing Scale	FS	[29]
PWB	Questionario sul Ben-essere Psicologico	QBP	[30]
Affect	Positive and Negative Affect Scale	PANAS	[31]
Affect	Differential Emotions Scale	DES	[32]
Affect	Scale of Positive and Negative Experience	SPANE	[29]
Affect	Bradburn Affect Balance Scale	BABS	[33]
Affect	Multiple Affect-Adjective Check List	MAACL	[34]
Affect	Derogatis Affects Balance Scale	DABS	[35]
Affect	Affectivity Scale	AFFS	[36]
Affect	Brief Mood Introspection Scale	BMIS	[37]
Affect	Chinese Affect Scale	CAS	[38]
Affect	Mehrdimensionaler Befindlichkeitsfragebogen	MB	[39]
Combined	Positive Psychotherapy Inventory	PPI	[40]
Combined	Bradley's Well-being Questionnaire	BWBQ	[41]
Combined	Mental Health Continuum - Short Form	MHC-SF	[42]
Combined	Orientations to Happiness Scale	OTH	[43]
Combined	Brief Inventory of Thriving	BIT	[44]

Combined	Pemberton Happiness Index	PHI	[45]
Combined	Schwartz Outcome Scale	SOS	[46]
Combined	Subjective Well-Being Scale for the Elderly	SWBS-E	[47]
Combined	Well-Being Manifestations Measure Scale	WBMMS	[48]
Combined	Warwick-Edinburgh Mental Wellbeing Scale	WEMWBS	[49]

SWB = scales that mainly measure Subjective Wellbeing, PWB = scales that mainly measure Psychological Wellbeing, Combined = scales that combine subjective and psychological wellbeing constructs

Criteria 4: The article needs to be written in the English language

Articles written in any other language than English will be excluded. While this will lead to exclusion of studies that would normally fit the other criteria, this criterion was implemented for pragmatic reasons. The expected search numbers were deemed too large to investigate non-English articles, and the resources available to the author team did not allow for translation of all expected articles.

Criteria 5: participants with cognitive impairment are excluded

Articles can study clinical and non-clinical populations, and therefore include participants with mental or physical illness. However, cognitively impaired participants are excluded, as the application of generic intervention psychological interventions in this population is not deemed equivalent, i.e. the degree of adaptation is too high.

Outcomes

One of the principal problems in assessing positive mental health is the lack of standards and the ambiguity surrounding the wellbeing literature [50]. A multitude of subjective measures has been developed that aim to capture wellbeing and positive mental health[51]. Validated measures that were specifically designed to measure subjective wellbeing, psychological wellbeing or overall (mental) wellbeing, positive mental health or flourishing are accepted. Sub-scales of Quality of Life scales, e.g. emotional wellbeing subscales, and measures that measure related concepts such as spiritual wellbeing were not accepted. An overview of included measures can be found in table 1. Outcomes of interest were as follows.

Primary outcome

Change in wellbeing: wellbeing will be treated as a singular construct that entails all subjective and psychological interpretations of wellbeing. Studies of psychological and subjective wellbeing measures show high correlations (up to .98) between one another[52], and with other measures of wellbeing [53], justifying utilization of a single overarching wellbeing outcome. Where a study reports multiple constructs of wellbeing or measures wellbeing using different scales (e.g. Life satisfaction and happiness) the main outcome measure (primary versus secondary) of focus will be used. If no main focus is mentioned, the first reported upon outcome measure on wellbeing is used.

Secondary outcomes:

Change in subjective wellbeing: change in subjective wellbeing will be assessed, by comparing studies that utilized measures that specifically measure subjective wellbeing and related constructs such as happiness, life satisfaction and positive affect. Although outcomes

of affect will be included to calculate the overall effect size of interventions on subjective wellbeing, separate meta-analyses contrasting negative affects versus positive affect will also be conducted.

Change in psychological wellbeing: change in psychological wellbeing will be assessed, by comparing studies that utilized measures that specifically measure psychological wellbeing.

The original protocol furthermore focused on looking at the impact of interventions on affect, symptoms of depression, anxiety and stress. In order to narrow the focus of the review, these outcomes were not included in the published review. The authors can be contacted in case readers are interested in the results.

Information sources and Search Strategy

The data sources for this review will be peer-reviewed journal articles, as sourced via PsycINFO and PsycARTICLES, Scopus, Medline, and CINAHL. The search was constructed based on previous meta-analyses and in consultation with two professional research librarians from Flinders University (Adelaide, Australia). The search is designed to return articles with any combination of the following outcomes (wellbeing, positive affect, happy, happiness, life satisfaction, satisfaction with life, flourish, resilience, cognitive flexibility, post traumatic growth, stress related growth, or hardiness) and an intervention description (intervention, treatment, prevention, therapy, psychotherapy, cognitive behavioral therapy, positive psychology intervention, anxiety management, relaxation, stress control, stress inoculation, progressive relaxation, diaphragmatic breathing, social skills training signature strength, character strength, mindfulness, acts of kindness, accomplishment, another door opens, gift of time, gratitude, life review, three good things, three funny things, best possible selves, coaching, savoring, self-compassion, acceptance commitment therapy, compassion, self-affirmation, reminiscence, coping, positive reframing, or humor) and an indication of randomization (random, randomly, randomized). The exact search strategy including mesh terms and results can be found below. Reviews that will arise from the search on related interventions or topics (e.g. mindfulness) will also be searched for relevant studies. The reference list from each included study will be manually inspected for additional studies, and this process will be continued iteratively until no new study is found. The search presented below is current until December 2018.

PsycINFO

1	(wellbeing or well-being or "positive affect" or happy* or happiness or "life satisfaction" or "satisfaction with life" or flourish* or resilienc* or "cognitive flexibility" or "post traumatic growth" or "stress related growth" or hardiness).ti,ab.	142144
2	exp Well Being/ or Life Satisfaction/ or Happiness/ or "Resilience (Psychological)"/	61465
3	1 or 2	147847
4	exp Intervention/ or Treatment/ or Prevention/ or exp psychotherapy/ or exp Cognitive Behavior/ or Therapy/ or exp Behavior Therapy/ or Anxiety Management/ or Relaxation/ or Relaxation Therapy/ or Stress Management/ or Social Skills Training/	388374

5	(Intervention* or treatment* or prevention or preventiv* or therapy or therapies or CBT or "positive psychology intervention" or "anxiety manage*" or relaxation or "stress control" or "stress inoculation" or "progressive relaxation" or "diaphragmatic breathing" or "social skills training" or psychotherap* or "signature strength*" or "character strength*" or mindfulness or "acts of kindness" or accomplishment or "another door opens" or "gift of time" or gratitude or "life review" or "three good things" or "three funny things" or yoga or "best possible sel*" or coaching or savour* or savor* or "self-compassion" or "acceptance commitment therapy" or "expressive writing" or "behavior activation" or "behaviour activation" or compassion or "physical exercise" or nature or "self affirmation" or reminiscence or coping or "positive reframing" or humour).ti,ab.	1260130
6	4 or 5	1327448
7	3 and 6	56311
8	(random or randomly or randomi*).ti,ab.	182531
9	7 and 8	4529
10	limit 9 to English language	4233

PsycARTICLES

1	(wellbeing or well-being or "positive affect" or happy* or happiness or "life satisfaction" or "satisfaction with life" or flourish* or resilienc* or "cognitive flexibility" or "post traumatic growth" or "stress related growth" or hardiness).ti,ab.	598923
2	(Intervention* or treatment* or prevention or preventiv* or therapy or therapies or CBT or "positive psychology intervention" or "anxiety manage*" or relaxation or "stress control" or "stress inoculation" or "progressive relaxation" or "diaphragmatic breathing" or "social skills training" or psychotherap* or "signature strength*" or "character strength*" or mindfulness or "acts of kindness" or accomplishment or "another door opens" or "gift of time" or gratitude or "life review" or "three good things" or "three funny things" or yoga or "best possible sel*" or coaching or savour* or savor* or "self-compassion" or "acceptance commitment therapy" or "expressive writing" or "behavior activation" or "behaviour activation" or compassion or "physical exercise" or nature or "self affirmation" or reminiscence or coping or "positive reframing" or humor).ti,ab.	1767819
3	1 and 2	230935
4	(random or randomly or randomi*).ti,ab.	332604

5	3 and 4	30122
6	limit 5 to sybarites	437

Scopus

TITLE-ABS ((wellbeing OR well-being OR "positive affect" OR happy* OR happiness OR "life satisfaction" OR "satisfaction with life" OR flourish* OR resilienc* OR "cognitive flexibility" OR "post-traumatic growth" OR "stress-related growth" OR hardiness) AND (intervention* OR treatment* OR prevention OR preventiv* OR therapy OR therapies OR cut OR "positive psychology intervention" OR "anxiety manage*" OR relaxation OR "stress control" OR "stress inoculation" OR "progressive relaxation" OR "diaphragmatic breathing" OR "social skills training" OR psychotherap* OR "signature strength*" OR "character strength*" OR mindfulness OR "acts of kindness" OR accomplishment OR "another door opens" OR "gift of time" OR gratitude OR "life review" OR "three good things" OR "three funny things" OR yoga OR "best possible sel*" OR coaching OR savour* OR savor* OR self-compassion OR "acceptance commitment therapy" OR "expressive writing" OR "behavior activation" OR "behaviour activation" OR compassion OR "physical exercise" OR nature OR self-affirmation OR reminiscence OR coping OR "positive reframing" OR humour) AND (random OR randomly OR randomi*)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "ip")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j")) OR LIMIT-TO (SRCTYPE , "p") OR LIMIT-TO (SRCTYPE , "Undefined")) **Final Results**: 7,631

Medline

1	personal satisfaction/ or happiness/ or Resilience, Psychological/	23721
2	(wellbeing or well-being or positive affect or happy* or happiness or life satisfaction or "satisfaction with life" or flourish* or resilienc* or cognitive flexibility or post-traumatic growth or stress-related growth or hardiness).ti,ab.	120932
3	1 or 2	133457
4	exp Psychotherapy/ or mind-body therapies/ or Relaxation/	185152
5	(Intervention* or treatment* or prevention or preventiv* or therapy or therapies or CBT or positive psychology intervention or anxiety manage* or relaxation or stress control or stress inoculation or progressive relaxation or diaphragmatic breathing or social skills training or psychotherap* or signature strength* or character strength* or mindfulness or "acts of kindness" or accomplishment or another door opens or "gift of time" or gratitude or life review or three good things or three funny things or yoga or best possible sel* or coaching or savour* or savor* or self-compassion or acceptance commitment therapy or expressive writing or behavior activation or behaviour activation or compassion or physical exercise or nature or self-affirmation or reminiscence or coping or positive reframing or humour).ti,ab.	6298678
6	4 or 5	6371115
7	3 and 6	54405

8	randomized controlled trial.pt.	472580
9	(randomly or randomi* or RCT).ti,ab.	806069
10	8 or 9	934222
11	7 and 10	8447
12	limit 11 to english language	8225

CINAHL

1	(MH "Hardiness") OR (MH"Happiness") OR (MH "Personal Satisfaction")	(20,302)
2	TI (wellbeing or well-being or "positive affect" or happy* or happiness or "life satisfaction" or "satisfaction with life" or flourish* or resilienc* or "cognitive flexibility" or "post traumatic growth" or "stress related growth" or hardiness)	(21,290)
3	AB (wellbeing or well-being or "positive affect" or happy* or happiness or "life satisfaction" or "satisfaction with life" or flourish* or resilienc* or "cognitive flexibility" or "post traumatic growth" or "stress related growth" or hardiness)	(54,138)
4	S1 OR S2 OR S3	(73,797)
5	(MH "Relaxation") OR (MH "Relaxation Techniques") OR (MH "Psychotherapy+") OR (MH "Cognitive Therapy+") OR (MH "Behavior Therapy+") OR (MH "Stress Management")	(163,667)
6	TI (Intervention* or treatment* or prevention or preventiv* or therapy or therapies or CBT or "positive psychology intervention" or "anxiety manage*" or relaxation or "stress control" or "stress inoculation" or "progressive relaxation" or "diaphragmatic breathing" or "social skills training" or psychotherap* or "signature strength*" or "character strength*" or mindfulness or "acts of kindness" or accomplishment or "another door opens" or "gift of time" or gratitude or "life review" or "three goo ..._	(492,848)
7	AB (Intervention* or treatment* or prevention or preventiv* or therapy or therapies or CBT or "positive psychology intervention" or "anxiety manage*" or relaxation or "stress control" or "stress inoculation" or "progressive relaxation" or "diaphragmatic breathing" or "social skills training" or psychotherap* or "signature strength*" or "character strength*" or mindfulness or "acts of kindness" or accomplishment or "another door opens" or "gift of time" or gratitude or "life review" or "three goo ..._	(1,013,957)

8	S5 OR S6 OR S7	(1,352,149)
9	S4 AND S8	(33,265)
10	TI (random or randomly or randomi*)	(87,845)
11	AB (random or randomly or randomi*)	(241,871)
12	S10 OR S11	(273,789)
13	S9 AND S12	(4,160)

Study Selection

Two Authors will independently screen all systematic search titles and abstracts for studies eligible for inclusion. Disagreement will be resolved by discussion of each study and reaching consensus. Abstract screening will be performed in Endnote V8. Any article that leads to doubt whether it needs to be included will be considered for full-text review. The two authors will then perform a full-text screen and will indicate reasons for exclusion of ineligible studies. Disagreements between review authors will again be resolved through discussion of disagreements. Inter-rater reliability will be calculated for the full text-screen only. Full-text screen will be performed in a custom-made Microsoft Excel worksheet, based on templates used in previous systematic reviews by members of the research team (*refs deleted due to blinding process)*

Data extraction

Data will be extracted into a custom-made systematic review form in Microsoft Excel, based on formats used by the research team in previously completed reviews (*refs deleted due to blinding process)*. Extracted information will include: country, participant group (*general population, physically ill, mentally ill, cognitively impaired*), age (*youth, adult, older adult*), control group type (*Assessment only including waitlist, and Active comparator*), delivery modality (*Group, individual, online),* study setting (*community, university, health service, or organizati*on intervention type, intensity (*session length, number of sessions, and session interval*), outcome data (*psychological well-being, subjective well-being, positive affect, negative affect, depression, anxiety, stress*), follow-up data (*post, 3-month, 6-month, 12-month, 2 year*). Interventions will be categorized based on the descriptions provided by the authors of each study.

Data Synthesis

Intervention efficacy will be assessed by meta-analyzing outcomes for continuous outcome variables where possible. All outcome data will be standardized to Hedges G [54] using Comprehensive Meta-Analysis (CMA) software [55]. Where available, mean difference scores will be used to calculate Hedges G. Effect size estimates on the between group different scores such as Cohen's d or test statistics such as F and T will be used when sufficient raw mean

difference information is presented in the published article. Post scores will be used when a lack of baseline scores is present.

Hedges G's will be reported in combination with their 99% Confidence Intervals (CI) and associated p-values. Hedges *G* of 0.2 indicated a small effect, 0.5 indicated a moderate effect and 0.8 indicate a large effect[56]. A p-value of 0.01 will need to be met in order to be counted as statistically significant.

An overall effect on wellbeing will be calculated for the meta-analysis, as research points to the existence of an overarching well-being factor [57]. In order to compare results to previous reviews [58-60] and the provide intervention designers with insight into the performance of individual psychological interventions on hedonic versus eudaimonic aspects of wellbeing, separate scores for subjective and psychological wellbeing will be calculated.

Intervention types will not be collapsed into an overarching effect size for 'psychological interventions'. Instead effect sizes will be determined for each individual intervention type, presented per population group. This is firstly done to justify the considerable differences between intervention implementation for general versus ill populations, and secondly was decided upon as a result of the differences between the psychological interventions. Furthermore, as it is unlikely that the studies are functionally equivalent (e.g. due to differences in researchers, countries of origin, exact formats used) the overall effect size will be calculated using random effect models [61].

Where multiple intervention or control groups exist within a single study (which would fall within one category of study types) a combined weighted mean effect size will be calculated. This is preferred over multiple-treatment meta-analysis as a result of the expected lack of standardization between psychological interventions targeting positive mental health [62,63].

Quality of effect size estimate and included studies

The quality of evidence provided in each meta-analysis will be assessed using the five GRADE considerations (study limitations, consistency of effect, imprecision, indirectness and publication bias)[1]. The Cochrane Risk of Bias assessment [64] will be used to determine the risk of bias for studies (RoB). A minimum of two reviewers will assign risk of bias. Disagreement will be resolved by consensus. RoB domains will be assessed as high, low, or unclear in the following domains: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective outcome reporting, and other.

Heterogeneity of results

The I^2 statistic as well as Cochrane's Q will be calculated to determine heterogeneity of results. An I^2 of 50% indicates moderate heterogeneity and an I^2 of 75% indicates high heterogeneity. Sensitivity analysis will be conducted in case of significant heterogeneity, based on the I^2 values as well as visual inspection of the forest plots.

Methodological moderators or subgroup analyses

A central aim of the review was to examine the influence of various mediators on the effect size of interventions. In other words, a number of subgroup analyses are planned 65. Specifically, the effect of intervention type, delivery format, intervention intensity, comparison group type and length of follow up measurements on effect size estimates will be estimated per population type.

Intervention type: Which different psychological intervention has a significant impact on improving outcomes of wellbeing? Intervention types will be

Follow-up time: how long do intervention effects last? The following time period are used:

- Post intervention (up until 1-month follow-up)
- Between 1- and 3-Month follow-up
- Between 3- and 6-Month follow-up
- Between 6- and 12-month follow-up
- Between 1 year and 2-year follow-up
- Longer than 2 year

Baseline scores will be compared to scores reported at the above-mentioned intervals to determine change scores. Where multiple assessments are taken with one of the time periods mentioned above, the latest reported upon time period is used for analysis.

Mode of delivery: Which mode of delivery leads to the best results? The following modes of delivery are expected to be found:

- Online (app or website)
- Direct message (Email or text-message)
- Telephone
- Individual (face-to-face in person instruction)
- Group
- Hybrid

Interval Intensity: is there a difference in effect between interventions that are delivered on different intervals?

- once-off, single session
- more than one session, but less than on a daily basis for a week (7-days)
- On a daily basis for a week (7-days)
- on a weekly basis for more than 1 week (7 days)
- a monthly basis for more than 1 month
- Any other schedule

Session length: Does the length of the session matter?

- Less than an hour
- between 1 and 2 hours
- Between 2 and 4 hours
- More than 4 hours

Participant type:

- healthy (non-clinical),
- physically ill,
- mentally ill.

Please note where comorbid populations are investigated, the main presenting symptom or focus area of the participant population is used to indicate population type.

Change of focus original protocol

The originally planned review intended to look at the influence of psychological interventions on both positive mental health (experiencing high levels of subjective well-being and being able to function fully' [2]) and resilience, with the aim of determining which interventions can improve positive states of mental health in the now and which can be used to bolster capacity to retain positive states of mental health in the future. After starting the screening process, the focus of the review got tightened around positive mental health. A number of reasons underpinned this decision, most notably the desire to create a focused review that could be assessed soundly, the magnitude of the search and the resources available to the team, and the publication of various reviews looking at resilience close to or during the time of conduct of the current review, including the publication of a Cochrane review on psychological interventions to enhance resilience [66-68].

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Part 3: PRISMA Checklist

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	2
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	n.a.
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3-7
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	7
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	21
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	21-22
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	22-23
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Suppl.
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	21-22
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	22 & suppl
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	21
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	24
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	22

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	22-25

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	23-25
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	23-25
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	8. fig 2
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7-8, table 1 & 2, suppl
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	suppl
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	8-11, fig 3, table 3
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	fig 3, table 3
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	9-12, table 3
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	12-13
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	14-21
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	17-19
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	14-21
FUNDING			

| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | 26 |

For more information, visit: **www.prisma-statement.org**.

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8.7. Study 7. Using the Intervention Mapping Approach to Develop a Mental Health Intervention: A Case Study on Improving the Reporting Standards for Developing Psychological Interventions

Using the Intervention Mapping Approach to Develop a Mental Health Intervention: A Case Study on Improving the Reporting Standards for Developing Psychological Interventions

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Replicating or distilling information from psychological interventions reported in the scientific literature is hindered by inadequate reporting, despite the existence of various methodologies to guide study reporting and intervention development. This article provides an in-depth explanation of the scientific development process for a mental health intervention, and by doing so illustrates how intervention development methodologies can be used to improve development reporting standards of interventions. Intervention development was guided by the Intervention Mapping approach and the Theoretical Domains Framework. It relied on an extensive literature review, input from a multi-disciplinary group of stakeholders and the learnings from projects on similar psychological interventions. The developed programme, called the "Be Well Plan", focuses on self-exploration to determine key motivators, resources and challenges to improve mental health outcomes. The programme contains an online assessment to build awareness about one's mental health status. In combination with the exploration of different evidence-based mental health activities from various therapeutic backgrounds, the programme teaches individuals to create a personalised mental health and wellbeing plan. The use of best-practice intervention development frameworks and evidence-based behavioural change techniques aims to ensure optimal intervention impact, while reporting on the development process provides researchers and other stakeholders with an ability to scientifically interrogate and replicate similar psychological interventions.

Keywords: wellbeing, intervention research, intervention development, mental health promotion and prevention, mental health – state of emotional and social well-being

INTRODUCTION

Psychological interventions, being activities or groups of activities aimed to change behaviours, feelings and emotional states (Hodges et al., 2011), come in many shapes and sizes. A popular delivery method is in the form of programmes consisting of several interacting components and procedures, which per definition makes them "complex interventions" (Moore et al., 2015). This complexity is often lost in academic publications, as articles for instance are bound to word limits or have a primary focus on presenting outcome data as opposed to theoretical rationale and methodological insights (O'Cathain et al., 2019). Despite various welcome initiatives such the Template for Intervention Description and Replication (TIDieR) the intervention literature typically lacks in-depth descriptions of psychological interventions and the way they were created (Pino et al., 2012; Candy et al., 2018).

These reporting challenges are problematic for the scientific method as they make it difficult to replicate interventions, interpret which underlying intervention components are effective and draw robust conclusions about how these interventions have been developed (Chalmers and Glasziou, 2009; Hoffmann et al., 2017). More importantly, these challenges are avoidable as robust intervention development methodologies already exist that can be used to scientifically describe the components of complex behavioural and psychological interventions (Michie et al., 2011b; Eldredge et al., 2016; Garba and Gadanya, 2017). Scientific articles that purely describe the development of interventions using such methodologies can mainly be found in research on health behaviours, including smoking (van Agteren et al., 2018b), nutrition (Rios et al., 2019), physical activity (Boekhout et al., 2017), AIDS (Wolfers et al., 2007), and oral hygiene (Scheerman et al., 2018) to name a few. Despite their potential merit, the application of similar methodologies has yet to receive traction in psychological science.

Rigour in reporting standards is particularly important for new and emerging scientific areas in gaining scientific credibility and facilitating replication. The last decades have seen the introduction of a range of new psychological interventions, as well as the re-purposing of existing interventions, specifically aimed at promoting mental wellbeing, as opposed to addressing mental disorder *per se* (Slade, 2010). Improving outcomes of mental wellbeing is a protective factor against the onset of mental illness (Keyes et al., 2010; Iasiello et al., 2019), aids in disease recovery and chronic disease self-management and is associated with improved health service utilisation (Lamers et al., 2012; Slade et al., 2017). Above all, feeling mentally well is an important outcome in its own right, for individuals, families, communities, and society (Diener and Seligman, 2018; Diener et al., 2018). As a result, psychological interventions are increasingly in demand by health organisations, educational providers, workforces, and governments looking at wellbeing initiatives. Considering this interest, the individual and societal benefits of improving wellbeing, and fair criticism that have been drawn toward the lack of rigour in wellbeing research (Heintzelman and Kushlev, 2020), it is important to adequately describe the development of any interventions aimed at improving outcomes of mental

wellbeing (Diener, 2003; Gable and Haidt, 2005; Kristjánsson, 2012).

The aim of the current article is to be a case study that firstly describes the application of a rigorous intervention development framework, the Intervention Mapping (IM) approach (Eldredge et al., 2016), to guide development of a theory- and evidence-based mental health intervention, designed to be used with both clinical and non-clinical populations. Secondly, as a result, it aims to act as a case study on the complexity that underpins scientific mental health interventions, and the detail that needs to be considered when aiming to replicate or modify them.

MATERIALS AND METHODS

The IM approach guides intervention development in a series of six steps. This article follows the standard structure of the IM methodology. The methods below explain each of the four steps and how they were used for the development of the intervention in this article: the Be Well Plan. For a description of the methodology see Kok et al. (2016). **Figure 1** visualises the methodology steps and its outputs at each stage, which are presented in the results below. The large bulk of programme development across the four steps was conducted by a small project team (JA, MI, KA, DF, and GF) who interacted with a larger multi-disciplinary project working group that among others included psychologists, counsellors, mental health researchers, and end-users, throughout the development life cycle. This group was crucial in informing and validating each of the IM steps, such as the exact objectives of the programme. The role for each of the members is described in more detail in **Supplementary Appendix 1**.

Step 1: Determine the Problem That Needs to Be Solved by the Intervention *via* a Thorough Needs Analysis

The first step of IM involved performing a needs analysis related to the problem that the programme aims to solve. The needs analysis focuses on determining the problem that needs to be changed and subsequently defining the exact scope of the intervention. The needs analysis firstly draws on an extensive study of the scientific literature on mental health and wellbeing interventions. Secondly, it is underpinned by findings and data (published and unpublished) from previous wellbeing studies our research group conducted across population groups including in the general community, within workforces such as health professionals, with older adults, carers, and disadvantaged youths (Raymond et al., 2018, 2019; van Agteren et al., 2018a; Bartholomaeus et al., 2019). All data that was being used to underpin the needs analysis was subject to ethics approvals issued by the Flinders University Social and Behavioural Research Ethics Committee (SBREC), project numbers (PN) 7834, 7891, 7350, 7358, 7221, 7218, and 8579.

The IM framework uses the PRECEDE-PROCEED model (Gielen et al., 2008) to summarise and structure the results of the needs analysis into an actionable logic model. In highly simplified terms, the model gets you to (1) determine

FIGURE 1 | Visualisation of the Intervention Mapping process and the outputs at each of the steps covered in the intervention development methodology.
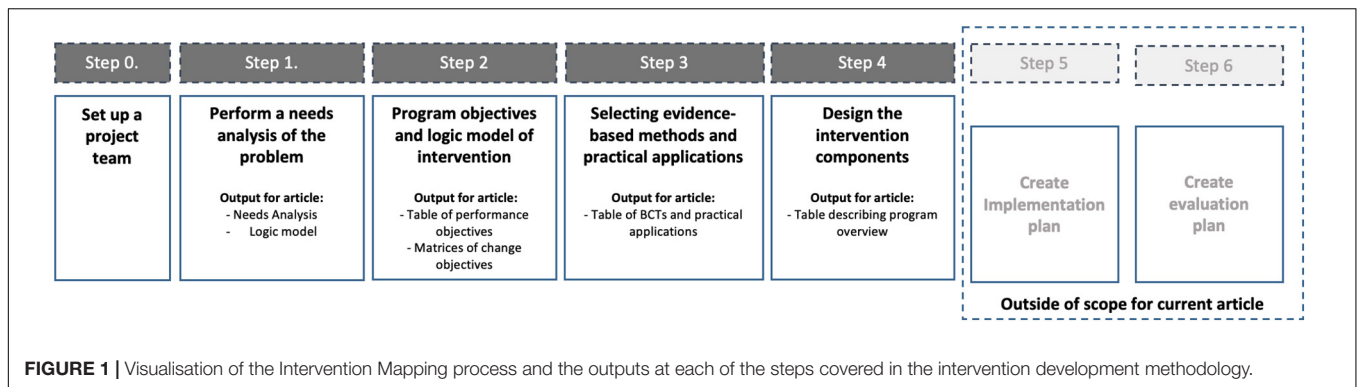
the key problem that the needs analysis indicates one needs to solve, (2) the overarching behavioural and environmental outcomes (or targets) one needs to meet to improve the problem, and (3) defining the underlying determinants of those behavioural and environmental outcomes. An example could be, "people with problematic mental health (the problem), may not consistently use psychological activities in their day-to-day lives (the outcome/target) as they do not have enough knowledge (the determinant) of the benefits of using such activities."

Rather than arbitrarily coming up with determinants that we wished to change, we relied on the Theoretical Domains Framework (Cane et al., 2012) to guide our choice. The TDF is a framework that synthesises 14 unique determinants (e.g., knowledge, skills, and beliefs) stemming from 33 behaviour change and implementation theories. It provides a comprehensive and intuitive theory-based overview of relevant behaviour change determinants that intervention developers can use. IM requires developers to prioritise and choose only the relevant TDF determinants by assigning which determinants (1) are actually related to the problem and (2) can actually be changed. An explanation for the choice of each determinant is provided in **Supplementary Appendix 1**.

The result of step 1 is a logic model of change that summarises the problem, the outcomes and the determinants, which will be used to underpin the intervention.

Step 2: Define the Objectives the Intervention Needs to Meet and What the Intervention Needs to Change to Meet Those Objectives

After determining the problem that needs to be addressed, IM continuous to delineate what needs to change to solve the problem. Firstly, each target area (e.g., the lack of participation in psychological activities) identified in the needs analysis were rewritten into desired behavioural and environmental outcomes (e.g., engaging in regular use of psychological activities). Secondly, these outcomes were subsequently broken into sub-objectives called performance objectives (e.g., demonstrates knowledge on how to improve mental health). Finally, these performance objectives were broken down further into so-called change objectives. These are very specific objectives that need to be achieved in order for the performance objective to be

realised (e.g., *increasing* knowledge of malleability of mental health). A change objective consisted of linking performance objective with determinants from the Theoretical Domains Framework (e.g., knowledge, skill, and beliefs about capabilities). The final output of step 2 was a collection of matrices, so-called matrices of change, depicting each change objective per performance objective (placed in the rows) and determinant (placed in the columns).

Step 3: Select Behaviour Change Techniques and Practical Applications of Those Techniques That Will Be Used to Achieve the Change Objectives

In step 3, a new table is created by placing the change objectives on individual rows and matching them with evidence-based "behaviour change techniques" (BCTs) (Kok et al., 2016). BCTs are theoretical strategies (e.g., goal setting, modelling, and active learning) that have been empirically proven to be able to change individual behaviour. The IM framework comes with an extensive summary of BCTs and how they can be used to create impactful interventions. It gets programme developers to match their change objectives with individual BCTs, thereby aiming to improve the chance that actual behaviour and environmental change in line with the change objective will be achieved.

The final part of step 3 is translating the theoretical BCTs into so-called "practical applications," referring to the proposed real-world application of each BCT. For example, to achieve the change objective "Demonstrating knowledge on malleability of mental health," the programme draws on the BCT "active learning" which can be achieved *via* the "practical application" of showing an engaging video on epigenetic changes that can alter our mental health (Schiele et al., 2020). The result is a line-by-line itemised list (or blueprint) of practical applications that need to be incorporated into the programme design in step 4.

Step 4: Design and Develop the Actual Intervention Components Based of the Practical Applications Identified in the Previous Step

In step 4, the programme designers created the actual intervention based on the blueprint established in step 3.

This process was guided *via* various project team meetings. A subgroup of project team members (JA, MI, KA, DF, LW, and GF) created a programme delivery framework, outlining the proposed intervention sessions, their underpinning rationale and the delivery format. This framework was evaluated and approved by the larger multi-disciplinary project team that included end-users over a series of meetings. The subgroup continued by creating a detailed narrative for the programme, which was subsequently translated into an interactive programme. The narrative and programme content is presented in the results below.

After developing the first iteration of the programme, two small-scale in-person test runs with university students ($n = 30$) and colleagues of the project team members ($n = 7$) were conducted by JA, MI, KA, GF, and AH. Feedback from these test runs was used to iterate the programme delivery, not to determine impact on outcomes (i.e., they were test runs not evaluation studies). After iteration, each of the five session sessions were recorded on video and the programme was subsequently tested in an online delivery format, i.e., delivered *via* video conferencing software, resulting in the programme presented in this manuscript.

Steps 5 and 6: Adoption, Implementation, and Evaluation Plans

After finishing the design and development of the intervention, IM concludes with two additional steps, the development of an adoption and implementation plan (step 5) as well as an evaluation plan (step 6). These two steps are outside the scope of this article, as the aim here is to describe the development and design process. The actual evaluation of the programme on outcomes will be covered in subsequent publications, including a pre-post pilot study in university students and general community members ($n = 89$; van Agteren et al., 2021a) and a randomised controlled study in university students. A brief description of the evaluation approach is provided in the discussion of this manuscript.

RESULTS

Step 1: The Needs Analysis of the Be Well Plan Programme

The results from the needs analysis are presented in a narrative format, combining the findings from the literature review and interrogation of qualitative and quantitative data from previous projects on wellbeing interventions our project team conducted. The needs analysis for this specific programme is structured around four distinct themes, which are outlined below. Supporting material underpinning the needs analysis can be found in **Supplementary Appendix 1**.

Theme 1: There Is a Need for Mental Health Interventions to Incorporate a Specific Focus on Positive and Adaptive States, in Addition to Taking Psychological Distress Into Account

Psychological interventions for mental health are often thought of to be synonymous to interventions aimed at treating or preventing mental illness or psychological distress. This is reflected in research on psychological interventions such as Cognitive Behavioural Therapy (CBT), Acceptance and Commitment Therapy (ACT) and mindfulness, with studies largely focussing on their effectiveness in improving outcomes of illness and psychological distress (Hofmann et al., 2010, 2012; Swain et al., 2013). There is however general agreement that optimal mental health does not equate to a mere absence of symptoms of mental illness as it also requires participants to demonstrate high levels of mental wellbeing, e.g., finding meaning in life, working on positive relationships, and building positive emotions (Jahoda, 1958; Smith, 1959; Fontana et al., 1980; Wilkinson and Walford, 1998; Greenspoon and Saklofske, 2001; Keyes, 2003, 2005; Suldo and Shaffer, 2008). A significant body of research has found that mental wellbeing should not be seen as the mere opposite of mental illness (Iasiello et al., 2020). Studies in Western and non-Western populations demonstrate that people who exhibit psychological distress or show symptoms of mental illness have varying levels of mental wellbeing (Peter et al., 2011; Seow et al., 2016; Bariola et al., 2017; Teismann et al., 2017; Xiong et al., 2017).

There are numerous ways of building outcomes of mental wellbeing, including spending time in nature (Howell et al., 2011; Korpela et al., 2016; Passmore and Holder, 2017), being physically active (Penedo and Dahn, 2005; Windle, 2014), doing yoga (Ivtzan and Papantoniou, 2014; Sharma et al., 2017), and spending more time engaging in social relationships (Keyes, 1998; Gallagher and Vella-Brodrick, 2008) among others. Psychological interventions such as CBT, ACT and mindfulness in addition to be effective for outcomes of mental illness (Hofmann et al., 2012; Öst, 2014; Goldberg et al., 2018) have joined this list in being able to improve outcomes of mental wellbeing, in addition to being effective for distress. A recent systematic review conducted by authors of the current article examined 419 studies ($n = 53,288$ included in meta-analysis) which clearly demonstrated their impact in both healthy populations and populations with mental illness or physical illness (van Agteren et al., 2021b). The significant findings were dependent on the specific target population (e.g., clinical versus non-clinical populations) and other moderators, most notably intervention intensity.

Psychological interventions are not simply beneficial for improving mental health outcomes in the moment. For instance, by improving outcomes of wellbeing, they can both increase the likelihood of recovery from mental illness or can prevent the onset of illness in the future (Keyes et al., 2010; Wood and Joseph, 2010; Grant et al., 2013; Lamers et al., 2015; Iasiello et al., 2019). By focussing on improving wellbeing it makes them a viable avenue for individuals seeking to reduce symptoms of distress (Gilbert, 2012; Schotanus-Dijkstra et al., 2019) and to build resilience to future adversity (Fritz et al., 2018). In other words, by teaching psychological skills that take future distress *and* wellbeing into account, participants can be taught techniques that aim to help them withstand adversity or stress (i.e., cope with) without succumbing to more serious mental health problems (Davydov et al., 2010; Harms et al., 2018). A deliberate focus on developing this resilience, or in other words improving adaptive states, could strengthen the impact of mental health

interventions, for those with and without current distress (Roy et al., 2007; Fritz et al., 2018).

Theme 2: There Is a Need for Mental Health Interventions to Target Malleable Non-psychological Determinants of Mental Health in Psychological Interventions

Our mental health is not simply determined by our thinking patterns, but rather is influenced by a myriad of bio-psycho-social influences. While not all these influences are within the control of behavioural or psychological interventions, or feasible in light of the focus for our intervention, the team determined that two aspects were. Firstly, stimulating positive change related to our physical health will be beneficial to our mental health, as both are intrinsically linked, which is demonstrated by a considerable body of scientific evidence on the importance of health promotive factors such as physical activity, nutrition and sleep, all of which can be positively addressed using behavioural interventions (Valois et al., 2004; Penedo and Dahn, 2005; Chu and Richdale, 2009; Deslandes et al., 2009; Oddy et al., 2009; Rethorst et al., 2009; Nanri et al., 2010; Gradisar et al., 2011; Rienks et al., 2013; Bernert et al., 2014; Dalton and Logomarsino, 2014; Jacka et al., 2015). Inclusion of, at minimum, rudimentary techniques that could be used to stimulate positive health behaviours was deemed necessary for our intervention. Secondly, the training needed to incorporate elements of our social environment into the intervention. Stimulating small positive change in our social environment can lead to improved mental health (Kawachi and Berkman, 2001; Santini et al., 2015; Verduyn et al., 2017). Similarly, feeling isolated and lonely exerts strong negative influence on wellbeing and mental health (Arslan, 2018; Wang et al., 2018).

Theme 3: Personalising the Mental Health Intervention to Match Individual Participant Needs Will Drive Impact and Is Feasible in Scalable Intervention Formats

In-person psychological mental health interventions outside the clinical setting tend to come in predictable formats. They often are delivered in groups (as this cost-effective), are delivered over multiple sessions, with content tending to come from (a combination of compatible) therapeutic paradigms. The content typically tends to be similar for all participants, despite the fact that personalising or tailoring interventions to individual needs might improve outcomes of interventions or improve the feasibility of its implementation (Norcross and Wampold, 2011). To improve tailoring, intervention developers often adjust the content of interventions to fit specific target *populations* such as students, older adults, or workforces (Waters, 2011; Shiralkar et al., 2013; Proyer et al., 2014; Robertson et al., 2015). While tailoring to group-needs is a right step in the direction, it is still removed from addressing the needs and preferences of *individuals* within each population group (Schork, 2015).

One potential way to achieve tailoring to individual needs is to allow participants to work on specific resources and barriers that are relevant to their unique lives. Rather than utilising an approach based on a singular therapeutic model

(e.g., CBT versus ACT) the intervention could focus on modelling the approach by recent innovations such as process-based interventions; the intervention could incorporate a range of effective intervention techniques that target known "theoretically derived and empirically supported processes that are responsible for positive treatment change" rather than focussing on a specific illness, medical diagnosis or set therapeutic paradigm (Hayes and Hofmann, 2018; Hofmann and Hayes, 2019). These techniques can come from varying evidence-based interventions, for instance those identified in our systematic review on psychological interventions to improve mental wellbeing (van Agteren et al., 2021b).

By facilitating tailoring to individual circumstances engagement with the intervention can be stimulated, as participants in mental health training offerings may resonate differently to different components of an intervention. This is reflected in responses to training feedback in previous projects the team conducted, see **Supplementary Appendix 1**. The training delivered in these projects consisted of skills stemming from CBT, mindfulness techniques and positive psychology. At the end of the training participants voices different preferences for different skills, with an eclectic response pattern noted. Allowing participants to experiment with different evidence-based techniques in an effective manner has furthermore become much more within reach with the rise of technology (Clough and Casey, 2015; Dinesen et al., 2016; Naslund et al., 2016; Naslund, 2017; Berrouiguet et al., 2018). For instance, technology can help guide activity recommendations based on an individual's response to scientific questionnaires for mental health and wellbeing. This can allow a participant to experiment with different techniques, without the requirement for a trainer or therapist to guide choice of activities, ultimately facilitating them to independently form a personalised strategy for good mental health and wellbeing.

Theme 4: In Order to Facilitate Lasting Change, There Is a Need for Mental Health Interventions to Leverage a Focus on Behaviour Change

In order for mental health interventions to "stick," individual participants need to change their behaviour, aligned to the goals of the intervention (Kok et al., 2016). Simply providing activities to build resources and remove challenges to good mental health may not be sufficient, for example, due to a discrepancy between intention to change behaviour and actual behaviour change (Atkins et al., 2017). Reliance on the IM approach stimulated an explicit focus on behaviour change, ultimately asking intervention developers to select key underpinning determinants that are related to the problem behaviour.

Interventions can broach this in numerous ways, depending on the determinants they consider to be the focus for the intervention. As part of the needs analysis, the project team focused on several determinants that were (1) deemed important for mental health and (2) were considered to be malleable and within reach of the current intervention. For instance, teaching *skills* to deal with stressors, adversity or negative social influence aids in improving the chance of engaging in wellbeing activities (Fritz et al., 2018). *Knowledge* has been found to be

one of the essential ingredients for psychological skills to be developed (Jorm, 2012; Oades, 2017), and *self-efficacy* helps in the execution of skills (Leamy et al., 2011; Trompetter et al., 2017). Often there is resistance or stigma toward mental health and wellbeing activities (Clement et al., 2015; Thornicroft et al., 2016), indicating the need to focus on changing *beliefs about the effectiveness* of wellbeing behaviours and *beliefs about the consequences* of implementing those behaviours (Sheeran et al., 2016). Finally, *goal-setting* aids in strategy formation and achievement of physical health improvements as well as behavioural regulation *via* self-monitoring (Wollburg and Braukhaus, 2010; Michie et al., 2011a). A further justification for why the project team chose these determinants over others can be found in **Supplementary Appendix 1**.

Use the Needs Analysis to Craft a Visual Logic Model for the Intervention

The project team subsequently set out to construct a logic model for the intervention based on the findings from the needs analysis, see **Figure 2**. The team followed the general structure for logic models as set out in IM and the PRECEDE-PROCEED model (Green and Kreuter, 1999). The key focus for the intervention was to help participants promote their mental health, pointing to the need for an intervention that would be able to target positive, adaptive, and distress states. The needs analysis pointed to the desire for an intervention that allowed participants to develop a personalised mental health and wellbeing strategy or "plan," allowing participants to take their unique characteristics and health status into account. The key objective was to get participants to change their behaviour by actively engaging in evidence-based activities. These activities firstly should allow individuals to build or leverage resources that can promote mental health in the now and secondly build resources that can help the individual cope with stressors in the future. It should thirdly aim to engage the social environment as a mechanism to support the individual. To achieve the objective, and ultimately behaviour change, the intervention would target specific behaviour change determinants that were derived from the Theoretical Domains Framework Domains (Atkins et al., 2017), including knowledge, skills, beliefs about capabilities and consequences, goals, social influences, and behavioural regulation.

Step 2: Definition of Programme Objectives

Step 2 required the project team to create programme outcomes based on the needs analysis and the logic model. The outcomes were: participant engages in regular activities that are known to increase wellbeing and mental health, participant implements a personal resilience plan to prepare for stressful periods and adversity, participant engages relationship supports in executing their mental health and wellbeing strategy. These outcomes were further specified into performance objectives, see **Table 1**. Change objectives were formulated for each of the performance objectives in line with the chosen TDF determinants mentioned earlier. All matrices of change can be found in **Supplementary Appendix 1**.

Step 3: Evidence-Based Behaviour Change Techniques and Practical Applications

The change objectives developed for each of the performance objectives in step 2 were placed in a new table. In step 3 these change objectives were matched to evidence-based BCT's (10) in **Table 2**. The table mentions each specific BCT as well as the psychological theories they come from. For each BCT, the programme team then constructed practical applications that were to be implemented in the programme. The result is a line-by-line theoretical blueprint for the programme.

Step 4: Design of the Programme
Programme Content

The Be Well Plan programme aims to teach participants to start developing their own tailored wellbeing plan. The standard programme is delivered over 5 weeks, allowing participants to develop, implement, and experiment with activities in their plan to suit their specific situation. Delivering sessions over several weeks was hypothesised to lead to larger effects than a short but intensive programme, as research shows that wellbeing programmes are more efficacious when delivered over a longer period of time (Bolier et al., 2013). While this contradicts with for instance brief intensive exposure literature (Öst and Ollendick, 2017) which focuses more on distinct situations rather than the development of more complex behavioural repertoires, it is in line with evidence from related areas such as memory formation and skill acquisition, which usually take time and practice to consolidate (Eichenbaum, 2011). Each session builds on the other, and gradually introduces more complexity. An overview of the each of the five sessions is provided in **Table 3**. Examples of the programme content described in the table can be found in **Supplementary Appendix 1**.

Each session relies on four key components. Firstly, in each session participants reflect on their personal situation and motivations that are related to their mental health. The participant is asked to perform various self-reflection exercises, for instance reflecting on specific drivers to work on their mental health (session 1), determining which mental health outcomes (e.g., mood, anxiety, and wellbeing) they want to work on (session 2), identifying existing resources and challenges to their wellbeing (session 3), determining which social supporters are present within their life (session 4). In the final session participants reflect on the best version of themselves related to mental health and wellbeing. In other words, the participant is stimulated to create a better understanding of their "self" (Kyrios, 2016) which in turn is used to help determine which psychological activities may be most relevant for them implement within their day-to-day life.

Second, each session introduces participants to *at least* one psychological concept that is considered to be beneficial or "helpful" to building mental health. These include Mindfulness in session 1 (Shapiro et al., 2006), Self-Compassion in session 2 (Neff et al., 2007), Values and Strengths in session 3 (Dahlsgaard et al., 2005), Psychological Flexibility in session 4 (Kashdan and Rottenberg, 2010), and Realistic Optimism in session 5 (Schneider, 2001). The use of these techniques are contrasted

FIGURE 2 | Simplified overview of the needs analysis for the Be Well Plan. The specific explanatory role of variables (e.g., mediating or moderating) is not taken into account in this figure. The model merely serves to outline the variability of behaviours and determinants that influence wellbeing and resilience using the PRECEDE-PROCEED model outline. Determinants are based on the Theoretical Domains Framework (TDF).

with less helpful psychological processes, biases or patterns (e.g., self-compassion versus excessive self-criticism). The aim was to get participants to experience helpful and practical activities related to the psychological concepts, the aim was not to provide a deep dive into each concept. Activities from these specific approaches were chosen as they underpin leading therapeutic models (e.g., CBT, ACT, etc.), are supported by a robust evidence-base, and highlight the malleability of mental health. By teaching these techniques the programme intends to improve participant's confidence in positively changing their mental health. While the Be Well Plan holds activities from various therapeutic streams other than the ones mentioned above, and aims to stimulate participants to experiment with different activities, highlighting a minimum set of concepts aimed to ensure that participants who were not motivated to experiment would still experience a variety of different activities.

Thirdly participants use the learning from the self-reflection exercises to find different evidence-based psychological activities to implement in their everyday life. The evidence-based activities are collated in an "activity bank," which were identified by investigating the literature on wellbeing interventions with a systematic review and meta-analysis (van Agteren et al., 2021b). The systematic review identified which intervention types (e.g., CBT, ACT, and positive psychology) were impactful at changing mental wellbeing. The author team then interrogated articles contributing to impactful intervention types and incorporated activities that were included in multiple studies (e.g., though defusion for ACT). Activities were added regardless of the therapeutic or theoretical background, see **Supplementary Appendix 1** for a list of the activities. This resulted in a programme that was "theory-agnostic": activities were chosen based on their demonstrated effectiveness to improve mental wellbeing, rather than their therapeutic background.

Activities can be practiced in two ways, common and personalised. Common activities are matched to specific self-reflection exercises and practised by *each* participant over the

course of the five sessions. For instance, after exploring the topic of self-criticism, every participants completes a self-compassion exercise which asks them to "treat yourself as you would treat your friends" (Neff et al., 2007). Personalised activities are activities that are suggested based on individual answers to the self-reflection exercises. These are therefore specific to the participant, meaning that each participant will use a different set of activities in the programme. Over the programme, the participant tries a different way to personalise the activities using so-called activity finders, which are visual aids that link activities to specific topics. In session 1 participants get taught that activities come in different formats, asking participants to try out different formats of mindfulness, e.g., mindful walking, body scan, or deep breathing (Keng et al., 2011). In session 2 participants match activities to a mental health outcome they want to work on, in session 3 they select resources to work on (e.g., self-esteem) and in session 4 they select activities based on a coping style they wish to use. The role of the facilitator throughout the sessions is to model how to use the activity finders, allowing participants to master different ways to tailor activities to their needs.

The fourth principle taught in each session is the basics behind planning and habit formation. At the end of each session, participants are required to choose at least one new activity to practice during the week. Once an activity is selected, participants are guided to refine and personalise the implementation of that activity by developing explicit statements on when and where activities are practiced. The participant first sets a clear goal related to the activity they will practice during the week, which aims to help motivate participants to execute a behaviour. The participant is then asked to form a habit statement, which is derived from the work of Fogg (2019) on **"Tiny Habits"** and the concept of implementation intentions (Gollwitzer and Sheeran, 2006). The development of a personalised plan and a focus on implementation means this process is couched in a language of experimentation, where participants try out multiple

TABLE 1 | Behavioural and environmental outcomes, and performance objectives (PO) for Complete Mental Health.

Behavioural outcome 1: Engages in regular activities that are known to increase the mental health and wellbeing of the individual

PO 1.1	Develops understanding of mental health, and its relationship to mental illness and mental wellbeing
PO 1.2	Understands that good psychological health can actively be achieved *via* different intervention types, regardless of physical or mental illness
PO 1.3	Understands that personal characteristics influence which interventions should be selected to improve mental health
PO 1.4	Understands that good psychological health requires a life-course approach
PO 1.5	Is aware of personal psychological health profile (wellbeing, resilience, and psychological distress)
PO 1.6	Creates overview of resources and challenges for their psychological health
PO 1.6.1	Determines which resources and challenges are currently present, which can be improved on using the programme and which ones are out of scope
PO 1.6.2	Determines when other programmes or services for mental health and mental wellbeing need to be considered
PO 1.7	Determines personal motivators for wanting to engage in activities that promote psychological health
PO 1.8	Develops a personal psychological health strategy
PO 1.8.1	Identifies barriers and enablers to implementing a personal psychological health strategy
PO 1.9	Maintains use of personal psychological health strategy over time
PO 1.10	Evaluates implementation of psychological health strategy
PO 1.10.1	Judges whether psychological health strategy is being executed successfully
PO 1.10.2	Re-evaluates psychological health strategy, if not effective achieving personal outcomes
PO 1.10.3	Contacts professional care when mental health and wellbeing symptoms impact personal life
PO 1.10.4	Adjusts psychological health strategy and returns to PO 1.8

Behavioural outcome 2: Implements a personal resilience plan to prepare for stressors and adversity

PO 2.1	Understands the concept of resilience and its relationship to psychological health
PO 2.2	Understands the impact of different stressor types or adversities on psychological health (chronic versus acute, foreseen versus unforeseen)
PO 2.3	Understands how effective use of psychological health strategies can lead to post adversity growth and better psychological health
PO 2.4	Understand that their personal characteristics influence which interventions they should be considering to build resilience
PO 2.5	Is aware of personal resilience status
PO 2.6	Identifies potential resources and challenges for their resilience
PO 2.6.1	Determines which resources and challenges are currently present, which can be improved on using the programme and which ones are out of scope
PO 2.7.	Identifies personal motivators for regularly engaging in resilience strategy
PO 2.8	Develops a personal resilience plan
PO 2.9	Practices resilience strategies on a regular basis regardless of presence of adversity
PO 2.10	Uses resilience strategies when facing personal adversity
PO 2.11	Evaluates implementation of resilience plan
PO 2.11.1	Judges whether resilience strategy is being executed successfully
PO 2.11.2	Re-evaluates resilience strategies if they are not effective
PO 2.11.3	Contacts professional care when mental health symptoms impact personal life
PO 2.11.4	Adjusts resilience strategy and returns to PO 2.8
PO 2.12	Identifies personal strength and growth in dealing with adversity

Environmental outcome 1: Identified relationship support helps individual in executing their mental health and wellbeing strategy

PO 3.1	Identified relationship support develops an understanding of the personal psychological health strategy of the training participant
PO 3.2	Identified relationship support participates in individual's psychological health activities when requested
PO 3.4	Identified relationship support checks up if individual is practicing use of strategies over time
PO 3.5	Identified relationship support reminds individual of thinking about mental health strategies when stress or adversity hits
PO 3.6	Identified relationship support determines whether engaging in training may be beneficial for themselves

activities and adjust their plan based on trial-and-error, as they determine which activities work for them, both from a likeability perspective and from their ability to improve the outcome they decided to work on (Proyer et al., 2015). Ultimately this means that each participant will have a different plan consisting of different evidence-based techniques and activities at the end of the programme, matched to their personal situation.

Delivery Format and Style
The standard programme was designed to be delivered over five sessions, in-person and online. The programme relies on facilitators using presenter slides, an extensive workbook and supporting video material. The Be Well Plan programme was designed to be deliverable in various formats. First and foremost, it was designed to be delivered as group-based training, where participants interact with one another and share reflections, led by a facilitator. The proposed group size is about 25–30 participants, to balance engagement, feelings of social support, and logistics with cost-effective implementation. The activities were designed to be conducted in pairs and small groups (size ranging between 2 and 5 people) providing flexibility in the way it may be implemented, either in small classrooms or larger settings. Secondly, the programme can be delivered online *via* video conferencing technology (Taylor et al., 2011), which can facilitate

TABLE 2 | Combined table for behavioural outcome 1 (engages in regular activities that are known to increase wellbeing and mental health of the individual), behavioural outcome 2 (practices resilience activities to prepare for times of stress and adversity), and environmental outcome 1 (relationship supports individual in striving for more wellbeing and resilience).

PO	Change objectives	BCT	Theory	Practical applications
Demonstrates understanding of (higher order comprehension)				
K1.1a	– Mental health, wellbeing and mental illness	1. *Persuasive Communication (6.5)* 2. *Elaboration (6.6)* 3. *Using Imagery (6.6)* 4. *Arguments (6.9)* 5. *Repeated Exposure (6.9)* 6. *Cultural Similarity (6.9)*	1. *CPM, ELM, DIT* 2. *IPT, ELM* 3. *TIP* 4. *CPM, ELM* 5. *TL* 6. *CPM*	1. *An image/video/text that displays the relationship of mental health, wellbeing & mental illness. Use real-world examples throughout to make it easier to comprehend.* 2. *Provide facts about psychological health and how it affects everyone on a day-to-day basis (includes definitions) and getting participants to relate this to their own psychological health.* 3. *Use physical fitness and physical health as analogies to the relationship between mental illness and wellbeing.* 4. *Discuss the evidence that underpins dual-factor models, wellbeing and mental illness individually (includes definitions) and get participant to understand the differences and how these differences apply to their own mental health.* 5. *Show visualisation of mental health, wellbeing and mental illness repeatedly throughout the programme and reaffirm notion that psychological health is relevant to all of us irrespective of clinical symptoms during different sessions.* 6. *Where possible use examples, statistics and support material that is relevant to the participant group (e.g., students, workforces, etc.).*
K1.2b	– The way different intervention types influence psychological health	1. *Persuasive Communication (6.5)* 2. *Active learning (6.5)* 3. *Elaboration (6.6)* 4. *Using Imagery (6.6)*	1. *CPM, ELM, DIT* 2. *ELM, SCT* 3. *IPT, ELM* 4. *TIP*	1. *Provide a brief explanation how different intervention types improve relevant outcomes, and what their scientific evidence is (on a high level).* 2. *Ask participants to guess which intervention type across the board influences most mental health outcomes.* 3. *Provide explanatory videos that shed insight into background mechanics of interventions (e.g., video on epigenetic influences on our life).* 4. *Use examples of healthy pot-plants versus garden-grown plants to explain that psychological health can be influenced by genetics and environment, and that this impacts intervention impact.*
K1.2c	– Current evidence-status for individual intervention types on improving psychological health	1. *Persuasive Communication (6.5)* 2. *Advance Organisers (6.6)* 3. *Arguments (6.9)*	1. *CPM, ELM, DIT* 2. *TIP* 3. *CPM, ELM*	1. *Give a general evidence overview of the main intervention types and their impact on psychological health. Include information about the benefits of improving psychological health for everyone.* 2. *Use symbols, way of organising and colours to indicate evidence status for individual techniques.* 3. *Provide high level summary of evidence for each activity proposed, split per main target outcome. Provide access to background research and get participants to realise that different types of interventions have a different impact depending on the outcome and other characteristics.*
K1.3a	– Personal characteristics that have a proven association with *psychological health*	1. *Persuasive Communication (6.5)* 2. *Elaboration (6.6)*	1. *CPM, ELM, DIT* 2. *IPT, ELM*	1. *Briefly list scientific evidence on personal characteristics that impact psychological health and their relation.* 2. *Use videos (e.g. on impact of stress) to indicate that biopsychosocial influences all play a role in how we feel.*
K1.3b	– Personal characteristics that are known to *impact interventions* for psychological health	1. *Persuasive Communication (6.5)* 2. *Advance Organisers (6.6)*	1. *CPM, ELM, DIT* 2. *TIP*	1. *Provide explanation on differential response for different people and the need for one-size fits all solutions based on background research. Place in larger frame of resources and challenges.* 2. *Create groupings were possible to make information processing easier (e.g., psychological, health, interpersonal).*
K1.4a	– The presence of fluctuations in psychological health outcomes throughout life	1. *Persuasive Communication (6.5)* 2. *Active learning (6.5)* 3. *Elaboration (6.6)* 4. *Using Imagery (6.6)*	1. *CPM, ELM, DIT* 2. *ELM, SCT* 3. *IPT, ELM* 4. *TIP*	1. *Provide high-level scientific evidence on daily mood and wellbeing fluctuations.* 2. *Embed measurement and reporting on mental health into programme, showing fluctuations over time.* 3. *Stimulate conversation between attendees regarding observed fluctuations.* 4. *Use the example of the weather and climate or alternatively progress in sports and physical health to explain how individual fluctuations in mental health work.*
K1.4b	– Psychological health over the life-course requires a committed approach	1. *Active learning (6.5)* 2. *Modelling (6.5)* 3. *Using Imagery (6.6)*	1. *ELM, SCT* 2. *SCT, TL* 3. *TIP*	1. *Ask participants to reflect on whether anything that plays a big role in life comes overnight.* 2. *Get trainers to talk about their own life course approach to building mental health.* 3. *Use analogy of marathon (or other big accomplishment) to explain that this journey is long. Use imagery to explain it is not a linear trajectory and that we will have wins and losses in this journey.*

(Continued)

TABLE 2 | (Continued)

PO	Change objectives	BCT	Theory	Practical applications
K1.5b	– Psychological health consists of different personal outcomes	1. *Arguments (6.9)* 2. *Advance Organisers (6.6)*	1. CPM, ELM 2. TIP	1. *Use definitions on mental health and distinct sub-outcomes to indicate the role that each outcome plays.* 2. *Break up definitions and guide participants through each relevant sub-outcome to create understanding of differences.*
K1.6d	– Importance of social relationships	1. *Persuasive communication (6.5)* 2. *Repeated Exposure (6.9)*	1. CPM, ELM, DIT 2. TL	1. *Provide clear rationale for the importance of social environment in our mental health and wellbeing, by referring to theories, evidence and examples throughout the programme.* 2. *Repeat importance of social environment throughout sessions.*
K1.6.1a	– Scope of the programme	1. *Persuasive communication (6.5)* 2. *Repeated Exposure (6.9)*	1. CPM, ELM, DIT 2. TL	1. *Clearly articulate that the main focus of the programme is to build mental health, not to focus on mental illness. Explain the difference between those concepts clearly.* 2. *Repeat information on scope throughout course.*
K1.6.1b	– Types of challenges that cannot be altered by a psychological skills training	1. *Persuasive communication (6.5)*	1. CPM, ELM, DIT	1. *Provide clear rationale for focus on mental health and not mental illness or other problems that may contribute to problems in mental health (e.g. housing, finances) from start of the programme. Point to presence of external influences that can shape mental health and indicate that improvement potential differs per person and their environment.*
K1.7b	– The role that values play in steering positive human behaviours	1. *Persuasive Communication (6.5)* 2. *Active Learning (6.6)* 3. *Discussion (6.6)* 4. *Using Imagery (6.6)* 5. *Arguments (6.9)*	1. CPM, ELM, DIT 2. ELM, SCT 3. ELM 4. TIP 5. CPM, ELM	1. *Give insight into scientific evidence on role of values and life goals, and how values relate to positive health behaviours and goal attainment. Share different theories that they play a role in (e.g. ACT).* 2. *Get participants to identify their own values in past behaviour and link this to new goals they set related to their mental health and wellbeing.* 3. *Talk through individual values with other participants.* 4. *Ask participants to think about a time when they relied on their values to steer positive behaviour.* 5. *Provide scientific arguments for the role of values in positive human behaviour and indicate that everybody has certain values they hold, which they can use to influence their mental health.*
K1.8a	– The importance of developing a strategy of sufficient intensity	1. *Persuasive Communication (6.5)* 2. *Elaboration (6.6)* 3. *Using Imagery (6.6)* 4. *Arguments (6.9)*	1. CPM, ELM, DIT 2. IPT, ELM 3. TIP 4. CPM, ELM	1. *Provide scientific evidence on developing a strategy of sufficient intensity across different outcomes. Rhetorically, ask participants to think of the last time they nailed an important life skill (driving a car, having sex, learning a new language) in one go.* 2. *Ask participants to place the importance of investing in their mental health by developing a strategy of sufficient intensity in the context of their own life, motivations, and values.* 3. *Use physical activity as an example to explain how it is important to train sufficiently when trying to run a marathon (your life). Alternatively use medicine as an example.* 4. *Provide the results of the systematic review to develop scientific trust in presented findings and need to fully commit to developing a strategy.*
K.1.8.1	– How barriers can influence successful execution of the psychological health strategy	1. *Persuasive Communication (6.5)* 2. *Repeated Exposure (6.9)*	1. CPM, ELM, DIT 2. TL	1. *Provide information on various barriers, both theoretical and from the trainer's own experience, and how participants need to be aware of them to be successful in executing the strategy.* 2. *Repeat information and cues on reflecting on barriers throughout the programme (e.g. during reflection on how previous weeks went at start of each session).*
K1.9	– Improving or maintaining psychological health requires an ongoing commitment	1. *Persuasive Communication (6.5)* 2. *Using Imagery (6.6)* 3. *Arguments (6.9)*	1. CPM ELM, DIT 2. TIP 3. CPM, ELM	1. *Provide information on typical trajectory of improvement, indicating that sometimes a deterioration may happen before positive change occurs.* 2. *Use analogies of sports or other areas to indicate that improvement comes with ups and downs.* 3. *Provide realistic optimism as an approach to indicating that success can happen despite failures, but requires ongoing commitment.*
K1.10.1a	Different people require different strategies to see effective change in outcomes	1. *Persuasive Communication (6.5)* 2. *Active Learning (6.5)* 3. *Modelling (6.5)* 4. *Using Imagery (6.6)*	1. CPM, ELM, DIT 2. ELM, SCT 3. SCT, TL 4. TIP	1. *Provide examples of difference in people responding to different strategies, both in effectiveness as well as implementation and liking.* 2. *Let people interact with their own wellbeing scores and compare changes with other participants.* 3. *Over course of the programme get participants to discuss their personal strategy, showing that individuals will gravitate to and need different activities depending on their life's circumstances* 4. *Provide analogy of the way psychologists and counsellors work in finding ways to work with their clients.*

(Continued)

TABLE 2 | (Continued)

PO	Change objectives	BCT	Theory	Practical applications
K1.10.3a, K2.8.2b, K2.11.3a	Personal situation/outcome that warrants professional support	1. *Persuasive Communication (6.5)* 2. *Using Imagery (6.6)* 3. *Consciousness Raising (6.7)* 4. *Personalise Risk & framing (6.7)* 5. *Repeated Exposure (6.9)*	1. *CPM, ELM, DIT* 2. *TIP* 3. *HBM, PAPM, TTM* 4. *PAPM* 5. *TL*	1. *Provide scientific evidence on differing levels of symptoms and the effectiveness of different techniques on dealing with symptoms, leading participants to understand they can't take everything on themselves.* 2. *Use analogy of going to the GP and ED for severe physical illness and the need to go to the pharmacy yourself when it is minor. Use analogy of various fires to indicate that you can deal with some fires but not with all (i.e. you need to call the fire department).* 3. *Make it clear that not understanding about severity of symptoms can impact them in forming an effective strategy and thus in being able to improve their mental health.* 4. *Provide information on the long-term impact of not acting on their mental health, and how this may impact the participant's future* 5. *Repeat symptoms message and need to know which symptoms can be manageable or not throughout programme.*
K1.10.4	Adjusting a strategy may lead to better outcomes over the life-course	1. *Persuasive Communication (6.5)* 2. *Using Imagery (6.6)* 3. *Repeated Exposure (6.9)*	1. *CPM, ELM, DIT* 2. *TIP* 3. *TL*	1. *Ensure that the participant knows that creating and tweaking a strategy is the core principle of the programme and generally underpins growth.* 2. *Provide analogies such as sports and adjusting training to improve outcomes.* 3. *Reinforce the message each session by allowing participants to experiment with their strategy.*
K2.1b	– Resilience as an outcome	1. *Persuasive Communication (6.5)* 2. *Active learning (6.5)* 3. *Discussion (6.6)* 4. *Elaboration (6.6)* 5. *Arguments (6.9)*	1. *CPM, ELM, DIT* 2. *ELM, SCT* 3. *ELM* 4. *IPT, ELM* 5. *CPM, ELM*	1. *Provide scientific definitions of resilience and place in context of its malleability (i.e. resilience as an outcome you can change).* 2. *Ask participants to think of a time where they felt they were resilient to stress or stressful events.* 3. *Get participants to talk through learned information on resilience and other mental health outcomes.* 4. *Get participants to reflect on concept of resilience and how this relates to their life.* 5. *Throughout programme provide scientific information on why resilience is malleable.*
K2.2c	– How stress can lead to growth	1. *Persuasive Communication (6.5)* 2. *Modelling (6.5)* 3. *Elaboration (6.6)* 4. *Using Imagery (6.6)*	1. *CPM, ELM, DIT* 2. *SCT, TL* 3. *ELM* 4. *TIP*	1. *Provide information on scientific evidence regarding post stress growth and the positive consequences of stress* 2. *Get trainers to provide an example where they felt they went through stress and grew afterward.* 3. *Ask people to think about a time where they felt they grew after going through stress* 4. *Use bushfires as an analogue of a completely destructive force, but nature recovering afterward. Alternatively use examples of physical activity when someone suffered an injury and miraculously recovered.*
K2.6b	That resources and barriers for resilience can change over time	1. *Persuasive Communication (6.5)* 2. *Modelling (6.5)* 3. *Using Imagery (6.6)*	1. *CPM, ELM, DIT* 2. *SCT, TL* 3. *TIP*	1. *Provide information on the transient nature of resources and barriers in one's life and that we can actively work on them.* 2. *The trainer will provide the group with an example where their own resources and barriers shifted in life and how it impacted an outcome.* 3. *Use analogy of the life course to show that we all evolve and as a consequence our resources shift.*
K2.8b	What stressor types can and cannot be managed individually	1. *Facilitation (6.5)* 2. *Modelling (6.5)* 3. *Using Imagery (6.6)*	1. *SCT* 2. *SCT, TL* 3. *TIP*	1. *Recommendations based on clinical cut-offs are presented within online measurement and accompanied by explanatory text. They indicate which symptom levels recommend being seen a professional* 2. *Trainer provides example from their own life in which they had to decide whether to get help or not to deal with stressors (where applicable).* 3. *Use medical or fire analogy to indicate that some events can be managed personally and some benefit from professional help.*
K2.10b	Individual differences in capacity to deal with adversity	1. *Persuasive Communication (6.5)* 2. *Using Imagery (6.6)*	1. *CPM, ELM, DIT* 2. *TIP*	1. *Provide scientific literature that indicates individual differences in coping and their determinants (e.g., genomics video) and the role of perception in stress.* 2. *Use analogy from nature that highlights differences between people and being able to deal with stress.*
K2.10c	That individual judgement may need to be supplemented with input from social environment	1. *Persuasive Communication (6.5)*	1. *CPM, ELM, DIT*	1. *Provide scientific evidence on important role of social support and positive relationships, as well as the environment in general. Explain the role that the mind plays in interpreting symptoms and that an outsider's perspective can help in overcoming biases.*

(Continued)

TABLE 2 | (Continued)

PO	Change objectives	BCT	Theory	Practical applications
Lists/describes (descriptive knowledge)				
K1.1b	– Behavioural and non-behavioural factors and outcomes that are associated with good psychological health outcomes	1. *Persuasive Communication (6.5)* 2. *Active learning (6.5)* 2. *Arguments (6.9)* 3. *Repeated exposure (6.9)*	1. *CPM, ELM, DIT* 2. *ELM, SCT* 3. *CPM, ELM* 4. *TL*	1. *List various scientifically derived behavioural and non-behavioural factors.* 2. *Ask participants to choose from a large set of associated variables and ask which ones they care about or has impacted their own personal lives.* 3. *Provide scientific evidence that indicates the role of each factor in relationship to psychological health via links to resources page.* 4. *Repeat behavioural and non-behavioural factors information throughout course.*
K1.1c	– Positive outcomes associated with good psychological health	1. *Persuasive Communication (6.5)* 2. *Advance organisers (6.6)* 3. *Active learning (6.5)* 4. *Arguments (6.9)* 2. *Repeated Exposure (6.9)*	1. *CPM, ELM, DIT* 3. *TIP* 4. *ELM, SCT* 5. *CPM, ELM* 6. *TL*	1. *List scientific evidence to support positive outcomes of working on good psychological health.* 2. *Break the positive outcomes down into subsets of groups to facilitate better information processing.* 3. *Ask participants to choose from a large set of associated variables and ask which ones they care about or has impacted their own personal lives.* 4. *Provide scientific references that indicate their association with psychological health.* 5. *Repeat information on positive outcomes throughout sessions.*
K1.2a	– Evidence-based psychological interventions to build psychological health	1. *Persuasive Communication (6.5)* 2. *Advance Organisers (6.6)* 3. *Active learning (6.5)*	1. *CPM, ELM, DIT* 2. *TIP* 3. *ELM, SCT*	1. *List scientific evidence on evidence-based intervention types to build psychological health.* 2. *Group interventions into different sub-types to aid in retention.* 3. *Create a short puzzle/quiz that gets people to reflect on the impact of specific interventions on specific outcomes.*
K1.6a	– Common resources and challenges for good psychological health	1. *Persuasive Communication (6.5)* 2. *Advance organisers (6.6)* 3. *Active learning (6.5)*	1. *CPM, ELM, DIT* 2. *TIP* 3. *ELM, SCT*	1. *List scientific evidence on commonly understood resources and challenges.* 2. *Group resources and challenges into clearly understandable groups.* 3. *Ask participants to reflect on resources and challenges and their importance to the participant.*
K1.7a	– List of motivators that drive human (health) behaviour	1. *Persuasive Communication (6.5)* 2. *Active learning (6.5)*	1. *CPM, ELM, DIT* 2. *ELM, SCT*	1. *List common motivators for health behaviour change and their scientific evidence.* 2. *Ask participants to think of their own motivators related to psychological health and refer back to these motivations throughout the course.*
K1.7b	– Values that drive human (health) behaviour	1. *Persuasive Communication (6.5)*	1. *CPM, ELM, DIT*	1. *Provide list of values including the definition of values. Provide scientific background to values, virtues and strengths and how they lead to improved mental health.*
K1.7c	– What a growth mindset is and how it aids in mental health improvement	1. *Persuasive Communication (6.5)* 2. *Arguments (6.9)*	1. *CPM, ELM, DIT* 2. *CPM, ELM*	1. *Provide examples on a growth mindset versus a fixed mindset and how both relate to improvements in outcomes. Focus is on malleability, not the theory per se.* 2. *Relate growth mindset back to scientific evidence on change in mental health outcomes and role of nature/nurture (e.g. via epigenetics video)*
K1.8a	– Different activities that can be used to improve resources and offset barriers to psychological health	1. *Persuasive Communication (6.5)* 2. *Advance organisers (6.6)* 3. *Arguments (6.9)*	1. *CPM, ELM, DIT* 2. *TIP* 3. *CPM, ELM*	1. *List variety of recommended activities that are known to improve psychological health.* 2. *Group activities into easily understood topic areas (feeling, doing, communicating, thinking).* 3. *Provide scientific rationale for each individual activity and the way we currently understand they impact mental health (outcomes).*
K1.8d	– Possible strategies they can consider to grow social connections as part of strategy	1. *Facilitation (6.5)*	1. *SCT*	1. *Provide examples and exercises that participants can use to involve their social network in the programme.*

(Continued)

TABLE 2 | (Continued)

PO	Change objectives	BCT	Theory	Practical applications
K1.10.3b, K2.11.3b	– Contact information for professional support	1. *Facilitation (6.5)* 2. *Repeated Exposure (6.9)*	1. *SCT* 2. *TL*	1. *Provide clear overview of professional support contacts.* 2. *Repeatedly show the contact information for professional support throughout the programme.*
K2.1a, K2.2a	– The concept of stress and stressors, and their consequences	1. *Persuasive Communication (6.5)* 2. *Repeated Exposure (6.9) Elaboration (6.6)*	1. *CPM, ELM, DIT* 2. *TL* 3. *TIP, ELM*	1. *Provide the definition of stress and a variety of examples ranging from mild to big adversity, and how they impact individuals differently.* 2. *Repeat definitions throughout the course.* 3. *Explore concept of eustress and how this applies to the individual.*
K2.1c	– Positive outcomes associated with improved resilience	1. *Persuasive Communication (6.5)* 2. *Repeated Exposure (6.9)*	1. *CPM, ELM, DIT* 3. *TL*	1. *Provide scientific evidence on positive outcomes associated with resilience.* 2. *Repeatedly frame the benefits of high resilience being a positive outcome.*
K2.2b	– How stressors can be appraised differently and how this impacts stress levels	1. *Persuasive Communication (6.5)*	1. *CPM, ELM, DIT*	1. *Touch upon various stressors and the fact that stressors influence people differently, which partly depends on their level of severity and other variables.*
K2.3b	– Evidence-based activities that can boost resilience	1. *Persuasive Communication (6.5)* 2. *Advance organisers (6.6)* 3. *Repeated Exposure (6.9)* 2. *Facilitation (6.5)*	1. *CPM, ELM, DIT* 2. *TIP* 3. *TL* 4. *SCT*	1. *Provide scientific evidence for list of activities that boost resilience.* 2. *Group activities into categories (feeling and thinking, doing, communicating).* 3. *Refer to different activities throughout course.* 4. *Provide overview of evidence via website or other resources.*
K2.3c	– Positive effects associated with engaging in resilience activities	1. *Persuasive Communication (6.5)* 2. *Repeated Exposure (6.9)*	1. *CPM, ELM, DIT* 2. *TL*	1. *Provide scientific evidence on positive outcomes associated with resilience and their flow-on effects on other mental health outcomes.* 2. *Repeatedly frame the benefits of resilience and the fact that it is malleable.*
K2.4	– Role of biology, psychology and social circumstances on resilience	1. *Persuasive Communication (6.5)* 2. *Active Learning (6.5)*	1. *CPM, ELM, DIT* 2. *ELM, SCT*	1. *Provide scientific evidence on characteristics that influence resilience (and other mental health outcomes).* 2. *Integrate knowledge by linking resilience to other videos on mental health used in the programme.*
K2.6a	– Common resources and challenges for resilience	1. *Persuasive Communication (6.5)* 2. *Repeated Exposure (6.9)*	1. *CPM, ELM, DIT* 2. *TL*	1. *Provide scientific evidence on common resources and challenges for resilience and coping with stress.* 2. *Repeat the common resources and challenges throughout the course.*
K2.8a	– Activities that can be used for personal resilience strategy	1. *Persuasive Communication (6.5)* 2. *Advance Organisers (6.6)*	1. *CPM, ELM, DIT* 2. *TIP*	1. *List scientific evidence on evidence-based interventions types to build resilience.* 2. *Group interventions into different sub-types to aid in retention.*
K2.8b	– What stressor types can and cannot be managed individually	1. *Persuasive Communication (6.5)*	1. *CPM, ELM, DIT*	1. *Provide information on aspects that are in scope and out of scope to be self-managed.*
K2.10a	– The mental and physical health symptoms associated with unhealthy reactions to stress	1. *Persuasive Communication (6.5)* 2. *Active Learning (6.5)* 3. *Repeated Exposure (6.9)*	1. *CPM, ELM, DIT* 2. *ELM, SCT* 3. *TL*	1. *List scientifically derived symptoms that can come from adversity and stress.* 2. *Use video to explain symptoms associated with stress.* 3. *Repeat information on stress symptoms throughout programme.*
K2.11.2	– Barriers to executing psychological health strategies	1. *Active Learning (6.5)* 2. *Repeated Exposure (6.6)*	1. *IPT, ELM* 3. *TL*	1. *Ask participants to reflect on barriers that have inhibited them from executing health behaviours in the past.* 2. *Repeat the need to reflect on barriers throughout the programme.*

(Continued)

TABLE 2 | (Continued)

PO	Change objectives	BCT	Theory	Practical applications
Explains (procedural knowledge)				
K1.5a, K2.5	– How to access psychological outcome assessment methods to build psychological profile and resilience	1. *Advance organisers (6.6)* 2. *Modelling (6.5)* 3. *Guided practice (6.11)*	1. *TIP* 2. *SCT, TL* 3. *SCT, TSR*	1. *Break up steps of accessing the platform into simple steps.* 2. *Have a trainer explain how to access the measurement tools.* 3. *Develop video that explains how to access the platform and how to conduct the measurement.*
K1.6.1c	– Where to find help for psychological issues out of scope of the programme	1. *Advance Organisers (6.5)* 2. *Facilitation (6.5)*	1. *TIP* 2. *SCT*	1. *Create a process for participants to find information on additional out-of-scope resources.* 2. *Create overview for relevant professional support references.*
K1.8b	– How to access activities that can be used improve psychological health	1. *Advance Organisers (6.6)* 2. *Guided practice (6.11)* 3. *Modelling (6.5)*	1. *TIP* 2. *SCT, TSR* 3. *SCT, TL*	1. *Visualise the steps of accessing the activities in a simple diagram. Use colours, ordering and symbols to guide participants to activities within the booklet.* 2. *Have trainers demonstrate how to access each activity and use it to form a strategy.* 3. *Have trainers demonstrate use of the support material to the participant.*
Identifies				
K1.6b, K1.6c, K2.6c, K2.6d	– Personal resources and barriers for their psychological health and resilience	1. *Tailoring (6.5)* 2. *Modelling (6.5)* 3. *Providing Cues (6.6)* 2. *Framing (6.7)* 3. *Public commitment (6.8)* 4. *Arguments (6.9)*	1. *TTM, PAPM, PMT, CPM* 2. *SCT, TL* 3. *TIP* 4. *PMT* 5. *TAIHB* 6. *CPM, ELM*	1. *Ask participants to reflect on personal circumstances and select different types of resources and barriers that apply to their own life.* 2. *Let trainers select types of barriers and resources that applied to their own psychological health out of list of options.* 3. *Indicate the consequence of not identifying personal resources, i.e., they can still do the course, but the results will be suboptimal.* 4. *Use a gain frame to indicate that identifying resources will lead to positives and that not identifying it will come at a cost.* 5. *Get participants to talk to other participants about their own resources and how it shaped their strategy.* 6. *Provide scientific rationale for the importance of selecting personal resources and barriers.*
K1.8c	– Specific strategies that contribute positively to their psychological health	1. *Persuasive Communication (6.5)* 2. *Modelling (6.5)* 3. *Discussion (6.6)* 4. *Consciousness Raising (6.7)* 5. *Framing (6.7)* 6. *Public Commitment (6.8)*	1. *CPM, ELM, DIT* 2. *SCT, TL* 3. *ELM* 4. *HBM, PAPM, TTM* 5. *PMT* 6. *TAIHB*	1. *Provide scientific rationale for individual psychological strategies and when to consider them.* 2. *Have a trainer demonstrate how they selected a strategy that was matched to their own wellbeing profile.* 3. *Share one of the strategies the participant chose with another participant and explain why this was matched to their personal circumstances.* 4. *Point to consequences of not selecting strategies that relate to their own psychological health (e.g., suboptimal outcomes) and their wellbeing profile.* 5. *Use a gain frame to indicate that identifying strategies will lead to positives and that not identifying it will come at a cost.* 6. *Get participants to pledge to identify and explore tailored strategies on a weekly basis.*
K1.8.1	– How barriers can influence successful execution of the psychological health strategy	1. *Discussion (6.6)* 2. *Consciousness Raising (6.7)* 3. *Arguments (6.9)*	1. *ELM* 2. *HBM, PAPM, TTM* 3. *CPM, ELM*	1. *Share one of the barriers the participant chose with another participant and explain how this affected their strategy.* 2. *Point to consequences of not selecting personal barriers that relate to their own psychological health (e.g., suboptimal outcomes) and their wellbeing profile.* 3. *Provide rationale for the importance of selecting personal resources and barriers.*
K1.10.1, K2.10.1	– Personal criteria for successful execution of psychological health strategy	1. *Persuasive Communication (6.5)*	1. *CPM, ELM, DIT*	1. *Provide information on the importance of determining what success looks like, how to measure it and how to use it in the context of the programme.*

(Continued)

TABLE 2 | (Continued)

PO	Change objectives	BCT	Theory	Practical applications
Demonstrates ability to				
S1.1, S2.1, S2.2	– Process information on psychological health	1. *Facilitation (6.5)* 2. *Set Graded tasks (6.11)*	1. *SCT* 2. *SCT, TSR*	1. *Facilitate the creation of workbooks and the opportunity to access the materials. Provide sufficient time to allow ability to master information. Ensure access to in-person resources and space to participate in the training.* 2. *Gradually build complexity of information in programme to facilitate better processing of information.*
S1.2, S2.3, S2.4b	– To critically interpret evidence on interventions to improve psychological health	1. *Facilitation (6.5)* 2. *Guided practice (6.11)*	1. *SCT* 2. *SCT, TSR*	1. *Create access to evidence on interventions to improve psychological health in slides and course material. Transform scientific formats into laymen friendly resources. Provide access to scientific resources where possible.* 2. *Demonstrate how to interpret evidence related to personal situation. Use an example to get the participants to interpret the evidence.*
S1.3, S1.6, S1.7, S2.4a, S2.6, S2.7	– Reflect on personal characteristics that apply to the individual	1. *Facilitation (6.5)* 2. *Provide contingent rewards (6.11)* 2. *Modelling (6.5)*	1. *SCT* 2. *TL, TSR* 3. *SCT, TL*	1. *Provide safe opportunity and space to reflect on individual characteristics without causing resistance of the individual. Create exercises that are specifically designed to reflect on personal lives.* 2. *Praise and encourage participation even though it may require people to reflect on difficult subjects.* 3. *Use trainer examples to highlight how reflection is done in the context of the programme.*
S1.6.1	Which resources and challenges can be managed or improved by themselves	1. *Facilitation (6.5)*	1. *SCT*	1. *Use online measurement to indicate whether symptom levels are higher than should be self-managed. Get participants to link resources and challenges to symptoms level.*
S1.10.3c	Compare the objectives of existing programme to other services	1. *Facilitation (6.5)*	1. *SCT*	1. *Provide overview of focus areas for the programme, what is in and out of scope and point to other services to handle out of scope objectives.*
S1.7, S2.7	– Identify personal motivators to improve psychological health and resilience	1. *Tailoring (6.5)* 2. *Modelling (6.5)* 3. *Consciousness Raising (6.7)* 4. *Framing (6.7)* 5. *Discussion (6.5)* 6. *Arguments (6.9)* 7. *Facilitation (6.5)*	1. *TTM, PAPM, PMT, CPM* 2. *SCT, TL* 3. *HBM, PAPM, TTM* 4. *PMT* 5. *ELM* 6. *CPM, ELM* 7. *SCT*	1. *Ask participants to reflect on personal circumstances and motivators, and reflect on what motivates them in general life.* 2. *Let trainers demonstrate their own motivators and drivers in life.* 3. *Indicate the consequence of not identifying motivators, i.e., they can still do the course, but the results will be suboptimal.* 4. *Use a gain frame to indicate that identifying motivators will lead to positives and that not identifying it will come at a cost.* 5. *Ask participants to share their own motivators.* 6. *Provide scientific rationale for the importance of selecting personal resources and barriers* 7. *Provide resources to reflect on personal motivators, e.g., self-reflection exercises*
S1.5b, S2.5b	– Ability to interpret scores on psychological health assessment methods	1. *Facilitation (6.5)*	1. *SCT*	1. *Facilitate access to assessment criteria and their interpretation to ensure the participant understand current profile, without the need for a professional to help explore scores. Provide clear explanation via slides on how to interpret scores when in-person training is taught.*
S1.8d	– Match intervention activities to personal needs	1. *Tailoring (6.5)* 2. *Facilitation (6.5)*	1. *TTM, PAPM, PMT, CPM* 3. *SCT*	1. *Create tailored recommendations for interventions based on psychological profile and identified needs* 2. *Facilitate resources (online/offline) that match recommendations with intervention recommendations. Match booklet recommendations to wellbeing profile generated by platform, e.g., activity finders.*
S1.10.1a, S2.11.1	– Reflect on whether strategy activities are leading to change	1. *Self-monitoring (6.11)* 2. *Facilitation (6.5)*	1. *TSR* 2. *SCT*	1. *Patient is prompted to keep track of use of strategy (e.g., in diary) on weekly basis and to reflect on their personal experience with the strategies.* 2. *The training will provide resources to enable reflection and self-monitoring, including access to a self-monitoring too (i.e. the online platform).*

(Continued)

TABLE 2 | (Continued)

PO	Change objectives	BCT	Theory	Practical applications
S1.10.2b	– Explain psychological health strategy to social supporter	1. *Modelling (6.5)* 2. *Facilitation (6.5)*	1. SCT, TL 2. SCT	1. *Use personal stories where the trainer or models explain how they talked to their relationships.* 2. *Provide a specific exercise that gets participants to share their strategy with their social supporter.*
S1.10.3b, S2.11.3	– Reach out to professional support	1. *Facilitation (6.5)* 2. *Set graded tasks (6.11)*	1. SCT 2. SCT, TSR	1. *Provide access to support contact information in training and resources.* 2. *Tell participants to come up to trainer in case they are unsure of how to broach problems or where to go with challenges.*
S2.10	– Recognise stress when faced with it	1. *Self-monitoring (6.11)* 2. *Facilitation (6.5)*	1. TSR 2. SCT	1. *Allow function where participant can monitor stressors over a set period when revising and checking their strategy.* 2. *Provide for self-monitoring functionality in course content as well as measurement platform. Allow participants to practice recognising stressors.*
S2.6.1	– To identify stressors which can and cannot be managed personally	1. *Self-monitoring (6.11)* 2. *Facilitation (6.5)*	1. TSR 2. SCT	1. *Allow diary function where participant can monitor stressors over a monthly period when revising and checking their strategy.* 2. *Provide for self-monitoring functionality in course content.*
S1.5a, S2.5a	Can complete psychological health assessment methods	1. *Facilitation (6.5)*	1. SCT	1. *Embedding the psychological health assessment as part of the training in an online environment that can be accessed with any device that adheres to modern web standards.*
Practices				
S1.8a, S2.8a	– The use of psychological health activities during the training	1. *Modelling (6.5)* 2. *Feedback (6.5)* 3. *Reinforcement (6.5)* 4. *Facilitation (6.5)* 5. *Guided practice (6.11)* 6. *Verbal persuasion (6.11)*	1. SCT, TL 2. TL, GT, SCT 3. TL, SCT 4. SCT, TSR 5. SCT, TSR 6. SCT, TSR	1. *The trainer displays certain activities during the training. Videos with appropriate models are embedded within the activities were possible.* 2. *The trainer provides feedback on execution or practice of tasks.* 3. *The trainer provides praise to general group after completing an activity.* 4. *Individual practices activities during training time, guided by explanations or by modelling activities by the trainers. Examples are provided in course material.* 5. *Participants are asked to highlight tasks they have difficulty with and can act as models in a simulation to both get feedback and provide information to other participants.* 6. *Provide information about the fact that all skills are designed to be used by anyone, regardless of their individual knowledge and skill level.*
S1.8b, S2.8b	– The use of psychological health activities after training	1. *Modelling (6.5)* 2. *Feedback (6.5)* 3. *Reinforcement (6.5)* 4. *Facilitation (6.5)* 5. *Guided practice (6.11)* 6. *Verbal persuasion (6.11)*	1. SCT, TL 2. TL, GT, SCT 3. TL, SCT 4. SCT, TSR 5. SCT, TSR 6. SCT, TSR	1. *Trainer gives examples on how they used the activities outside of the training. They provide examples of how they embedded the activities within their own life.* 2. *The trainer provides feedback on execution or practice of tasks at subsequent sessions.* 3. *The trainer provides praise after successfully practicing the activities during previous weeks. Emails are sent as reinforcement.* 4. *Provide course materials and activity sheets to allow practicing at home. Provide tips and tricks on how to embed activities within their own life.* 5. *Implementation within normal life of skills is stimulated.* 6. *The trainer provides examples of how they practiced skills within their normal life.*
S1.8.1b, S2.11.2	Develops strategy to overcome barriers to using psychological health activities	1. *Reinforcement (6.5)* 2. *Facilitation (6.5)* 3. *Planning coping responses (6.11)*	1. TL, SCT 2. SCT, TSR 3. ATRPT, TSR	1. *Provide verbal reinforcement to continue to work through barriers that are encountered during the programme* 2. *Provide resources to allow participants to reflect on barriers.* 3. *Provide potential examples that participants can consider when devising a plan to overcome the barriers. Provide exercise that gets participants to reflect on future barriers.*
S1.8c	Develops competency in use of psychological health activities in day-to-day life	1. *Reinforcement (6.5)* 2. *Facilitation (6.5)* 3. *Guided practice (6.11)*	1. TL, SCT 2. SCT, TSR 3. SCT, TSR	1. *Provide praise throughout the course when activities and exercises are completed. Allow reflection after each session to reinforce progress.* 2. *Provide resources that permit rehearsing activities.* 3. *The trainer selects specific skills and demonstrates it in the course. The coursebook refers to multimedia context that further explains skills so the participant can practice.*

(Continued)

TABLE 2 | (Continued)

PO	Change objectives	BCT	Theory	Practical applications
S1.9b	Recognises when to use specific activities to improve psychological health	1. *Guided practice (6.11)* 2. *Facilitation (6.5)* 3. *Self-monitoring (6.11)*	1. *SCT, TSR* 2. *SCT* 3. *TSR*	1. *Participant practices recognising symptoms or activities that warrant them using their strategy.* 2. *The course content will prompt participants to match activities to life events, stressors and outcomes (symptoms).* 3. *The course material provides ability to reflect on specific triggers that warrant the use of activities.*
Express positive attitude				
BI1.1, BI1.2, BI2.2	- Toward learning about psychological health and learning about different interventions to build psychological health	1. *Belief selection (6.5)* 2. *Consciousness Raising (6.7)* 3. *Personalise Risk (6.7)* 4. *Framing (6.7)* 5. *Self-reevaluation (6.7)* 6. *Environmental reevaluation (6.7)*	1. *TPB, RAA* 2. *HBM, PAPM, TTM* 3. *PACM* 4. *PMT* 5. *TTM* 6. *TTM*	1. *Ask participants to determine why the training would have personal value and follow this with examples of benefits of attending the training in each potential category.* 2. *Indicate the scientific evidence on the importance of good psychological health for individuals, their work, their family and other drivers. Provide evidence on malleability of psychological health.* 3. *Relate information on psychological health back to the participant's personal situation.* 4. *Explain that not participating in the training will lead to a loss, whereas participating will lead to a gain.* 5. *Ask participants to reflect on how their life would benefit if they were to learn about psychological health.* 6. *Ask participants why participating in the training would be beneficial for their loved ones.*
BI1.3, BI2.4	– Toward interrogating personal characteristics and needs	1. *Consciousness Raising (6.7)* 2. *Modelling (6.5)*	1. *HBM, PAPM, TTM* 2. *SCT, TL*	1. *Provide scientific information and personal examples to highlight the benefits of interrogating personal needs. Indicate that this leads to better results in the programme.* 2. *Let trainers provide examples of where reflection on personal needs led to benefits for the trainer.*
B1.5a, BI2.5a	– Toward validity of psychological health assessment methods	1. *Persuasive Communication (6.5)* 2. *Consciousness Raising (6.7)*	1. *CAPM, ELM, DIT* 2. *HBM, PAPM, TTM*	1. *Provide scientific evidence on reliability and validity of assessment tools and their use in everyday life. Explain how they are used in other health settings.* 2. *Provide overview of benefits of using the assessment tools in relationship to the course and their general life.*
B1.5b, BI2.5b	– Toward measuring their psychological health profile over time	1. *Verbal Persuasion (6.11)* 2. *Consciousness Raising (6.7)* 3. *Using Imagery (6.6)*	1. *SCT, TSR* 2. *HBM, PAPM, TTM* 3. *TIP*	1. *Provide information on fluctuations of outcomes throughout life and the need to repeat measurements.* 2. *Provide overview of benefits of using the assessment tools in relationship to the course and their general life.* 3. *Use analogy of physical health or weight to show how we fluctuate over time. Or alternatively use the weather and climate analogy.*
BI1.7a, BI2.7a	– That psychological health *training* will be beneficial	1. *Persuasive Communication (6.5)* 2. *Consciousness Raising (6.7)*	1. *CAPM, ELM, DIT* 2. *HBM, PAPM, TTM*	1. *Provide evidence on how training can lead to important benefits in people's life across a number of domains.* 2. *Get participants to reflect on why training will be relevant to their own personal life and motivators.*
BI1.8a, BI2.8a	– That psychological health *strategy* will be beneficial	1. *Consciousness raising (6.7)* 2. *Self-reevaluation (6.7)*	1. *HBM, PAPM, TTM* 2. *TTM*	1. *Provide information on benefits of executing psychological health activities.* 2. *Encourage the participants to think about the benefits of enacting the strategy and what personal loss it would be to not complete the strategy.*
BI1.6	– Expanding social support	1. *Consciousness raising (6.7)* 2. *Self-reevaluation (6.7)*	1. *HBM, PAPM, TTM* 2. *TTM*	1. *Provide information on the importance of social support for our mental health and wellbeing.* 2. *Encourage participants to reflect on the social supporters that have been there for them in important times, and how they can help them in the future*
BI2.6.1	– Toward reaching out or using other mental health and wellbeing services	1. *Consciousness raising (6.7)*	1. *HBM, PAPM, TTM*	1. *Get participants to reflect on how professional services play an important role in other health areas, and how they do the same for mental health and wellbeing.*

(Continued)

TABLE 2 | (Continued)

PO	Change objectives	BCT	Theory	Practical applications
B1.10.2a, B1.10.4, BI2.11.4	– Toward effectiveness of re-evaluated strategy after implementation	1. *Reattribution training (6.11)* 2. *Persuasive communication (6.5)* 3. *Direct Experience (6.9)*	1. *ATRP, TSR* 2. *CAPM, ELM, DIT* 3. *TL*	1. *Aim to get the participant to relate unsuccessful strategies to external events, not the individual participant.* 2. *Provide scientific information on the need for trial and error and personalisation.* 3. *By integrating experimentation throughout the course, the participant will become more confident that the strategy becomes stronger over time.*
B.1.10.3, BI2.11.3	– Toward the use of professional support	1. *Belief selection (6.5)* 2. *Personalise Risk (6.7)* 3. *Framing (6.7)* 4. *Self-reevaluation (6.7)* 5. *Persuasive Communication (6.5)*	1. *TPB, RAA* 2. *PACM* 3. *PMT* 4. *TTM* 5. *CAPM, ELM, DIT*	1. *Provide positive messages toward the effectiveness of professional support.* 2. *Provide information on consequences of not using professional support in terms of losses and gains.* 3. *Use gain and loss frames when promoting use of professional support.* 4. *Try and stimulate participant to think of themselves with and without the use of professional support and the consequences it may have.* 5. *Provide scientific data on the benefit of professional services when symptoms become too much.*
B1.2b, BI2.3b	Judges that psychological health and resilience is malleable *via* different interventions	1. *Persuasive communication (6.5)* 2. *Modelling (6.5)*	1. *CPM, ELM, DIT* 2. *SCT, TL*	1. *Provide scientific information and personal anecdotes of how psychological training can improve mental health.* 2. *Use videos etc. of role model or experiences of the trainer to create belief in malleability of psychological health.*
BI1.7b, BI2.7b	Beliefs that personal identity is congruent with focus of psychological health training	1. *Persuasive communication (6.5)* 2. *Normative influence (6.10)*	1. *CAPM, ELM, DIT* 2. *TPB, RAA, SCT*	1. *Provide scientific information and personal anecdotes of how psychological training can improve mental health for different people.* 2. *Provide information on approval of other participants or people who are similar to the target group via testimonials and interaction with other participants.*
BI1.7c, BI2.7c	Relates personal motivators to importance of engaging in psychological health activities	1. *Consciousness Raising (6.7)* 2. *Personalise Risk (6.7)* 3. *Framing (6.7)* 4. *Self-reevaluation (6.7)*	1. *HBM, PAPM, TTM* 2. *PACM* 3. *PMT* 4. *TTM*	1. *List different motivator types and provide information on why they will benefit from training* 2. *Place the benefits of engaging in health activities in relation to motivators.* 3. *Explain that not participating in the training will lead to a loss, whereas participating will lead to a gain* 4. *Ask participants to reflect on how their motivators would benefit if they were to actively participate in working on their mental health.*
BI1.7d, BI2.7d	Demonstrate a (positive shift toward) a 'growth' identity	1. *Persuasive communication (6.5)* 2. *Repeated Exposure (6.6)*	1. *CPM, ELM, DIT* 2. *TL*	1. *Provide overview of growth and fixed mindsets, and the scientific evidence of adopting a growth mindset.* 2. *Repeat information on the importance of a growth mindset throughout the programme, both explicitly and implicitly.*
BI1.8c	Beliefs they can identify social supporters within or outside of the programme	1. *Facilitation (6.5)*	1. *SCT*	1. *Provide activity that gets participants to select a supporter. Get other participants or trainers to volunteer in case someone is lacking a supportive social environment.*
BI1.10.1	Demonstrates self-compassion in the case their strategy is not leading to desired outcomes	1. *Persuasive Communication (6.5)* 2. *Enactive Mastery Experiences* 3. *Modelling* 4. *Self-reevaluation*	1. *CPM, ELM, DIT* 2. *SCT, TSR* 3. *SCT* 2. *TTM*	1. *Explain concept of self-compassion and how it relates to self-criticism. Practice self-compassion strategies as part of the fundamental principles in the programme.* 2. *Get participant to practice self-compassion in another related area and refer to the need for self-compassion at each point of experimentation.* 3. *Trainer demonstrates self-compassion throughout course.* 4. *Get participant to think of how they would improve in various life domains if they practiced self-compassion.*
BI2.3b	Beliefs that growth can happen after stress and difficult circumstances	1. *Persuasive Communication (6.5)* 2. *Modelling*	1. *CAPM, ELM, DIT* 2. *SCT*	1. *Use examples to show that growth does not happen in linear ways. Provide scientific evidence to point to ability to grow after stress (e.g., post-adversity growth).* 2. *Trainer provides examples of themselves growing after stressful times.*

(Continued)

TABLE 2 | (Continued)

PO	Change objectives	BCT	Theory	Practical applications
Expresses confidence				
BI1.9, BI2.9	– In implementing activities in day-to-day life	1. *Planning coping responses (6.8)* 2. *Guided practice (6.11)*	1. *ATRPT, TGDB* 2. *SCT, TSR*	1. *Ask the persons to reflect on the exact methods on how to overcome barriers and list these explicitly.* 2. *Get the participant to practice implementing the activities in day-to-day life and ask them to reflect on how the implementation is going, followed by positive reinforcement.*
BI1.10.2b, BI2.12.2c	– In discussing psychological health strategy with social actor	1. *Modelling (6.5)*	1. *SCT, TSR*	1. *Provide exercises that get participants to practice how to broach the psychological health strategy with social actor. Where possible let the trainer model this out and share between participants.*
BI2.10a	– In effectiveness of strategy in dealing with stress	1. *Persuasive communication (6.5)*	1. *CPM, ELM, DIT*	1. *Provide evidence-based information about the merit of psychological interventions in dealing with adversity and highlight its limitations. Provide information on the fact that stress is often result of our perception and provide examples of activities that are specifically beneficial to work on stress (e.g. via activity finders).*
BI2.10b	– Usefulness of reaching out to health professional when needed	1. *Persuasive communication (6.5)* 2. *Framing (6.7)*	1. *CPM, ELM, DIT* 2. *PMT*	1. *Provide information about the merit of professional interventions in dealing with adversity and highlight its limitations.* 2. *Provide a gain frame when discussing that professional support has merit and that not reaching our leads to a loss. Where the setting permits, ask participants to share positive experiences with professional support.*
BI2.8c	– That certain stressors can be managed personally	1. *Persuasive communication (6.5)* 2. *Belief selection (6.5)*	1. *CPM, ELM, DIT* 2. *TPD, RAA*	1. *Provide scientific information on ability to self-manage certain stressors and their intensity level.* 2. *Strengthen belief that individual has capacity to manage certain stressors by designing an activity that targets values and resources.*
BI2.2a	Accepts that stressors are part of everyday life	1. *Persuasive communication (6.5)* 2. *Active Learning (6.5)*	1. *CPM, ELM, DIT* 2. *ELM, SCT*	1. *Provide information on common stressors and their impact throughout the life course.* 2. *Ask participants to reflect on which stressors might apply their own life and how they have an impact on their wellbeing and mental health.*
BI2.2b	Accepts that stressors can be mitigated against by developing a strategy to cope	1. *Persuasive communication (6.5)* 2. *Modelling (6.5)*	1. *CPM, ELM, DIT* 2. *SCT, TL*	1. *Provide information on how we can deal with a number of stressor types.* 2. *Let trainer provide an example on how they mitigated a stressor by using an activity from the strategy.*
Develops				
GB1.4	– Commitment to actively construe a strategy to build psychological health	1. *Planning coping responses (6.8)* 2. *Public commitment (6.8)* 3. *Facilitation (6.5)* 4. *Direct Experience (6.9)*	1. *ATRPT, TGDB* 2. *TAIHB* 3. *SCT* 4. *TL*	1. *Develop a clear list of barriers and enablers that can help hinder or improve the commitment to set a strategy.* 2. *Ask person to commit to sharing the formulation of their strategy to fellow participants, their social network and the trainers, throughout the programme.* 3. *Provides activities that allow the development of the strategy including the development of habits, e.g. via formation of habit statements.* 4. *Get participants to develop a strategy over the course of 5 weeks and experience the process of gradual improvement and benefit.*
GB1.8, GB2.8	– Personal goals for the implementation of strategy in day-to-day life	1. *Set graded tasks (6.11)* 2. *Planning Coping Responses (6.8)* 3. *Facilitation (6.5)*	1. *SCT, TSR* 2. *ATRPT, TGDB* 3. *SCT*	1. *Develop simple and easy subtasks that lead to the creation of personal goals. Build these goals in complexity over time.* 2. *Get participants to think about the necessary steps to attain a goal and barriers that may come up.* 3. *Provide exercise to set goals at each stage of the programme. Relate goals to values where possible.*
Monitors				
GB1.6, GB2.6a	– Personal resources and challenges to psychological health	1. *Facilitation (6.5)* 2. *Self-monitoring of behaviour (6.11)* 3. *Persuasive communication (6.5)*	1. *SCT* 2. *TSR* 3. *CAPM, ELM, DIT*	1. *Provide ability to monitor resources and challenges within course material on weekly basis (via self-reflection exercises). Provide resources to allow participant to self-monitor beyond course.* 2. *Stimulate self-monitoring throughout the course and provide praise/feedback on various moments in course* 3. *Provide scientific arguments for why monitoring resources and challenges frequently is required.*

(Continued)

TABLE 2 | (Continued)

PO	Change objectives	BCT	Theory	Practical applications
GB1.10.1a	– Adherence to psychological health strategy	1. *Facilitation (6.5)* 2. *Self-monitoring of behaviour (6.11)*	1. *SCT* 2. *TSR*	1. *Provide ability to monitor progress in strategy throughout course material. Provide resources to allow participant to self-monitor beyond course.* 2. *Stimulate self-monitoring throughout the course and provide praise/feedback on various moments in course.*
GB1.10.1b	– Training goal attainment	1. *Facilitation (6.5)* 2. *Self-monitoring of behaviour (6.11)*	1. *SCT* 2. *TSR*	1. *Provide ability to monitor training goal attainment throughout course material. Provide resources to allow participant to self-monitor beyond course.* 2. *Stimulate self-monitoring throughout the course and provide praise/feedback on various moments in course.*
GB1.9, GB2.9	Schedules time to engage in psychological health activities to ensure goal attainment	1. *Planning Coping Responses (6.8)* 2. *Goal-setting (6.11)* 3. *Implementation Intentions (6.8)* 4. *Facilitation* 5. *Nudging (6.5)*	1. *ATRPT, TGDB* 2. *GST, TSR* 3. *TGDB, TAIBB* 4. *SCT* 5. *TAIHB*	1. *Set up plan for implementation into daily life and think of ways to improve this implementation.* 2. *Participant develops a goal to engage in participating in psychological health activities.* 3. *Provide space to write down implementation intention (habit statements) to create time for enacting strategy.* 4. *Provide calendar in training to schedule activities.* 5. *Teach participants to set prompts and nudges for training. Build in reminders.*
GB1.10.2a, GB2.11.2a	Recognises ineffective elements of personal wellbeing strategy	1. *Facilitation (6.5)* 2. *Self-monitoring of behaviour (6.11)*	1. *SCT* 2. *TSR*	1. *Construct exercise that allows people to identify and think about ineffective elements of their strategy.* 2. *Get participants to actively monitor behaviour throughout the training.*
GB1.10.2b, GB2.11.2b	Identifies new activities to be included in strategy	1. *Facilitation (6.5)*	1. *SCT, TSR*	1. *Construct exercise that allows people to identify new activities throughout training. Allow participants the space to reflect and recreate their strategy.*
GB1.10.4	Adjust personal goal for strategy implementation in day-to-day life	1. *Tailoring (6.5)* 2. *Facilitation (6.5)* 3. *Personalise risk (6.7)*	1. *TTM, PAPM, PMT, CPM* 2. *SCT* 3. *PAPM*	1. *Allow participants to reflect on their personal strategy and adjust their goals in line with learnings over the training course.* 2. *Ensure that the programme material has a spot where participants can revise their goal.* 3. *Write information that informs the participant about risks of not performing adjustment of goal to implement strategy into life.*
GB2.6b	Reflects on potential future resources and challenges to resilience	1. *Persuasive communication (6.5)* 2. *Facilitation (6.5)*	1. *CPM, ELM, DIT* 2. *SCT*	1. *Provide information on importance of identifying resources and challenges in the future.* 2. *Provide specific reflection exercise to identify future resources and challenges.*
GB2.10	Reflect on personal life to determine presence of stressors or adversity	1. *Reinforcement (6.5)* 2. *Facilitation (6.5)*	1. *TL, SCT* 2. *SCT*	1. *Provide encouragement for participants to reflect on their personal life to determine presence of stressors or adversity.* 2. *Construct exercise that gets people to reflect on personal life and presence of stressors and adversity.*
GB2.11.1a	Recall personal psychological health and resilience strategy	1. *Facilitation (6.5)*	1. *SCT*	1. *Provide space to reflect on strategy at each week and offer resources to continue doing this after the programme has finished.*
GB1.11.1b	Monitors training goal attainment	1. *Repeated exposure (6.9)* 2. *Self-monitoring (6.11)*	1. *TL* 2. *TSR*	1. *Repeatedly prompt participants to monitor their goal attainment throughout course* 2. *Facilitate ability to reflect on goal attainment via reflection exercises.*
GB2.11.1c	Review personal resilience plan at regular intervals	1. *Self-monitoring (6.11)*	1. *TSR*	1. *Monitor progress throughout the course by providing exercises at regular interval that prompts them to investigate the active strategy components.*
GB2.11.c	Compares resilience and psychological health scores from before until after adversity	1. *Facilitation (6.5)*	1. *SCT*	1. *Allow access to online measurement report that gets participants to compare their scores from before and after the training.*

(Continued)

TABLE 2 | (Continued)

PO	Change objectives	BCT	Theory	Practical applications
SOC1.6a, SOC2.6a	Investigates social support for implementation of psychological health strategy	1. *Facilitation (6.5)* 2. *Persuasive communication (6.5)* 3. *Shifting perspective (6.9)* 4. *Info on normative approval (6.10)*	1. *SCT* 2. *CPM, ELM* 3. *TSD* 4. *TPB, RAA, SCOT*	1. *Provide opportunity for participant to reflect on social support by creating an exercise in programme* 2. *Provide scientific evidence on importance of social support in mental health and wellbeing.* 3. *Ask participants to consider why the social supporter would think it is important to be engaged in the participant's psychological health.* 4. *Provide insight into the fact that social supporters are never far away, even in the case of social isolation (e.g., other training participants).*
SOC1.6b, SOC2.6b	Determines influence of social identity to form psychological health strategy	1. *Persuasive Communication (6.5)* 2. *Individualisation (6.5)* 3. *Facilitation (6.5)*	1. *CPM, ELM* 2. *TTM* 3. *SCT*	1. *Provide scientific evidence on the role of social identity in promoting or inhibiting behaviour that promoted psychological health.* 2. *Allow participant to reflect on their own situation and question their own social identity.* 3. *Provide opportunity within working book to reflect on role of social identity.*
SOC1.8, SOC 2.8	Involves social support in development of psychological health strategy	1. *Facilitation (6.5)* 2. *Consciousness raising (6.7)* 3. *Repeated exposure (6.7)* 4. *Personalise risk and Framing (6.7)*	1. *SCT* 2. *HBM, PAPM, TTM* 3. *TL* 4. *PAPM*	1. *Provide resources that are targetting social support and provide instructions to the participant on how to engage the social supporter.* 2. *Provide scientific information on why support from social actor is beneficial.* 3. *Repeat information on the important role of a social support network throughout course.* 4. *Provide information on the risk of not involving social support.*
SOC1.10.1, SOC2.11.1	Communicates with social relationships whether positive changes can be noted	1. *Verbal persuasion (6.11)* 2. *Modelling (6.5)* 3. *Public Commitment*	1. *SCT, TSR* 2. *SCT, TL* 3. *TAIHB*	1. *Participants are encouraged to think that talking to social support is within their capability.* 2. *Provide example on how to broach the conversation with social support.* 3. *Stimulate pledge to discuss changes with social supporter by including it as an exercise in the programme.*
SOC.1.10.2a, SOC2.11.2a	Schedule time to engage with social actor	1. *Goal setting (6.11)* 2. *Implementation intentions (6.8)*	1. *GST, TSR* 2. *TGDB, TAIHB*	1. *Provide exercise that actively gets participants to schedule time to discuss the programme.* 2. *Include implementation intention exercise in booklet that prompts participants to set a time to engage with social actor*
Describes				
K3.1a, K3.4	– Mental health and the positive effects of engaging in psychological health training	1. *Elaboration (6.6)* 2. *Using Imagery (6.6)* 3. *Arguments (6.9)* 4. *Facilitation (6.5)*	1. *IPT, ELM* 2. *TIP* 3. *CPM, ELM* 4. *SCT*	1. *Participants provides can provide facts about psychological health, its prevalence and how it affects everyone on a day-to-day basis (includes definitions).* 2. *Participants can use physical fitness and physical health as analogy to relationship between MI and Wellbeing* 3. *Participant can talk about the scientific evidence that underpins the programme and point out this information in the programme material.* 4. *Guide participants to the programme material that allows them to gain an understanding of the positive effects of training. Create a resource for the social supporter.*
K3.1b	– The components of the training participant's psychological health strategy	1. *Facilitation (6.5)* 2. *Direct Experience (6.9)*	1. *SCT* 2. *TL*	1. *Get training participant to write down what their strategy is about and provide an exercise that lists out the training components, which the participant can show to the supporter.* 2. *Supporter is actively involved in the strategy by practicing various evidence based mental health activities with the training participant.*
K3.1c	Professional support contact information	1. *Facilitation (6.5)*	1. *SCT*	1. *Provide resource for social supporter that lists professional support numbers, and explains how, when and why to reach out to them.*
K3.3	– Strategy activities of individual that benefit from social supports engagement	1. *Facilitation (6.5)* 2. *Direct Experience (6.9)*	1. *SCT* 2. *TL*	1. *Get training participant to write down what their strategy is about and provide an exercise that lists out the training components, which the participant can show to the supporter.* 2. *Participant is actively involved in the strategy by practicing various evidence based mental health activities with the training participant.*

(Continued)

TABLE 2 | (Continued)

	PO	Change objectives	BCT	Theory	Practical applications
	K3.6	*Understands that they can access measurement and training themselves*	1. *Persuasive Communication (6.5)* 2. *Facilitation (6.5)*	1. *CAPM, ELM, DIT* 2. *SCT*	1. *Create information material which indicates how to access the training and the measurement platform.* 2. *Create support material for training participant to hand out to supporter.*
life about Capabilities & identity	**Express positive attitude**				
	BI3.1	– That engaging in psychological activities will be beneficial to individual's psychological health	1. *Persuasive Communication (6.5)* 2. *Consciousness Raising (6.7)* 3. *Direct Experience (6.9)*	1. *CAPM, ELM, DIT* 2. *HBM, PAPM, TTM* 3. *TL*	1. *Participant to provide information on how training can lead to important benefits in people's life across a number of domains in easy-to-understand resource.* 2. *Get social supporter to reflect on why training would be relevant to their own personal life and motivators, and whether they have seen other people improve after actively working on their mental health.* 3. *Get social supporter directly involved in activities, thereby aiming to see noticeable changes in both participant and themselves.*
	BI3.2a	That reflection on personal psychological health profile will be beneficial to themselves	1. *Consciousness raising (6.7)* 2. *Persuasive Communication (6.5)* 3. *Framing (6.7)*	1. *HBM, PAPM, TTM* 2. *CAPM, ELM, DIT* 3. *PMT*	1. *Get participants to reflect on why they think taking regular health check-ups is a good idea, but why they don't do this for their mental health.* 2. *Provide short resource on evidence-base behind the measurement tool.* 3. *Try and use a loss and gain frame to highlight the benefits behind the measurement tool.*
	GB3.3, 3.4	Develops personal goal for monitoring strategy use of individual	1. *Facilitation* 2. *Planning Coping Responses (6.8)* 3. *Goal-setting (6.11)* 4. *Implementation Intentions*	1. *SCT* 2. *ATRPT, TGDB* 2. *GST, TSR* 3. –￼	1. *Facilitate an exercise for supporters to set a goal to help the participant.* 2. *Get supporter to think about potential barriers to executing the goal and ways to overcome them.* 3. *Supporter develops a goal to engage in participating in psychological health activities.* 4. *Create space for implementation intentions in material.*
	GB3.1	Schedules time to learn strategy from training participant	1. Facilitation	1. SCT	1. *Create a specific task for the supporter to schedule time.*

Notes: Change objectives are coded in line with their determinants, with determinants being coded as follows: Knowledge (K), skills (S), beliefs about capabilities and consequences, and identity (BI), goals and behavioural regulation (GB) and social influences (SOC). Each change objective stems from their matrices of change and can be found using the number after the letter it belongs to. When multiple change objectives belong to the same determinant and performance objective, change objectives are separated by alphanumeric symbols. ATRPT = Attribution Theory and Relapse Prevention Theory, CPM = Communication-Persuasion Matric, DIT = Diffusions of Innovation Theory, ELM = Elaboration Likelihood Model, HBM = Health Belief Model, GT = Goal-setting Theory, IPT = Information processing theories, PAPM = Precaution Adoption Process Model, PMT = Protection Motivation Theory, RAA = Reasoned Action Approach, SCT = Social Cognitive Theory, SCOT = Social Comparison Theory, TAIHB = Theories of Automatic, Impulsive and Habitual Behaviour, TGDB = Theories of Goal-Directed Behaviour, TIP = Theories of information processing, TL = Theories of Learning, TPB = Theory of Planned Behaviour, TSD = Theories of Stigma and Discrimination, TSR = Theories of Self-regulation, TTM = Trans-Theoretical Model.

TABLE 3 | Table describing the overall content for the individual sessions of the Be Well Plan.

Pre-programme	**Participants are sent an invite to complete a pre-programme measurement that measures outcomes of mental wellbeing, resilience, and distress due to mood problems, anxiety, and stress. This results in an online report, which provides explanation on the findings and points participants to resources they can explore.**
Session 1: getting on the same page	• Introduction to facilitators and the group norms. If presented online, particular focus will be placed on explaining the software. • Participants self-reflect on the reasons for participating in the programme and reflect on their personal drivers. Facilitators provide insight into their own drivers to work on their mental health by sharing them with the group. • Participants share their personal drivers with other group members in small groups. • Participants acquire basic knowledge on mental health and definitions for key concepts such as mental health and resilience to create a common language and understanding. • Facilitators delineate scope of the programme: focus on building mental health not treating mental illness. • Participants explore importance of believing in malleability of mental health and the need to have a growth mindset. Evidence on malleability is presented. • Participants are asked to reflect on most surprising thing they learned so far. Participants do a small group sharing exercise where they discuss their choice. • The evidence for different psychological interventions is presented. Participants learn that finding activities that work for their specific situation is key. • Participants are introduced to the fact that over the course of the programme they will practice different ways of making activities work for them. • Participants are introduced to a number of easy mindfulness activities and are asked to choose one to practice during the week based on their own personal preference (the first way to tailor activities). • Participants are asked to set a goal and are introduced to the concept of tiny habits/implementation intentions as a technique to improve the chance of goal-attainment. • *Homework: complete measurement if participants have not completed it before the training.*
Session 2: using your mental health profile	• Participants reflect on their first week of using their plan and how their mindfulness activity worked during the past week. They reflect on whether they need to adjust their plan. Participants share reflections in small groups. • Participants get familiar with the concept of self-compassion (as opposed to self-criticism) and how it can be used to learn from failure and shape our thinking patterns. • Participants practice a self-compassion activity and share their reflections in small groups. • Participants interrogate their measurement result stemming from the integrated measurement. Facilitators can share their own results with the group. • They identify areas they can improve on and select one outcome (wellbeing, resilience, mood, anxiety, and stress) they want to focus on for this session. • Participants are introduced to activity finders: flow charts that map evidence-based activities to each of the activities. • Participants use the activity finders to explore activities they can add to their plan focused on their outcome of choice. Tailoring activities to their outcome of choice is the second way of tailoring that is presented in the programme. • Participants pick one activity from the activity bank to add to their Be Well Plan and will set new goals for the week. • Participants are introduced to the use of prompts and reminders as another method to increase goal attainment. *Homework: complete a survey that allows participants to identify their own values.*
Session 3: your resources and challenges	• Participants reflect on week 2 and make changes to their plan if needed. Participants share reflections in small groups. • Participants work with (and are reminded of) existing resources to their own mental health *via* two practical activities. • The first activity gets participants to choose pictures that display sources of meaning in their life. Participants share the pictures in small groups. Facilitators show their own pictures to start the activity. • The second activity gets participants to identify core values that can be used to guide their life decision and their goals. Participants share which values are important to them. Facilitators share their own values. • Participants then use a custom questionnaire to identify a key resource or challenge they want to work on for the next week. These resources and challenges can be psychological, Interpersonal, health behavioural or external. • Participants are introduced to a new activity finder that maps evidence-based activities to each of the challenges and resources. • Participants explore new activities mapped to the resources and challenges and pick one new activity from the activity bank to add to the Be Well Plan. This is the third way participants are taught to tailor activities. • Participants finish the session with adjusting their Be Well Plan and are reminded of the importance to celebrate small wins related to their mental health (i.e., when they practice activities in line with their Be Well Plan. *Homework: Participants are asked to choose and reach out to a social supporter as part of their weekly activities.*
Session 4: stress, coping, and resilience	• Participants reflect on week 3, adjust their plan if needed and share their reflections in small groups. • The concept of stress and eustress is introduced, and participants learn the effect of stress on our mind and body. • Participants learn about coping strategies (avoidance-focused coping versus more helpful ways, e.g., problem-focused coping). They complete an activity where they reflect on when they used different coping strategies and what impact it had on them. • Participants are then walked through various ways of effective coping using psychological techniques, including identification of cognitive traps and the use of thought defusion. • Participants complete example activities related to cognitive traps and thought defusion in their own life. They share their reflections with other participants in small groups. Facilitators provide examples of their own life. • Participants learn about the importance of asking for help, both from their social support network and professional services. • Participants then choose one new activity specifically focussing on coping using a final activity finder. • They add the new activity to their Be Well Plan. *Homework: participants are asked to complete another measurement, the results of which will be used during the next session.*

(Continued)

TABLE 3 | (Continued)

Session 5: future-proofing your Be Well Plan	• The participants reflect on the past 4 weeks, what has worked and what has not. Participants share reflections in small groups. • Participants are asked to investigate how their measurement results have changed over the 4 weeks. • The facilitator will introduce the concept of realistic optimism, growth, the fact that progress comes with ups and downs and that it is a slow and gradual process to see change. • They are introduced to Positive Reframing as a technique to deal with setbacks. • Participants will then build their final Be Well Plan, which aims to summarise key learnings from the previous weeks into a standalone plan. • Participants summarise what their best possible mental health looks like. They share their best possible mental health with group members. • Participants highlight their unique drivers and motivations, and existing resources and challenges in their life. They write down the values that are important to them. • Participants set a longer-term mental health goal. • Participants choose the activities they wish to add to their "final" Be Well Plan. They identify their key supporters and reflect on what support services they need in case of emergency.

all individual components including the sharing exercise, e.g., *via* breakout rooms in conferencing software.

The programme was designed to be delivered without the clear requirement of clinical staff, with the programme utilising a Train-the-Trainer methodology to ensure reach and scalability (Pearce et al., 2012). The facilitators are trained over the course of several week, with a minimum total training time of 26 h. Facilitators in the programme model each of the common activities that are practiced in sessions. This involves facilitators walking participants through the activity, sharing their own experiences of the activity and how they have integrated it into their life. This strategy aims to facilitate a connection between facilitators and participants, in alignment with the importance of the therapeutic relationship in psychological interventions (Clarkson, 2003).

Finally, the programme has an active integration with technology. At the start of the programme participants fill out an online mental health measurement looking at outcomes of mental wellbeing, resilience, and distress, which results in a tailored report. Individual reports serve two purposes: improving the wellbeing literacy (Green et al., 2011) of participants, as well as providing a sense of agency over mental health changes (Schroder et al., 2017). Participants complete the assessment at the start and the end of the programme, allowing them to track their outcomes of interest and "test" whether their personalised strategy has had the desired effect. They also use the results to select an outcome they want to work on during session 2.

DISCUSSION

This article outlines the use of an intervention development framework to guide the design and development of a mental health intervention. Significant detail about the development process and the intervention itself is provided to allow transparency for end-users, researchers, practitioners and policy makers who may wish to access, evaluate or replicate the programme. At the same time, it serves to illustrate a methodology that allows for improving the reporting of development and design processes for psychological interventions. Firstly, we will discuss the Be Well Plan in the context of other existing mental health interventions.

Secondly, we will discuss the implications of using this reporting approach which provides an extensive descriptions of intervention methodology and design, and compare its strengths and limitations to other approaches.

Although a plethora of mental health interventions exist, the needs analysis that underpins the Be Well Plan led it to be designed differently to most other interventions in various ways, e.g., the need for a focus beyond mental illness, the need to personalise, and the need to focus on behaviour change. Firstly, most existing mental health interventions are focused on treating mental *illness* (Das et al., 2016) and not necessarily building or promoting mental *health* (Keyes, 2007). Simply relying on techniques designed to treat symptoms of illness could be limiting for a mental health promotion intervention that aimed to be suitable for clinical and non-clinical populations, considering the existence of differential antecedents for mental illness and wellbeing (Kinderman et al., 2015). For example, simply extrapolating techniques that were developed to address maladaptive thought patterns might only be relevant for a proportion of participants, whose maladaptive thoughts patterns are the cause of their challenges, rather than for instance a lack of purpose or positive social relations. Similarly, traditional "wellbeing" interventions such as positive psychology interventions are typically designed to target positive constructs, and do not necessarily address the potential maladaptive antecedents of poor mental health (Seligman et al., 2005). A notable exception can be found in ACT-based interventions as they address both states (Fledderus et al., 2012), although they are still typically applied in the context of mental *illness* rather than promotion of *wellbeing* (Doorley et al., 2020).

The Be Well Plan is "theory agnostic" and explicitly deviates from existing interventions that are underpinned by a set therapeutic paradigms. A broad variety of interventions based on CBT, ACT or positive psychology exist (Hofmann et al., 2012; Öst, 2014; Carr et al., 2020). While they have demonstrated, on average, significant impacts on mental health outcomes, there is no decisive evidence to suggest that these are the only valid approaches to improving mental health, particularly when the focus is on mental health promotion and not simply the treatment of mental illness (Slade, 2009). Rather, the Be Well Plan includes a set of empirically derived psychological activities from across paradigms targeting various

antecedent, with which the participant experiments with, drawing a parallel with process-based therapies (Hofmann and Hayes, 2019). Future studies that focus on outcome evaluation are planned to validate whether this approach will lead to cause the hypothesised positive impact on mental health outcomes.

Furthermore, a key aim for the programme is to create lasting behavioural change for participants, using guidance from behaviour change taxonomies (Kok et al., 2016). Instead of providing participants with activities and leaving it up to participants to decide which activities can be used as part of their life journey to good mental health, the programme encourages participants to match and experiment with activities to their needs, which may be driven by distress or illness, by wellbeing needs or by both. This approach is in line with a personal recovery approach to mental health promotion, which is captured by Anthony (1993) as "a deeply personal, unique process of changing one's attitudes, values, feelings, goals, skills, and/or roles. It is a way of living a satisfying, hopeful and contributing life, even within the limitations caused by illness." The focus of the intervention is to guide participants to develop a sustainable wellbeing plan and provide them with tools to monitor their mental health over the life-course. This required the integration with an online assessment that facilitated real-time reporting. While tracking of change as a result of interventions is common in e-health solutions, particularly those focussing on Ecological Momentary Assessment (Shiffman et al., 2008), the integration of reporting capability in group-based interventions is uncommon. It follows the growth in popularity of outcome monitoring (Carlier et al., 2012; Boswell et al., 2015), where health practitioners are able to monitor treatment progress, and expands this by providing this same real-time capability to participants; a principle which is not typically seen in group-based programmes. This fundamentally aims to provide self-agency and gives the participant ownership over and accountability on their own mental health, now and in the future (Clarke et al., 2014).

Detailed outcome evaluation will be needed to determine the impact of the approach chosen in the Be Well Plan. Two studies have, at time of writing this manuscript, been completed, with further studies underway. The first completed study was an uncontrolled intervention study aimed at determining the initial impact of the intervention, finding significant improvements in outcomes of wellbeing, resilience, and psychological distress, most notably for those with more problematic mental health scores at baseline (van Agteren et al., 2021a). Preliminary findings of a randomised controlled study are replicating the positive findings of the first study, with a manuscript currently being prepared. The Be Well Plan evaluation is ongoing, with future studies focussing on investigating who benefits most from the intervention and investigating the impact of different formats of the Be Well Plan (e.g., face-to-face versus online) as well as its longer term impact, including comparing its impact to other psychological intervention types.

Improving the Reporting Standards for Mental Health Intervention Research

The article aimed to provide a foundation for anyone who seeks more detailed information about the Be Well Plan's scientific foundations. Using an extensive intervention development process such as IM to document intervention design allows for detailed replication of the theoretical approach to the programme. By doing so, IM provides a specific methodology to improve attempts at reproducibility and replicability, following other positive developments in reporting standards for interventions and research. One example of such a development is the more frequent use of checklists such as the TIDieR checklist (Hoffmann et al., 2014). While TIDieR asks detailed questions regarding theoretical underpinnings, materials, procedures, tailoring, and iterations, it lacks a focus on describing the individual detailed components of the intervention such as the one reported in **Table 2**. Merely requesting researchers to explain that their intervention was based on for instance CBT-based principles or the Theory of Planned Behaviour does not provide sufficient details about the exact design principle of intervention components. A more detailed approach, *via* the use of taxonomies and ontologies to break down intervention components into active building blocks, is becoming more frequent (Larsen et al., 2017). The development of matrices of change, use of BCTs and guidance from the TDF provides an in-depth explanation of each component of the intervention, which can provide an extra safeguard at achieving intervention impact.

The use of IM or similar approaches such as the Behaviour Change Wheel (Michie et al., 2011b) also protects against a limitation of reporting checklists. These checklists are often used *after* the intervention has been designed, even if they were supposed to be used to guide design and studies. By using intervention development frameworks, the exact steps of the *development* process are captured throughout the entire project (Eldredge et al., 2016). This extensive process does come with its own limitations (Peters et al., 2015), including their requirement of resources. This ultimately also influenced the way the Be Well Plan was developed as it mainly on a small "core" group of contributors (JA, MI, GF, and KA) who guided the large majority of the development work, while the larger multi-disciplinary group provided input at half a dozen meetings and at key touch points. This was mainly the result of practical constraints (e.g., availability to contribute in-kind on top of existing workloads) and on lack of familiarity with the process, which poses a general limitation to methods such as IM (Eldredge et al., 2016). If programmes require rapid development with limited resources, using the current framework might at first glance not be favoured over a more pragmatic approach. The ultimate effectiveness of programmes that are designed, developed and implemented within short periods of time without adequate methodological considerations, may however be suboptimal in their ability to change outcomes and limit our ability to advance psychological science and improve mental health research. Adoption of

rigorous development methodologies and investing resources in their use, such as is demonstrated in the case of the Be Well Plan, may be a way to counter this, pushing us another right step in the direction of scientific rigour in psychological intervention research (Prager et al., 2019).

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by underpinning data stems from a variety of studies approved by the Flinders University Social and Behavioural Research Ethics Committee, project numbers (PN) 7834, 7891, 7350, 7358, 7221, 7218, and 8579. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JA and MI: project methodology, needs analysis, programme objectives, theoretical framework for programme, programme material development, and manuscript write-up. KA: project methodology, programme objectives, theoretical framework for programme, programme material development, and manuscript write-up. DF: programme objectives, theoretical framework for programme, and manuscript write-up. GF, LW, and AH: programme objectives, theoretical framework for programme, programme material development, and manuscript write-up. MK: project methodology, guidance of process and clinical input, and manuscript write-up. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

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Supplementary appendix to

"Improving the reporting standards for developing psychological interventions: utilising the Intervention Mapping approach to design a mental health intervention."

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Section 1. Development process

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1. Project governance

Project development responsibilities were split into three levels. The initials below refer to the main authors of the manuscript.

- Level 1: the project leads. The main responsibility for guiding the project was placed with JA and MI, who together coordinated the development of the training and its implementation. They were overall responsible for the needs analysis, creation of the majority of program materials and the scientific rational.
- Level 2: the project group. The project leads worked closely together with the project group (DF, LW, KA, MK, GF, AH) who supported the project leads in development of material and the validation of the design process for all the Intervention Mapping steps.
- Level 3: the stakeholder groups. The training was developed by involving two stakeholder groups. The first stakeholder group consisted of professional staff working for the South Australian Health and Medical Research Institute (SAHMRI) Wellbeing and Resilience Centre (WRC), who deliver mental health training and provide wellbeing assessment to community members. They brought expertise in delivery and implementation of mental health training in various population cohorts (older adults, disadvantaged youth, workforces etc) and played a crucial role in ensuring that the new program can be implemented and scaled outside of a research setting. The second stakeholder group consisted of a multi-disciplinary team of academics and professionals working at Flinders University (Adelaide, Australia) who specialised in psychology, social work, education, group-work, student services, wellbeing research and physical health behaviours. These groups were actively used to underpin step 1-3 via serious of meetings to help shape the steps and validate them once the project group finalised the content to each step.

2. Design process

Firstly, the project leads verified the need to create a new training program in 2018 after conducting formative research and established the requirement to use Intervention Mapping (1) to guide the project. The formative research involved a preliminary needs analysis and determined the need to conduct a systematic review to determine effective intervention components, see main manuscript for the needs analysis findings. The project leads went on to engage the first stakeholder group to test the initial draft needs analysis and program objectives (IM steps 1 and 2). After verifying that the focus was in line with expectations, the project leads worked on finalising the needs analysis, and drafted the initial program objectives and draft matrices of change.

Parallel to this process, the project group and the second stakeholder groups were engaged in 5 general meetings and various sub-meetings to provide input into and validate the results of IM step 1 to 2. The second stakeholder group was furthermore involved in validating step 3, ultimately resulting in a theoretical backbone to the training. The project leads used the input from these meetings to further develop the theoretical intervention components and the draft content into a preliminary program. First a program delivery framework was created, outlining the proposed sessions (the Be Well Plan was designed to take place over multiple weeks, which we refer to as sessions), the underpinning rationale for each of the sessions and the delivery format for the training. This theoretical framework for the Be Well Plan was evaluated and approved by both stakeholder groups. The design process which solidified the theoretical rationale took a total of 10 months.

The project group, led by the project leads, went on to develop a written version of the program in the form of a program booklet. This had the purpose of creating the narrative for the program and allowed for the booklet to be used as an underpinning resource, e.g. to be used in case participants would miss a session. The program booklet was subsequently used to underpin the session structure for the interactive training and its materials, most notably the workbook, the presentation slides and the supporting trainer notes. The Be Well Plan was aimed to be delivered using multiple formats including in-person delivery and online facilitated delivery (over platforms such as Zoom (2)). The team set out to first test and iterate the in-person delivery.

4 testing and iteration

The subgroup completed a first draft of each session and the accompanying materials and performed two small-scale pilot tests: one in university students (n=30) and one in colleagues of the project team members (n=7). During these pilot tests several improvement areas were noted, including the need for simplification of materials and the creation of program materials that was suitable for vision impaired participants; the colour scheme and various examples caused issues for a participant with severe vision impairment. The project team met on various occasions to improve the training materials in response to the pilot over the course of January to February 2020 and involved a professional designer in the final program material designs.

After initial testing of the in-person version, further in-person testing was placed on hold as a result of the COVID-19 pandemic, which constrained in-person delivery within Adelaide (Australia), as restrictions on gatherings came into place in March 2020, see van Agteren et al. (3) for a brief description on the impact of COVID-19 in South Australia. As a result, testing of online delivery of the training was fast-tracked. The training was re-formatted to fit the online setting (e.g., certain activities would not work on online formats) and the training was recorded in full as a contingency for when online facilitated delivery would not be feasible. This had the added benefit that participants who missed a session could continue in the program without missing important educational content. The online delivery was predominantly performed via the online conference software Zoom (version 5.3). Zoom was chosen as it allowed the training to stay true to some of its core principles including the need to share in small groups (via the breakout room function), the ability to access Zoom without an account and the visual lay-out working well for groups of maximum 30 participants.

Section 2. Needs Analysis Supplement (step 1)

Determinants for change choice justification

The below table describes the justification for choice of behaviour change determinants underpinning the logic model for change. The table lists the determinants as described in the Theoretical Domains Framework (TDF) (4) and provides a definition for the determinant. It then provides a judgement of the relative perceived importance in relation to the Be Well Plan and the judged changeability of the determinant in the context of the training. It then provides a simple judgement of inclusion and a brief written rationale to underpin the judgement.

Determinants	Definition in IM	Importance	Changeability	Include	Why
Knowledge	An awareness of the existence of something	++	+++	YES	Having an understanding of the importance of mental health and wellbeing, how you can influence it and how this intervention can help improve it is. It is a pre-requisite for the intervention components to work and to build motivation for change.
Skills	An ability or proficiency acquired through practice	++	++	YES	Competence in dealing with situations that can threaten mental health and wellbeing is necessary by practicing skills or activities. Mastery of skills is essential to the program.
Social/professional role and identity	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting	+	+	NO	The main focus is to design an intervention that works regardless of social identity or social roles. It is not the main focus of the intervention, but may be considered in the implementation phase for project delivery.
Beliefs about capability	Acceptance of the truth, reality or validity about an ability, talent or facility that a person can put to constructive use	+++	++	YES	Empowerment and sense of agency are desired states to ensure participants feel adequate in being able to deal with stressors and adversity when it arises. Increasing self-efficacy is an important precondition to learn behaviours that are associated with a stigmatised outcome (such as mental health outcomes).
Optimism	The confidence that things will happen for the best or that desired goals will be attained	+	+	No	The intervention will rely on beliefs about capabilities and consequences, and goal setting to ensure that end-states are achieved. Specifically targeting optimism is out of scope. The topic of realistic optimism is however touched upon when investigating participant's changes in mental health levels.
Beliefs about consequences	Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation	+++	++	YES	The intervention will place emphasis on explaining how and why techniques used in the interventions are beneficial for health and wellbeing, thereby positively influencing beliefs

					and outcome expectancies. The belief that mental health is changeable is key to program impact.
Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus	+	+++	NO	Reinforcement is not the aim of the intervention content, but will be included in the design of the different 'vehicles' of the intervention in step 4, e.g. mobile applications.
Intentions	A conscious decision to perform a behaviour or a resolve to act in a certain way	+	++	NO	The intervention will aim to help the individual set a strategy and give them the ability to perform all steps in the strategy. The main goal of the intervention is not to act in a specific way, but rather to reach a goal and adjust the behaviours until that goal is achieved.
Goals	Mental representations of outcomes or end states that an individual wants to achieve	+++	+++	YES	In order to develop an overarching mental health strategy, the participant is expected to set gradient goals to help build the overarching outcomes. Will also include implementation intentions and action planning,
Memory, Attention and decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives	+	+	NO	No explicit focus is placed on memory and attention processes in the content or the underpinning construct. The construct will be taken into account when thinking of delivery format.
Environmental context and resources	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence and adaptive behaviour	++	+	NO	The environment is powerful in changing someone's behaviours. The aim of the intervention is to design a universal solution regardless of the presence of environmental blocks. When the intervention gets implemented within specific environments, this determinant can be addressed, but other than the impact of social relationships, will be a focus for the implementation stage.

Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours	++	++	YES	Peer relationships are closely related to our mental health, but are often ignored in interventions. The existing intervention will focus on bringing in loved ones, to ensure a supportive environment where possible
Emotion	A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event	+	++	No	While emotion is an outcome of the study, it is not specifically a direct determinant of action. Where possible, affective states will be improved in order to ensure optimal engagement with the intervention.
Behavioural regulation	Anything aimed at managing or changing objectively observed or measured actions	++	++	Yes	Application of behavioural regulation, which includes self-monitoring is relevant for physical activity behaviours underpinning the health component.

Collated feedback from previous training programs
Feedback recorded below summarises participant responses to the question what they liked about previous mental health group training and what they did not like. A number of academic papers have been written on the outcomes of the training that these participants took part in (5-8). The first column provides a code to identify different respondents. Each response is given a general topic and the implications for the Be Well plan are indicated. In the final column the actual anonymised response can be found. Any identifiers are redacted.

Responder ID	Overall topic	Implications for Be Well Plan	Quotes
WRC54	Facilitation	• Ensure trainer professionalism • incorporate sharing of personal reflections	[Trainers] worked very well together and transitioned from topic to topic very well. Both were passionate about the subject area. Both also prepared to be vulnerable and share personal experience relating to the topic.
WRC55	Facilitation	• Ensure trainer professionalism • incorporate sharing of personal reflections	[Trainers were] experienced, engaging, funny, with relevant stories
WRC2	Facilitation	• Ensure trainer professionalism • Build safe environment for sharing	Trainers had many effective skills but could be more effective with some tweaking and coaching on their presentation strengths and areas for improvement. Very engaging and passionate and made the audience feel comfortable.

WRC1	Facilitation	• Ensure trainer professionalism • Build safe environment for sharing	They were both great facilitators sharing genuinely good examples on each of the skills. They never made anyone in our group feel uncomfortable about sharing if they didn't wish to, very respectful. The training was also done at a nice pace "
WRC56	Facilitation	• incorporate sharing of personal reflections	The personal experiences were very poignant, and added a lot of value - whether the story was big or small.
WRC3	Facilitation	• Trainer qualities • Build safe environment for sharing	[Trainers had] Complementary styles, established an atmosphere of comfort/trust, genuine, fun, human!!
WRC6	Facilitation	• Build safe environment for sharing	[The Trainers] Created a great environment where it was reasonably easy to interact with others.
WRC4	Facilitation	• incorporate sharing of personal reflections	I appreciate the sharing of trainers personal stories as it made me realize 'it's not just me!
WRC5	Facilitation	• incorporate sharing of personal reflections	<3 Very approachable. Provided real life examples based on their own experiences. Made the material more tangible
WRC58	Facilitation	• Select diverse trainers where possible	I thought their diversity of style and delivery was engaging and interesting
WRC14	Format	• Create clear and simple resources	A spare booklet for note taking, the book isn't in order and note taking pages were limited.
WRC2	Format	• Ensure adequate session length and program timing	Some sessions … were too short for exercises. More time speaking with strength group on all top 5 so I guess we need [more days]
WRC15	Format	• Create clear and simple resources	A copy of slides or alternate notes Ways to consolidate training to become 'hard wired'
WRC16	Format	• Ensure adequate session length and program timing	Option for a course to be spread out over a longer period of time. More relatable examples used by some trainers. More take home materials or references
WRC18	Format	• Ensure that the sessions are engaging and offer a mix of content	mix up delivery methods as there is a bit of death by Powerpoint happening. You may find value in Dr. John Medina's work and Garr Reynolds Presentation Zen and Harvard's Making Thinking Visible. Consider drawing more upon the wisdom of participants even while teaching the concepts, not just in debrief.
WRC19	Format	• Create clear and simple resources	[Provide] Some take away que cards. Reminders of what we learned
WRC20	Format	• Ensure adequate session length and program timing • Ensure that the sessions are engaging and offer a mix of content	[Provide] More practical examples. [Provide] More time to practice the exercises
WRC25	Format	• Ensure adequate session length and program timing • Ensure that the sessions are engaging and offer a mix of content • Build safe environment for sharing	Less reflection, more funny videos to represent concepts with group discussion. Talking one on one with people we don't know about topics is confronting and at times uncomfortable. Course is very long, could be condensed
WRC26	Format	• Allow sharing of personally relevant experiences	I wasn't particularly interested with sharing personal examples in a group setting and it felt trivial discussing [smaller adversities]

WRC30	Format	• Ensure adequate session length and program timing	I had a bit of afternoon fatigue but not sure how to avoid that.
WRC33	Format	• Ensure that the sessions are engaging and offer a mix of content	More time up and out of our seats doing activities with different people. I know not everyone likes being active in trainings but I think it could have added another element for different learning styles.
WRC34	Format	• Build in sufficient opportunity to ask clarifying questions	Expand more on areas of ambiguity, like what was done when difficult questions were asked (very well handled btw)
WRC37	Format	• Provide opportunities for follow-up after the program • Streamline registration process	Some type of a follow up program to track how people put it in practice. Registration / initial tests were somewhat messy. Two different websites, messages from different people etc
WRC36	Format	• Clearly indicate scope of the program • Provide clear background to role of biopsychosocial factors	I strongly disagreed with the idea that wellbeing begins with the individual, I don't believe this is an evidence based concept and in my work as a social worker what I have learnt is that relationships and communities and societies have an enormous impact on our wellbeing, so I think it's important to acknowledge this and to acknowledge the things we can and cannot control, to avoid the danger of being overly individualistic. We have to be very careful not to tell people that they are responsible for their own adversity or failures. It is not possible to CBT yourself out of structural disadvantage or complex trauma. So, acknowledging limitations of this course is important I think. I also found the slide at the beginning about mental disorder being at the opposite end of flourishing to be slightly misleading and problematic as someone with a diagnosis can also be flourishing at the same time!
WRC40	Format	• Ensure that the sessions are engaging and offer a mix of content • Provide opportunities for follow-up after the program	More interaction with other participants. More activities for experiential learning. Definitely requires follow up program.
WRC42	Format	• Build safe environment for sharing	Advance notice that multiple scenarios required Adversities "Interpersonal problems" …. forewarned is forearmed
WRC54	Format	• Ensure that the sessions are engaging and offer a mix of content • Ensure adequate session length and program timing	1. Move the groups around a bit more during the day to encourage people to work with different people and get even more perspectives on issues. 2. Option for a walking lunch - walk and talk around the block. take a theme and share it with a partner. new perspective outside the building 3. Sometimes the slides moved very quickly - hard to take notes. Would be great to have a copy of these.
WRC55	Format	• Ensure that the sessions are engaging and offer a mix of content • Ensure adequate session length and program timing	Materials could be more comprehensive. Slides have lots of info and there isn't enough time to write them all down. More moving around and working with other people than predominantly with the same people.
WRC13	Format	• Build safe environment for sharing	I found it awkward when people started raising big picture issues or problems in their lives. This course tried to just deal with the small or medium issues but when people raise significant issues from their lives the conversation gets heavy and it feels like the presenters are not sure where to go with it. Hard balance to keep the conversation light but still meaningful and useful.

WRC23	Format	• Clearly indicate scope of the program	I think the course was very good as an introduction, I was anticipating something more in-depth and challenging, it did not offer me the depth I was looking for, but I take responsibility for not considering it more carefully.
WRC47	Format	• Ensure adequate session length and program timing • Provide opportunities for follow-up after the program	There was a lot of content covered that it could almost be made into a longer course to allow time to fully delve into the skills. The course can be a bit emotionally challenging but not much you can do about that…There could be a shorter follow-up course to allow further integration of skills and discussion.
WRC49	Format	• Clearly indicate scope of the program • Aim for a balance between depth and reach	Would have enjoyed more time and some greater depth - but wouldn't fit into this course in the format, will try to read further myself or do you run other courses with longer / more details / more exploration of these ideas? I missed some people's comments - could not hear without microphone I would prefer examples given to use in ETR, ACR
WRC50	Format	• Aim for a balance between depth and reach • Ensure that the sessions are engaging and offer a mix of content	I really [the] training and I have a lot to apply. For me (personally) I believe the content could have been covered over one day with smarter breaks. I also found that the workbook relies on note taking of most topics …. I found the exercises in the workbook to be repetitive and I felt certain participants in my group didn't take them as seriously as two days went on and may have got a little bored of this style of repeat exercises.
WRC51	Format	• Ensure adequate session length and program timing • Aim for a balance between depth and reach	Not really enough time for group discussions to talk between one another. I felt that I already practice a lot of these skills so would be interested in learning more about turning around conversations from people who are not resilient. The course focused very much on improving my own wellbeing and less on that which surprised me.
WRC52	Format	• Ensure adequate session length and program timing	Really enjoyed the course, thank you, but sometimes felt the discussion sessions were a bit rushed.
WRC53	Format	• Ensure adequate session length and program timing	At times a little more time to discuss with partner to understand limits. Good materials of own reflections to keep as ongoing reference material.
WRC60	Format	• Ensure that the sessions are engaging and offer a mix of content • Clearly indicate scope of the program	I think there could have been more group activities which involved moving into different groups and interacting with other staff members. There was a lot of "reading from the powerpoint" The presenters were very enthusiastic. Some aspects of the program could cause tress to people who have been through traumatic events in their lives. Some traumas do not lead the person involved to "find a positive" and can make them feel guilty that they are not coping as well as they "should"
WRC61	Format	• Create clear and simple resources • Ensure adequate session length and program timing	The booklet would be most helpful if it followed the sequence of the training. Understand pace to fit all content but not really enough time to really think through and record goals/plans activities.
WRC66	Format	• Ensure adequate session length and program timing	like any [Professional Development] day I find myself falling off past 2pm.

WRC68	Format	• Ensure adequate session length and program timing	Just wondering if it would be better to split the [training] up as I found the [format] a bit tiring.
WRC69	Format	• Provide opportunities for follow-up after the program & embedding during the program	This training program is really useful for an individual. But noticed some people do not implement in their life and behaviour.
WRC44	Format	• Provide opportunities for follow-up after the program & embedding during the program	[Provide] Opportunity to practice over time. Split training
WRC28	Format	• Provide opportunities for follow-up after the program & embedding during the program	I enjoyed it. Two full days. Might be better one day a week for two weeks. To avoid the overload feeling and allow time to process the information before being given more information
WRC1	Improvement points	• Create clear and simple resources • Ensure a follow-up process	More space to write in our booklets (I didn't bring any note paper) … Not sure if it's coming - but maybe an email reminder down the track to remind us of the skills so we can try continuing regularly using them
WRC7	Improvement points	• Ensure a follow-up process	Implement a follow up session / webinar to check in and share our journey.
WRC8	Improvement points	• provide examples to improve reflection	[Provide] some scenarios for people within the booklet who struggle to come up with their own situations … That's all I can think of!
WRC17	Trainers	• provide examples to improve reflection	The trainers were great at interacting and connecting with the audience (me), the examples that they provided in every … topic was reflective which help[s] strengthen the understanding of each skill topic.
WRC38	Trainers	• Use easy-to-understand language	Delivery, facilitators were amazing. Also, the consistent and simple to understand language that is used.
WRC39	Trainers	• Use easy-to-understand language	Facilitators were passionate but also didn't over talk. Delivery kept it interesting and easy to keep attention.
WRC62	Training	• Provide a safe space for participants • Ensure group norms are clear up front	As someone with a childhood (teenage years) trauma (sexual assault) I found [an example] too confronting so I deeply appreciated how you provide space @ "permission " for people to leave the room from the start. To be honest, if I hadn't been seeing a psychologist every 2 weeks or so for the past 18 months, most of this would have been too much for me to process.
WRC14	Training strengths	• Ensure that the sessions are engaging and offer a mix of content	Beneficial for both personal and professional use. A relaxed and open minded setting where everyone feels comfortable to speak their voice. Break times with yoga stretches were awesome!
WRC7	Training strengths	• Allow reflection, practice and sharing • Highlight evidence-base	Based on research, practical application with lots of opportunities to practice.
WRC8	Training strengths	• Allow reflection, practice and sharing • Highlight evidence-base	That they had examples and visuals to support what they were saying. The course was evidence based and provided opportunities to take down names of studies to continue to read at a later date.

WRC3	Training strengths	• Provide a safe space for participants	Atmosphere of trust & enjoyment, meeting new people & hearing of different experiences & perspectives. Applying all skills to real life. Encouragement gained from course.
WRC6	Training strengths	• Ensure that the sessions are engaging and offer a mix of content	As I don't like role-play, I found the group work/discussions etc to be a less confronting experience
WRC10	Training strengths	• Aim for a balance between depth and reach	Relatable to all walks of life. Well-rounded course with each section linking well to the next.
WRC21	Training strengths	• Ensure that the sessions are engaging and offer a mix of content	A great balance of theory and individual reflection/ practice
WRC24	Training strengths	• Provide a safe space for participants	Calm and peaceful trainers/atmosphere, honesty, applicable material personally and professionally
WRC27	training strengths	• Ensure that the sessions are engaging and offer a mix of content • Provide clear and simple resources	Great organisation and team-work. Great balance of information and activities. Really appreciate folder with booklet and gratitude book. Beautiful delicious food.
WRC35	training strengths	• Ensure that the sessions are engaging and offer a mix of content	Good mix of slides, videos, facts, quotes, examples and group work. Enabled content to be reinforced.
WRC41	Training strengths	• Balance group size	Interactions, group work. Groups were large enough for interactions but small enough for inclusion.

Section 3. Matrices of Change (step 2).

The below section provides the matrices of change for the Be Well Plan, looking at the behavioural and environmental outcomes.

Table S1

Matrices of change for behavioural outcome 1 showing the change objectives of each determinant and performance objective (PO).

Behavioural outcome 1: Engages in regular activities that are known to increase the mental health and wellbeing of the individual

Code	Performance Objective	Determinants				
		Knowledge	Skills	Beliefs in capabilities & consequences	Goals and Behavioural regulation	Social influence
PO 1.1	**Creates understanding of mental health, and its relationship to mental illness and wellbeing**	**K1.1a** Defines mental health, wellbeing and mental illness **K1.1b** Lists behavioural and non-behavioural factors that are associated with psychological health outcomes **K1.1c** List positive outcomes associated with good psychological health	**S1.1** Demonstrates ability to process entry-level information on psychological health	**BI1.1** Expresses positive attitude towards learning about psychological health		
PO 1.2	**Understands that good psychological health can actively be achieved via different intervention types, regardless of physical or mental illness**	**K1.2a** Lists evidence-based interventions to build psychological health **K1.2b** Explains the way intervention types can influence psychological health **K1.2c** Explains current evidence-status for individual intervention types on improving psychological health	**S1.2** Demonstrates capacity to determine whether or not interventions are based on evidence	**B1.2a** Expresses positive attitude towards learning about different interventions to build psychological health **B1.2b** Judges that psychological health is malleable via different interventions **B1.2c** Beliefs in one's own ability to judge evidence on interventions and to relate back to own experience		
PO 1.3	**Understand that personal characteristics influence which interventions participant should be considering to improve mental health**	**K1.3a** Explains that personal characteristics and context has an impact on personal impact of interventions **K1.3b** Understands that personal characteristics and contexts for an individual may change, which can influence the impact of interventions	**S1.3** Demonstrates capacity to reflect on personal characteristics that apply to the individual	**BI1.3** Expresses positive attitude towards interrogating personal characteristics		
PO 1.4	**Understands that good psychological health requires a life-course approach**	**K1.4a** recalls evidence that discusses fluctuations in psychological health outcomes throughout life **K1.4b** understands that psychological health over the life-course requires a committed approach			**GB1.4** Develops commitment to actively construe a strategy to build psychological health	

PO 1.5	**Is aware of personal psychological health profile (wellbeing, resilience and psychological distress)**	**K1.5a** Understands how to access measurement tools in the program to understand individual mental health **K1.5b** understands that psychological health consists of different personal outcomes	**S1.5a** Demonstrates ability to complete psychological health assessment methods **S1.5b** Demonstrates ability to interpret scores on psychological health assessment methods	**B1.5a** Expresses positive attitude towards validity of psychological health assessment methods **B1.5b** Expresses positive attitude towards measuring their psychological health profile over time		
PO 1.6	**Creates overview of resources and challenges for their psychological health**	**K1.6a** Lists common resources and challenges for good psychological health **K1.6b** Identifies personal and contextual resources for their psychological health **K1.6c** Identifies personal and contextual barriers to their psychological health **K1.6d** Describes importance of social relationships	**S1.6** Demonstrates ability to self-reflect on personal and contextual resources and challenges	**BI1.6** Has positive attitude towards expanding social support to build psychological health	**GB1.6** Monitors personal resources and challenges to psychological health over time	**SOC1.6a** Investigates social support for implementation of psychological health strategy **SOC1.6b** Determines influence of social identity to form psychological health strategy
PO 1.6.1	**Determines which resources and challenges are currently present, which can be improved on using the program and which ones are out of scope**	**K1.6.1a** Recalls scope of the program **K1.6.1b** Describes types of challenges that cannot be altered by a psychological skills training **K1.6.1c** Understands where to find help for psychological issues out of scope of the program	**S1.6.1** Demonstrates ability to determine which resources and challenges can be managed or improved by themselves	**BI1.6.1** Demonstrates positive attitude towards reaching out or using other mental health and wellbeing services		
PO 1.6.2	**Determines when other programs or services for mental health and mental wellbeing need to be considered**		**S1.6.2** Demonstrates ability to compare personal outcomes to target areas for the training		**GB1.6.2** Set goal to seek help for any psychological or social issues outside of the scope of the program	
PO 1.7	**Determines personal motivators for wanting to engage in activities that promote psychological health**	**K1.7a** Names list of motivators that drive human (health) behaviour **K1.7b** Describes the role that values play in steering positive human behaviours **K1.7c** Describes what a growth mindset is and how it aids in mental health improvement	**S1.7** Demonstrate ability to identify motivators to work on psychological health	**BI1.7a** Express positive attitude that psychological health *training in general* will be beneficial **BI1.7b** Beliefs that personal identity is congruent with focus of psychological health training **BI1.7c** Relates personal motivators to importance of engaging in psychological health activities **BI1.7d** Demonstrate a (positive shift towards) a 'growth' identity		**SOC1.7** Determines the reinforcing or inhibiting impact of their personal social environment on motivation for participation in the program

PO 1.8	Develops a personal psychological health strategy	K1.8a Describes the importance of developing a strategy of sufficient intensity K1.8b Explains how to access activities that can be used improve psychological health K1.8c Lists specific strategies that contribute positively to their psychological health	S1.8a Practices the use of psychological health activities during training S1.8b Practices the use of psychological health activities after training S1.8c Develops competency in use of psychological health activities in day-to-day life S1.8d Develops the ability to match intervention activities to personal needs	BI1.8a Express positive attitude that psychological health *strategy* will be beneficial BI1.8b Express positive attitude to integrating personal psychological health strategy in day-to-day life BI1.8c Beliefs they can identify social supporters within or outside of the program	GB1.8 Develop personal goal for strategy implementation in day-to-day life	SOC1.8a Identifies social support within personal circumstances SOC1.8b Involves social support in development of psychological health strategy
PO 1.8.1	Overcomes barriers to implementing a personal psychological health strategy	K1.8.1 Explains how barriers can influence successful execution of the psychological health strategy	S1.8.1a Identifies personal barriers to enacting psychological health strategy S1.8.1b Develops strategy to overcome barriers to using psychological health activities			
PO 1.9	Maintains use of personal wellbeing strategy over time	K1.9 Demonstrate understanding that improving or maintaining psychological health requires an ongoing commitment	S1.9a Performs activities on regular basis according to individual strategy S1.9b Recognises when to use specific activities to improve psychological health	BI1.9 Express confidence in implementing activities in day-to-day life	GB1.9 Schedules time to engage in psychological health activities to ensure goal attainment	
PO 1.10	Evaluates implementation of wellbeing strategy	/	/	/	/	/
PO 1.10.1	Judges whether psychological health strategy is being executed successfully	K1.10.1a Understands that different people require different strategies to see effective change in outcomes K1.10.1b describes criteria for successful execution of psychological health strategy	S1.10.1a Demonstrates ability to reflect on whether strategy activities are leading to change S1.10.1b Demonstrates ability to determine why strategies are not leading to positive change	BI1.10.1 Demonstrates self-compassion in the case their strategy is not leading to desired outcomes	GB1.10.1a Recall personal psychological health strategy GB1.10.1b Monitors training goal attainment	SOC1.10.1 Communicates with social relationships whether positive changes can be noted
PO 1.10.2	Re-evaluates strategy if not effective at achieving personal outcomes		S1.10.2a Practices additional psychological health strategies when other activities do not work out	BI1.10.2a Demonstrate positive attitude towards effectiveness of re-evaluated psychological health strategy after implementation	GB1.10.2a Recognises ineffective elements of personal wellbeing strategy	SOC1.10.2 Schedule time to engage with social actor

			S1.10.2b Demonstrate ability to explain psychological health strategy to social connection	BI1.10.2b express confidence in discussing wellbeing strategy with social actor	GB1.10.2b Identifies new activities to be included in strategy	
PO 1.10.3	Contacts professional care when mental health and wellbeing symptoms impact personal life	K1.10.3a Describes personal situation/outcome that warrants professional support K1.10.3b Names contact information for professional support	S1.10.3a Illustrates how distress can be monitored to ensure professional support is warranted S1.10.3b Demonstrates capability to reach out to professional support S1.10.3c Compare the objectives of existing program to other services	BI1.10.3 Demonstrates positive attitude towards the use of professional support	GB1.10.3 Sets clear goal around what to do when symptoms warrant professional support	
PO 1.10.4	Adjusts strategy and returns to PO 1.8	K1.10.4 Understands that adjusting a strategy may lead to better outcomes over the life-course		BI1.10.4 Demonstrate positive attitude towards effectiveness of re-crafted psychological health strategy	GB1.10.4 Adjust personal goal for strategy implementation in day-to-day life	

Notes. Each change objective is coded according to the determinant, i.e. Knowledge (K), skills (S), beliefs about capabilities and consequences, and identity (BI), goals and behavioural regulation (GB) and social influences (SOC), and the performance objective (PO), as depicted by the number after the letter, it belongs to. When multiple change objectives belong to the same determinant and performance objective, change objectives are separated by alphanumeric symbols.

Table S2

Matrices of change for behavioural outcome 2 showing the change objectives of each determinant and performance objective (PO).

Behavioural outcome 2: Implements a personal resilience plan to prepare for adversity					
Code	Performance Objective	Determinants			
		Knowledge	Skills	Beliefs in capabilities & consequences	Goals and Behavioural regulation	Social influence
PO 2.1	**Understands the concept of resilience and its relationship to psychological health**	**K2.1a** Describes the concept of stress and their consequences both positive and negative **K2.1b** Describes resilience as an outcome **K2.1c** List positive outcomes associated with improved resilience	**S2.1** Demonstrates ability to process entry-level information on psychological health	**BI2.1** Expresses positive attitude towards learning about resilience and related constructs		
PO 2.2	**Understands the impact of different stressors types or adversities on psychological health (chronic vs acute, foreseen vs unforeseen)**	**K2.2a** Defines the concept of stressors **K2.2b** Understands how stressors can be appraised differently and how this impacts stress levels **K2.2c** Explains how stress can lead to growth	**S2.2** Demonstrates ability to process information on psychological health	**BI2.2a** Accepts that stressors are part of everyday life **BI2.2b** Accepts that stressors can be mitigated against by developing a strategy to cope		
PO 2.3	**Understands how effective use of psychological health strategies can lead to improved resilience after difficulty**	**K2.3a** Understands that resilience can be grown through difficulty **K2.3b** List evidence-based activities that can build resilience **K2.3c** List positive effects associated with engaging in resilience activities		**BI2.3a** Recognise malleability of resilience **BI2.3b** Beliefs that growth can happen after stress and difficult circumstances		
PO 2.4	**Understand that their personal characteristics influence which interventions they should be considering to build resilience**	**K2.4** describes role of biology, psychology and social circumstances on resilience	**S2.4** Demonstrates capacity to reflect on personal characteristics	**BI2.4** Expresses positive attitude towards interrogating personal characteristics		

PO 2.5	Is aware of personal resilience status	K2.5 Explains how to access resilience assessment methods	S2.5a Demonstrates ability to complete resilience measures S2.5b Demonstrates ability to interpret scores on psychological health assessment methods	BI2.5a Expresses positive attitude towards validity of resilience assessment methods BI2.5b Expresses positive attitude towards measuring their resilience over time		
PO 2.6	Identifies potential resources and challenges for their resilience	K2.6a Lists common resources and challenges for resilience K2.6b Explains that resources and barriers for resilience can change over time K2.6c Identifies personal barriers to build resilience K2.6d Identifies personal resources to build resilience	S2.6 demonstrates capacity to reflect on personal characteristics		GB2.6a Monitors personal resources and challenges to resilience GB2.6b Reflects on potential future resources and challenges to resilience	SOC2.6a Investigates social support for implementation of resilience strategy SOC2.6b Determines influence of social identity to form resilience strategy
PO2.6.1	Determines which resources and challenges are currently present, which can be improved on using the program and which ones are out of scope	K2.6.1a Recalls scope of the program K2.6.1b Lists types of resources and challenges that cannot be altered by a psychological skills training K2.6.1c Understands where to find help for psychological issues out of scope of the program	S2.6.1 Demonstrates ability to identify stressors which can and cannot be managed personally	BI2.6.1 Demonstrates positive attitude towards reaching out or using other mental health and wellbeing services		
PO 2.7	Creates overview of personal motivators for regularly engaging in resilience strategy		S2.7a Demonstrate ability to self-reflect on personal situation S2.7b Identifies personal motivators to work on building a resilience strategy	BI2.7a Express positive attitude that psychological health *training* will be beneficial to improve resilience BI2.7b Beliefs that building resilience is congruent with identity BI2.7c Relates personal motivators to importance of engaging in resilience activities BI2.7d Demonstrate a (positive shift towards) a 'growth' identity		
PO 2.8	Develops a personal resilience plan	K2.8a List activities that can be used for personal resilience strategy K2.8b Defines what stressor types can and cannot be managed individually	S2.8a Practice resilience strategies during training S2.8b Demonstrate practicing of resilience activities after training S2.8c Identifies professional support for out-of-scope symptom levels	BI2.8a Express positive attitude that psychological health *strategy* will be beneficial for resilience BI2.8b Express positive attitude to integrating personal psychological health strategy into own identity BI2.8c Express confidence that certain stressors can be managed personally	GB2.8a Develop personal goal for strategy implementation in day-to-day life GB2.8b Determines potential barriers to executing goals	SOC2.8 Involves social support in resilience strategy

PO 2.9	**Practice resilience strategies on regular basis regardless of presence of stressors**			**BI2.9** Expresses confidence in implementing resilience practice in day-to-day life	**GB2.9** Schedule time to engage in resilience activities to ensure goal attainment	
PO 2.10	**Uses resilience strategies when facing personal stress**	**K2.10a** Describes the mental and physical health symptoms associated with unhealthy reactions to stress **K2.10b** Demonstrates understanding of individual differences in capacity to deal with stress **K2.10c** Explains that individual judgement may need to be supplemented with input from social environment	**S2.10** Recognise stress when faced with it	**BI2.10a** Express confidence in effectiveness of strategy in dealing with stress **BI2.10b** Express confidence in usefulness of reaching out to health professional when needed	**GB2.10** Reflect on personal life to determine presence of stressors or adversity	
PO 2.11	**Evaluates implementation of resilience strategy**	/	/	/	/	/
PO 2.11.1	**Judges whether resilience plan is being executed successfully**	**K2.11.1a** Identifies criteria for successful execution of psychological health strategy **K2.11.1b** Identifies personal strength and growth in dealing with adversity	**S2.11.1** Demonstrates skills to reflect on whether strategy is executed properly		**GB2.11.1a** Recall personal resilience strategy **GB1.11.1b** Monitors training goal attainment **GB2.11.1c** Review personal resilience plan at regular intervals	**SOC2.11.1** Communicates with social actor after/leading up to stressor whether strategy seems to have positive effect
PO 2.11.2	**Re-evaluates resilience strategy if not effective at achieving personal outcomes**	**K2.11.2** Lists barriers to executing resilience strategies	**S2.11.2:** Develops strategy to overcome barriers to using training	**BI2.11.2a** Indicates the confidence to overcome barriers to implementing psychological health strategy **BI2.11.2b** Demonstrate positive attitude towards effectiveness of re-evaluated plan **BI2.11.2c:** Express confidence in discussing resilience strategy with social actor	**GB2.11.2a** Recognises ineffective elements of personal wellbeing strategy **GB2.11.2b** Identifies new activities to be included in strategy **GB2.11.c** Compares resilience and psychological health scores from before until after adversity	**SOC2.11.2** Schedule time to engage with social actor

PO 2.11.3	Contacts professional care when mental health and wellbeing symptoms impact personal life	**K2.11.3a** Describes symptoms that warrant professional intervention **K2.11.3b** Names contact information for professional support	**S2.11.3** Demonstrate ability to reach out to professional support	**BI2.11.3** Demonstrates positive attitude towards the use of professional support	
PO 2.11.4	Adjusts resilience strategy and returns to PO 1.8			**BI2.11.4** Demonstrate positive attitude towards effectiveness of re-evaluated plan	**GB2.11.3:** Adjust personal goals for strategy implementation

Notes. Each change objective is coded according to the determinant, i.e. Knowledge (K), skills (S), beliefs about capabilities and consequences, and identity (BI), goals and behavioural regulation (GB) and social influences (SOC), and the performance objective (PO), as depicted by the number after the letter, it belongs to. When multiple change objectives belong to the same determinant and performance objective, change objectives are separated by alphanumeric symbols.

Table S3

Matrices of change for environmental outcome 1 showing the change objectives of each determinant and performance objective (PO).

Interpersonal outcome 1: Relationship supports training participant in striving for more wellbeing and resilience

Code	Performance Objective	Determinants		
		Knowledge	Beliefs in capabilities & consequences	Goals and Behavioural regulation
PO 3.1	**Relationship develops understanding of the personal psychological health strategy of the training participant**	**K3.1a** Develops understanding of mental health and the positive effects of engaging in psychological health training **K3.1b** Describes the components of the training participant's psychological health strategy **K3.1c** Describes professional support contact information		**GB3.1** Schedules time to learn strategy from training participant
PO 3.2	**Relationship participates in individual's psychological health activities when requested**	**K3.2** Describes strategy activities of training participant that their help is wanted for	**BI3.2** Express positive attitude that engaging in psychological activities will be beneficial to individual's psychological health	
PO 3.3	**Relationship checks up if individual is practicing use of strategies over time**			**GB3.3** Develops personal goal for monitoring strategy use of individual
PO 3.4	**Relationship reminds individual of thinking about mental health strategies when stress or adversity hits**	**K3.4** Explains how using psychological health strategies can help in dealing with stress		**GB3.4** Develops personal goal for monitoring strategy use of individual
PO 3.5	**Relationship determines whether engaging in training may be beneficial for themselves**	**K3.5** Understands that they can access measurement and training themselves	**BI3.5** Express positive attitude that reflection on personal psychological health profile will be beneficial to themselves	

Notes. Each change objective is coded according to the determinant, i.e. Knowledge (K), skills (S), beliefs about capabilities and consequences, and identity (BI), goals and behavioural regulation (GB) and social influences (SOC), and the performance objective (PO), as depicted by the number after the letter, it belongs to. When multiple change objectives belong to the same determinant and performance objective, change objectives are separated by alphanumeric symbols.

Section 4. Be Well Plan program examples (step 4)

This section provides examples of actual Be Well Plan content to illustrate the components highlighted in step 4. It will generally follow the flow of the text that accompanies step 4 in the main manuscript. This section only demonstrates a sample of the activities to ensure readability of this appendix; the workbook for the Be Well Plan alone comprises over 100 pages, mainly the result of visuals and the large activity bank. Access to program materials can be given upon reasonable request. Please contact the main author at joep.vanagteren@sahmri.com.

Short overview of the five sessions in the Be Well Plan

A description of the Be Well Plan sessions is provided in the main manuscript. In order to ensure readability of the appendix, the sessions are briefly summarised below.

- Session 1: participants explore the reasons for participating in the program, their personal drivers and acquire basic knowledge on mental health and its malleability. This aims to stimulate a mindset for change. They follow by exploring the evidence for different psychological interventions and start creating their first be well plan. They do this by choosing one of many formats of practicing mindfulness, and setting a goal on how to practice it during the week. They get introduced to the formation of habits/implementation intentions as a technique to improve the chance of goal-attainment.

- Session 2: participants reflect on week 1. They get introduced to the concept of self-compassion (as opposed to self-criticism) and how it can be used to learn from failure and shape our thinking patterns. They practice a self-compassion activity. They subsequently use their measurement result stemming from the integrated measurement to pinpoint an outcome they want to work on (wellbeing, resilience, mood, anxiety, stress) and are introduced to activity finders: flow charts that map evidence-based activities to each of the activities. They pick one activity to add to their Be Well Plan and will set new goals for the week. They will be introduced to the use of prompts and reminders as another method to increase goal attainment.

- Session 3: participants reflect on week 2. They will work with (and are reminded of) existing resources to their own mental health via two practical activities. The first one gets participants to choose pictures that display sources of meaning in their life, the second one gets participants to identify core values that can be used to guide goals. They then use a simple questionnaire to identify a key resource or challenge they want to work on. They are introduced to a second activity finder that maps evidence-based activities to each of the challenges and resources. They pick a new activity to add to the Be Well Plan.

- Session 4: participants reflect on week 3. This session focuses on stressful times and effective ways to cope (avoidance-focused coping versus more helpful ways, e.g. problem-focused coping). They are then walked through various ways of coping using psychological techniques and theories, including identification of cognitive traps and the use of thought defusion. They are asked to identify social supporters for when times get too tough and are reminded of various professional services. They then choose one new activity specifically focusing on stress and resilience. They also are actively asked to reach out to a social supporter as part of their weekly activities.

- Session 5: participants reflect on the past 4 weeks. They are asked to complete a new measurement and investigate how their outcomes have changed over the four weeks. The trainer will introduce the concept of realistic optimism, growth and the fact that progress comes with ups and downs. They practice positive reframing as a way to deal with setbacks. They will then build their final Be Well Plan, which aims to summarise key learnings from the previous weeks into a standalone plan. They summarise what their best possible mental health looks like, highlight their unique drivers and motivations, and existing resources and challenges in their life. They set a longer-term goal and choose the activities they wish to add to their Be Well Plan. They identify their key supporters and reflect on what support services they need in case of emergency.

The sessions are designed to be taught over five weeks. Implementation in daily life is a core principle in the program to allow for experimentation with different activities, which means the training is not recommended to be rolled out as an intensive back-to-back course.

Examples to core components to individual Be Well Plan sessions
The following pages highlight actual example pages for Be Well Plan activities, structured according to the four core principles of self-reflection, sharing between participants, developing core psychological principles, evidence-based psychological activities, planning fundamentals and the integration of the measurement report. It starts with the activity index as it currently stands.

Activities Index
with descriptions

Activities Index
(continued)

Examples of self-reflection activities

Crossroads

This program helps you create your own personalised psychological health strategy. A strategy tailored to your own circumstances, your own unique barriers and resources, and outcomes that are **relevant to you**. We are going to do a simple exercise called the crossroads exercise to help us reflect on how we arrived at this point in our life and to see which road we might need to take next. By asking where we came from, what's important to us and what may work against us, we start laying a foundation of knowledge about ourselves, which will help when we start to personalise our strategy.

FOUNDATIONS

My history in a nutshell - Where have I come from?

Write a couple of sentences that capture your life so far. Think about your education, where you were born, where you lived, your cultural background. Also think about the big events in your life that shaped you. Anything that describes the road you came from.

My drivers and motivations - What is important to me?

Write a couple of thoughts on what is most important to you in life. What are the values you go by? What drives you and gets you out of bed? What brings you joy? What are the constant things that keep you going, no matter what? Just jot down what comes to mind first

SESSION ONE

My heroes and anti-heroes - Who plays a big role in my life?

Who has made you the person you are today? Who do you value? Who relies on you? Don't just think about the people who were positive influences: sometimes the negative ones can be the most influential in shaping your positive behaviours.

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Meaning and Purpose in Life

In this session you will be doing a meaningful pictures activity. We can use this exercise to identify important resources to our mental health: your job, your hobbies, your loved ones, your neighbourhood, your morning routine; you name it. In a couple of sentences, let's try and summarise what gives your life meaning and purpose. Use the meaningful pictures exercise answers, but also think whether there are other meaningful things you did not capture in the three pictures.

⚠ **WAIT FOR THE INSTRUCTIONS BY YOUR FACILITATOR**

Strength and Values

In life we often focus on trying to fix weaknesses. While this s not a bad thing, we need to balance it out. We can also work on our strengths and use them to build our wellbeing. One way to do this is by acting in line with our values and virtues, or in other words, the "Principles or standards of behaviour; one's judgement of what is important in life." If we behave more in line with our values, we will automatically see improvements in our wellbeing.

Your character strengths

The Via Character Strengths test you took before starting this session, summarises 24 'strengths' or 'values' that can be grouped under 6 virtues. Write down the top 5 as provided in your VIA results below. Next, use the second column to rank the strengths in order of importance to you, where number 1 is the most important value and number 5 is the least important value. Scan the QR code on the top of the page in case you still need to take the survey.

List of common virtues and strengths:

Wisdom & Knowledge:
Creativity, curiosity, open-mindfulness, love of learning, perspective, innovation

Courage:
Bravery, persistence, integrity, vitality, zest

Humanity:
Love, kindness, social intelligence

Justice:
Citizenship, fairness, leadership

Temperance:
Forgiveness & mercy, humility, prudence, self-control

Transcendence:
Appreciation of beauty & excellence, gratitude, hope, humour, spirituality.

Processes that underpin my wellbeing

Below you can find a list of common challenges (things that are not going well) or resources (things that are going well) for your mental health and wellbeing. Let's determine which of these apply to your life and how important you feel they are to your own life.

1. Mark the challenges with a "–", the resources with a "+", and use a "0" for the ones that are neither.
2. Have a go at assigning the importance of each of these concepts ranging from 1 to 10.

PROCESSES

Psychological

		CHALLENGES (–) RESOURCES (+) NEITHER (0)	Importance
Coping	My ability to cope with difficult situations is a..		
Self-esteem	The way I think about myself and my own self-worth is a....		
Emotions	The amount of positive emotions I feel on a daily basis is a ...		
Autonomy	The sense of control over my life that I feel is a...		
Empathy	My ability to feel what another person is experiencing is a...		
Negative thoughts	The negative self-talk that I feel on a daily basis is a ...		
Competence	The way I feel about my ability to successfully complete tasks is a...		
Achievement	The sense of achievement that I feel is a...		
Flow	My ability to 'get in the zone' and focus on an activity is a ...		
Meaning and Purpose	The sense of meaning and purpose that I feel on a daily basis is a...		
Creativity	My ability to be creative or creatively problem-solve is a...		
Time management	My ability to prioritise my tasks and manage my time is a...		

Interpersonal

		CHALLENGES (–) RESOURCES (+) NEITHER (0)	Importance
Positive relationships	My sense of positive and supporting relationships in my life is a...		
Communication skills	My ability to communicate clearly with others is a...		
Relatedness	The sense that I feel accepted and needed by others in my life is a...		
Feedback	My ability to deal with and accept positive or negative feedback is a...		

SESSION THREE

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Becoming your best possible self

To get to your best possible self, you will need to think about what you need to change in your life over the coming months. Over the past 5 weeks, we've explored a range of things that you can work on to improve wellbeing and resilience. Let's take a moment to revisit them.

Reflect on the mental health outcomes from Session 2 and 5. Which ones might you need to work on?

Reflect on your resources from Session 3. What resources in your life could you harness to help you build your best possible self?

Reflect on the challenges you identified in Session 3. Which of them might you need to address in order to move forward?

Think back to Session 4. What might you need to change in order to be able to better cope with stressful times?

What strengths/values that you have (remember the VIA survey!) do you want to build on and expand in your life? A summary of them is included in the column on the right.

Do you want to keep working on any of the insights we have covered (mindfulness, growth mindset, self-compassion, psychological flexibility, realistic optimism)?

Think of the activities you've tried over the past 5 weeks. Which ones would you like to continue? Were there any that you didn't get to try that you want to? We will make a list of these activities on the next page.

List of common virtues and strengths:

Wisdom & Knowledge: Creativity, curiosity, open-mindfulness, love of learning, perspective, innovation

Courage: Bravery, persistence, integrity, vitality, zest

Humanity: Love, kindness, social intelligence

Justice: Citizenship, fairness, leadership

Temperance: Forgiveness & mercy, humility, prudence, self-control

Transcendence: Appreciation of beauty & excellence, gratitude, hope, humour, spirituality.

Discuss the reflections in breakout rooms.

What is the most surprising, useful or interesting thing you learned so far?

Discuss the reflections in breakout rooms.

- Did/could these mindfulness activities appeal to you?
- Share other experiences with mindfulness in your life in group

Examples to highlight core psychological principles participants develop

My coping styles

Everyone, in one form or the other, will have to deal with stress and adversity. The way we deal with stressful times plays a huge role in our current wellbeing and the risk of developing more serious problems down the line. We will explain a couple of ways to cope in session 4 (scan the QR if you need a refresher), some more 'useful' than others.

Avoidant coping:

Trying to avoid addressing the problem or challenge and the immediate impact it has on you. Reflect on a time that you used avoidance to deal with the consequences of a problem.

While avoidant coping can be useful in the short-term, this style is typically considered to be an unhelpful style as it does not deal with the problem or the reaction to it. There are four other coping styles:

- *Emotion-focused:* trying to focus on managing the emotions or outcomes associated with the event or stressor

- *Problem-focused:* where we focus on resolving the stressful situation or changing the source of the stress

- *Support-seeking:* finding external support to help us deal with the issue at hand

- *Meaning-making:* reflecting on an issue and considering the meaning or growth that we may gain from the issue or adversity

Can you think of a time where you used one of the 'useful' coping strategies

Think of a time where you would gain more from using a 'helpful' coping style compared to using the 'avoidant' coping style. What would a more helpful coping response look like?

Psychological Flexibility

When stressful times or adversity inevitably pops its ugly head around the corner, we can train our brain how to better react to it. One way to do this is by using psychological flexibility, which refers to working on thoughts, feelings, and emotions in more flexible ways. Let's explore this a bit further.

Psychological flexibility comes from an approach called Acceptance and Commitment Therapy (ACT). It teaches us that we should remember that our emotions and thoughts come and go. Rather than acting on our emotions and thoughts,

We will be better off trying to focus on longer term values-based goals. In other words, we can learn to choose which emotions and thoughts we act on, and which ones are unhelpful to our wellbeing. This way we can better deal with stress and problems when they arise. It consists of three elements,

- *Be present:* we mindfully observe events as they occur. We mindfully observe the emotions and thoughts we experience as a result of these events. We don't judge the events, thoughts or our emotional reactions, but simply notice what is going on.

- *Be open:* we do not avoid dealing with our emotional reactions and our thoughts. Rather we accept the emotions happening and realise we don't always have to try and control them. We see thoughts for what they truly are: words, whose impact on us we can change core psychological processes. Working on developing more helpful processes, and working on reducing the impact of unhelpful processes in your life.

- *Commit to values-based actions:* we focus on living our life in line with our values. We focus on long-term values-based goals and behaviours. We choose not to act on short-term unhelpful feelings or thoughts. This way we can build and live a more vital, happy and fulfilling life.

Be present & Mindful – Do not Avoid

Be open to your emotional reaction

Commit to actions in line with your values

There are heaps of ways we can improve our psychological flexibility. We have added a couple of exercises to the activity bank and will add more over the course of time. For now, we will be practicing one of them called thought defusion. Want to find out a bit more about ACT and psychological flexibility? Scan the QR and watch Steven Hayes give a TEDx on the topic.

PSYCHOLOGICAL FLEXIBILITY

SESSION FOUR

① ② ③ ④ ⑤

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Examples of the evidence-based psychological activities

5. Re-thinking Thinking Traps

Avoid jumping to conclusions

THINK & FEEL

DURATION
20 minutes

FREQUENCY
3x/week

DIFFICULTY
Moderate

EVIDENCE QUALITY
★★★☆

+ WELLBEING

+ MOOD

+ ANXIETY

BACK TO INDEX

THINKING

What it is?

- When confronted with negative events, e.g. failing an exam or not getting a promotion, it is easy to fall into a spiral of negative thoughts.
- Our brain often misinterprets negative events and makes them much worse than they really are.
- These thinking traps (or cognitive distortions) can lead us to miss or mislabel critical information or small details that shape your thoughts about an event. This is called "getting caught in a cognitive trap".

What can I use it for?

- Re-thinking your thinking traps can be used to help you to understand and avoid cognitive traps.
- Learning to recognise thinking traps can help with improving negative mood and anxiety, and lead to increased wellbeing.

How to do it?

1. Choose an event you feel you didn't handle effectively and or left you feeling negative about yourself or others.
2. Take a pause and notice the narrative in your mind; Ask yourself: Is what I am saying to myself true and accurate? Have I jumped to conclusions?
3. Separate facts from interpretation e.g. Fact: my partner didn't do the thing I requested of him/her; Interpretation: my partner doesn't care about me.
4. Try to use critical thinking to realise where you jumped to a conclusion, and adjust your thinking accordingly.

Anything to consider before I start?

- We tend to judge ourselves more harshly than we judge others.
- Our mind has a negative bias so it is easy to lose perspectives.

5. Re-thinking Thinking Traps

Avoid jumping to conclusions

List the event you feel you didn't handle effectively. Write down the thoughts and reactions you had about the event

Take a pause and notice the narrative in your mind; Ask yourself: Is what I am saying to myself true and accurate? What are facts of the situation and what are interpretation? Have I jumped to a conclusion here?

Based on your answers to the previous question, do you feel differently about the event, now that you've avoided any possible thinking traps? Do you need to change your interpretation of the event?

Now think what you will tell yourself when a similar event happens in the future. Write down what you will do instead and say it out loud after writing it down. First write it in a sentence, then create the tiny habit statement below.
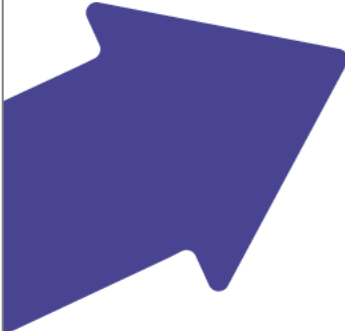
MY HABIT STATEMENT
Habit Statement:

When will I **practice** it?

How will I **remind** myself to practice?

How will I **celebrate**?

THINKING

17. Reflective and Active Listening

CONNECTING

DURATION
5 minutes

FREQUENCY
4x/day

DIFFICULTY
Moderate

EVIDENCE QUALITY
★★★☆

+ WELLBEING

+ RESILIENCE

BACK TO INDEX

CONNECTING

The way you respond to people makes all the difference

What It Is?

- Good two-way communication is key to any positive relationship
- Learn skills related to reflective and active listening, and how to provide social support.

What can I use It for?

- To build, strengthen and maintain important relationships so that there is enough trust for times of need.
- There is a strong connection between positive communication strategies, good relationships and wellbeing.

How to do It?

1. When someone is talking to you:
   a. Be present and pay attention to what he/she is saying
   b. Show enthusiasm
   c. Seek additional details
   d. Avoid thinking about how you want to respond
2. You can pair up with somebody at home and practise using this skill.

Anything to consider before I start?

- Remember, use reflective and active listening because you care about the person, not necessarily the news.
- It takes practise to get the hang of things, don't beat yourself up if you don't nail it on your first g

17. Reflective and Active Listening

The way you respond makes all the difference

EXAMPLE

Person 1: Hey, I'm thrilled to go to New Zealand next week. I am looking forward to get away and just take it easy.

Person 2: Oh wow! New Zealand is great, you're going to absolutely love it. [show enthusiasm] Are you going with anyone else [ask questions]?

Person 1: Yeah with my husband and 3 children.

Person 2: It will be great to have some family time, you deserve it. How long will you be away for? Any activities planned [seek additional details]?

Person 1: We'll be gone for about a week, nothing planned at the moment. We just really need the time to relax. We will probably just explore Christchurch and surrounding.

Person 2: It's so important to get time away from your busy schedule. What better way than to spend time with the kids and husband [comment on why the event is meaningful] . I hope you get recharged, see you when you get back.

Person 1: Cheers.

MY HABIT STATEMENT

Habit Statement:

When will I **practice** it?

How will I **remind** myself to practice?

How will I **celebrate**?

CONNECTING

21. Meaningful Pictures

Capture what gives most meaning to your life

DOING

DURATION
5 minutes

FREQUENCY
3xday

DIFFICULTY
Easy

EVIDENCE QUALITY

★★★☆

+ WELLBEING
+ RESILIENCE

BACK TO INDEX

DOING

90

What It Is?

- Meaning in life is a cornerstone of our wellbeing and we have unique sources of meaning in our lives. This exercise helps us identify day-to-day things that give us purpose.

- Pointing out something real in your life and acknowledging that it adds value to your life, you link an abstract construct (the philosophical concept of 'meaning in life') to something that you can see, feel & understand.

What can I use It for?

- Identifying and naming your personal sources of meaning is a great way to start working on getting more meaning in your life.

- The greater your sense of meaning and purpose the fewer negative emotions you feel and the more you are satisfied with your life

How to do It?

1. Throughout the day, take three photos that you feel bring a sense of meaning to your life.

2. On the other side of this page, describe the photos you've taken and how they bring meaning to your life.

a. These photos can be of anything that is meaningful to you or anything that represents something that is meaningful to you. Your job, your hobbies, your loved ones, your neighbourhood, your morning routine; you name it. Anything that is important to you goes.

b. You could think about posting these images somewhere online or printing them out as reminders of the things that give your life a sense of meaning.

Anything to consider before I start?

- Thinking about your sense of meaning can be an overwhelming, difficult tas

21. Meaningful Pictures

Capture what gives most meaning to your life

USE YOUR PHONE OR CAMERA TO CAPTURE THREE MEANINGFUL THINGS IN YOUR LIFE EACH DAY.

This can be anything: Your job, your hobbies, your loved ones, your neighbourhood, your morning routine; you name it. Now use the boxes below to describe the picture you took and why you feel they bring meaning to your life.

PHOTO 1
Description of the photo:

How it brings my life meaning:

PHOTO 2
Description of the photo:

How it brings my life meaning:

PHOTO 3
Description of the photo:

How it brings my life meaning:

MY HABIT STATEMENT
Habit Statement:

When will I practice it?

How will I remind myself to practice?

How will I celebrate?

DOING

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My weekly Be Well Plan

WAIT FOR THE INSTRUCTIONS BY YOUR FACILITATOR

Use the box below to select the activity you chose for your top resource or challenge.

Create a goal related to the activity or activities you chose for this week. For example: "My goal for next week is to do a guided meditation on at least three days before I start studying":

☐ Is the goal a SMART goal?

It sometimes helps to break down in a goal into smaller parts, so you can identify potential barriers to reaching your goal. Use the box below to break your goal down into smaller sub-steps.

1.
2.
3.
4.
5.
6.

MyWeekly BeWell Plan

Write down the activities you want to do this week as part of your be Well Plan. Attach a 'habit statement' to the activity to increase the chance you will end up completing it. *We want you to specifically focus on the celebration you are attaching to your habit statement.*

Activity	Habit Statement	Prompt

You can also use the below 'calendar' to indicate when you want to work on your Be Well Plan

Activity	M	T	W	T	F	S	S
	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐

WEEKLY PLAN

SESSION THREE

① ② ③ ④ ⑤

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Reflection on last week

Welcome to session four. Over the past weeks you have been slowly starting to build your own personalised mental wellbeing strategy. It is still early days and we have plenty of experimentation ahead of ourselves. Similarly, there is still plenty of improvement ahead. The more we experiment, the more we learn. So we will get straight into it and determine whether the activities you have been working with over the past three weeks are working for you or not. Let's focus on whether you feel you can make these activities part of your mental wellbeing routine.

REFLECTION TIME

SESSION FOUR

Reflection on your Be Well Plan:

How did you go with executing your Be Well Plan last week? Reflect in the box below about what went well and what did not?

Were there some activities that worked better than others? Was this because of the activity or because of external events?

Were you able to reach out to your social supporter? How did it go? Would you like to try this with some more people? Make sure to reach out to your facilitator if you feel you can't identify someone in your personal life.

Do you feel like you want to keep doing the activities you included in your Be Well Plan in the future, do you want to retain it in your strategy or do you want to switch it up?

① ② ③ ④ ⑤

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Example of the measurement report

Participants complete a measurement that provides a summary of their scores on six key domains. The participants interact with the report to improve their strategy over time, via a series of exercises in the workbook.
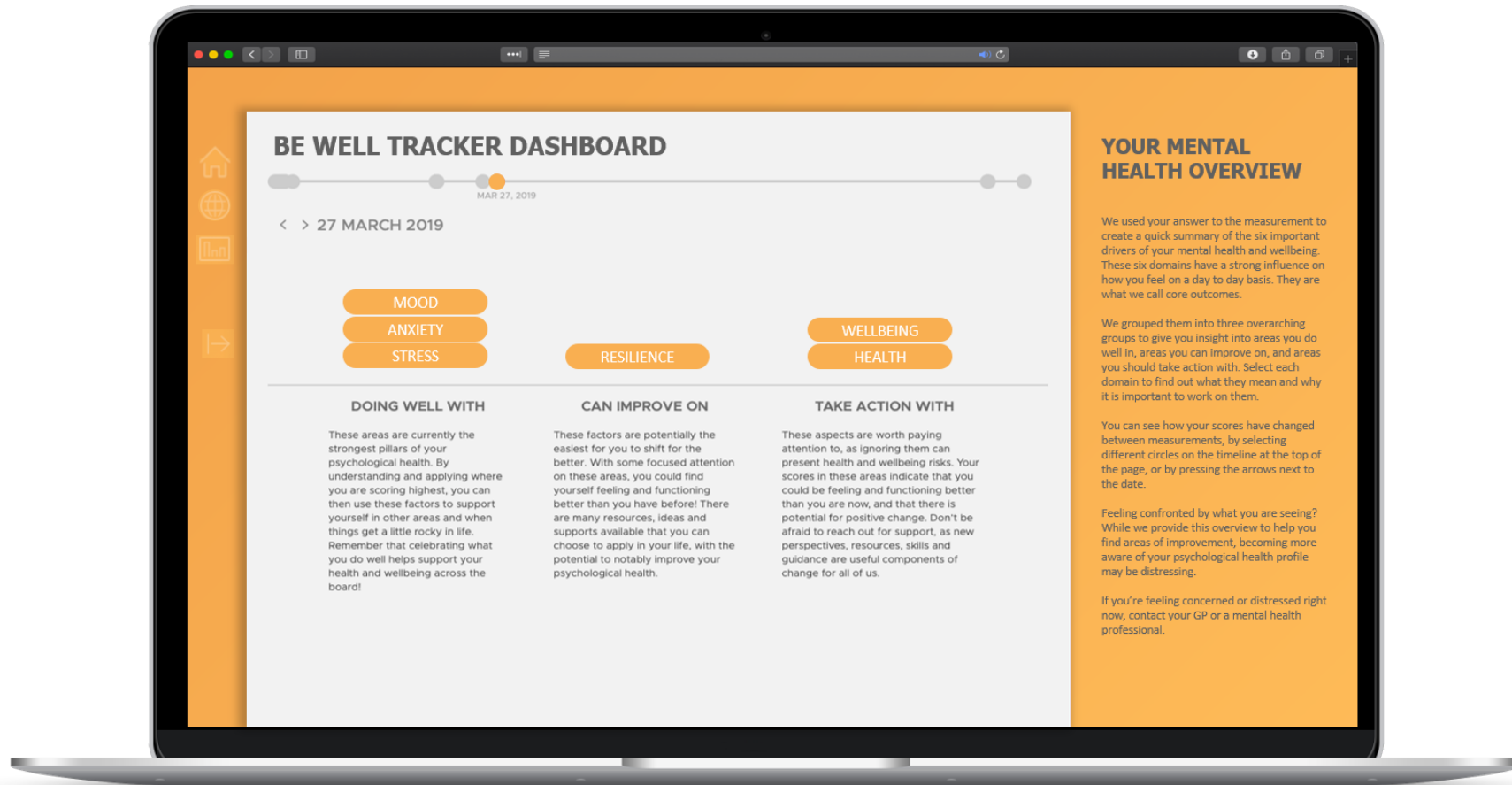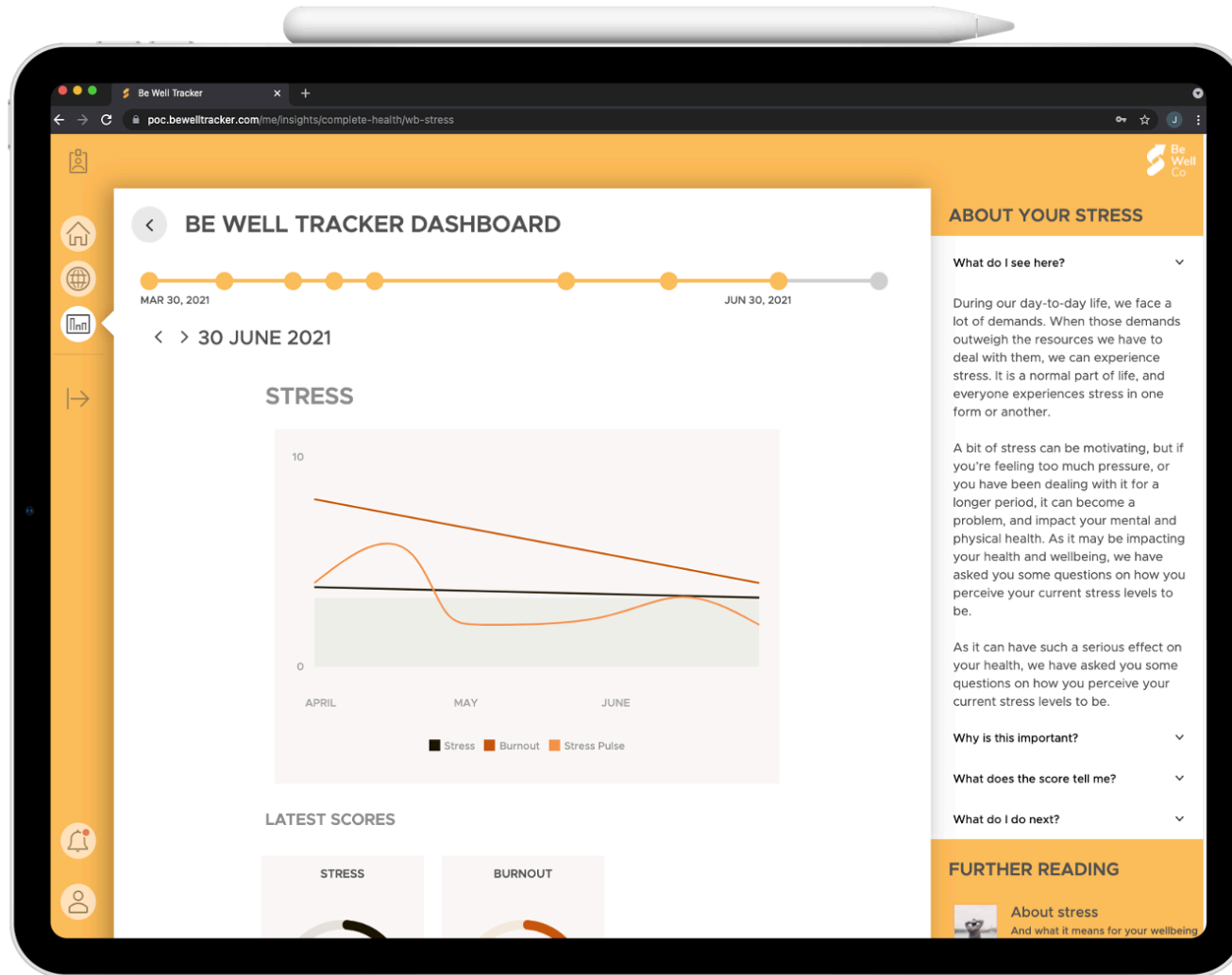
My mental health profile

On every journey it is important to know where we start from. In this program you can do a free online wellbeing measurement, which results in a report that describes your mental health profile. Follow the top QR to go to the login page and the bottom QR to watch a video on how to get there. Use the blocks below to indicate which outcomes you scored high, moderate or low on: To jolt your memory, the outcomes in the measurement platform are:

Wellbeing | Resilience | Health | Mood | Anxiety | Stress:

Domains I am doing well in:

Domains I can improve on:

Domains I need to take action with:

Use the quadrant below to indicate which outcomes you **WANT** to work on. Do this for outcomes you **NEED** to work on (those scored 'Can Improve On' or 'Take Action With') and the ones you do not need to work on (those scored 'Doing Well With'). Confused? Check out the session video for an explanation of this exercise).

	Outcomes I am interested in working on	Outcomes I am not interested in working on
Outcomes I need to work on	1. Priority	3. Risky
Outcomes I don't need to work on	2. Prevention	4. No problem!

Pick ONE of the 'priority' outcomes that you want to work on in during the remainder of the session (the ones that you **need** to change and **want** to change). This is the outcome that will be your main priority for this session. Before we continue, let's spend some time reflecting on why we've decided to work on this outcome:

Tracking your health over time

Before this session started, we asked you to go back to the CMH platform and take another measurement. Your platform now has two measurement time points, which means that we can start seeing whether there has been some change in your mental health profile

Looking for changes in your report:

Did you see an improvement on any of the six domains? This would be indicated by them moving to a new column on the left (or moving up on your mobile).

Did you see a decline in any of the six domains? This would be indicated by them moving to a new column on the right (or moving down on your mobile).

Did any domains stay the same since your last measurement?

Other than this program, has anything significant happened that may have influenced your measurement results?

! WAIT FOR THE INSTRUCTIONS BY YOUR FACILITATOR

Digging Deeper

The broad-level report can sometimes hide some of the great improvements or big declines that might have happened for you between two measurements. Let's click on some of the domains that you thought might have shifted over time, and see if you can see any changes in the specific markers displayed in the graphs. If necessary, think of any reasons that might explain these differences?

Were you surprised by any of the results you saw in your report? Either the higher level scores or the in-depth ones. Spend some time to really think about it.

TRACKING YOUR HEALTH

SESSION FIVE

1
2
3
4
5

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8.8. Study 8. Testing the Differential Impact of an Internet-Based Mental Health Intervention on Outcomes of Well-being and Psychological Distress During COVID-19: Uncontrolled Intervention Study

<u>Original Paper</u>

Testing the Differential Impact of an Internet-Based Mental Health Intervention on Outcomes of Well-being and Psychological Distress During COVID-19: Uncontrolled Intervention Study

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Abstract

Background: During COVID-19, the psychological distress and well-being of the general population has been precarious, increasing the need to determine the impact of complementary internet-based psychological interventions on both positive mental health as well as distress states. Psychological distress and mental well-being represent distinct dimensions of our mental health, and congruent changes in outcomes of distress and well-being do not necessarily co-occur within individuals. When testing intervention impact, it is therefore important to assess change in both outcomes at the individual level, rather than solely testing group differences in average scores at the group level.

Objective: This study set out to investigate the differential impact of an internet-based group mental health intervention on outcomes of positive mental health (ie, well-being, life satisfaction, resilience) and indicators of psychological distress (ie, depression, anxiety, stress).

Methods: A 5-week mental health intervention was delivered to 89 participants using the Zoom platform during 2020. Impact on outcomes of distress, well-being, and resilience was assessed at the start and end of the program with multiple analysis of variance (MANOVA) and reliable change indices (RCIs) being used to determine program impact at the group and individual levels, respectively.

Results: The intervention significantly improved all mental health outcomes measured, ($F_{6,83}=5.60$, $P<.001$; Wilks $\Lambda=.71$; partial $\eta^2=.29$) showing small to moderate effect sizes on individual outcomes. The largest effect sizes were observed for life satisfaction and overall well-being ($\eta^2=.22$ and $\eta^2=.2$, respectively). Larger effect sizes were noted for those with problematic mental health scores at baseline. A total of 92% (82/89) of participants demonstrated reliable change in at least one mental health outcome. Differential response patterns using RCI revealed that more than one-half of the participants showed improvement in both mental well-being and psychological distress, over one-quarter in outcomes of well-being only, and almost one-fifth in distress only.

Conclusions: The results provide evidence for the significant impact of an internet-based mental health intervention during COVID-19 and indicate the importance of assessing dimensions of both well-being and distress when determining mental health intervention effectiveness.

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Introduction

Mental Well-being and Psychological Distress as Dual Dimensions of Mental Health

A commonly cited definition of mental health is the one postulated by the World Health Organization: "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" [1]. Despite this definition — and numerous other readily used mental health definitions — incorporating positive facets of mental health, mental health care, and the research that underpins it is overwhelmingly focused on understanding and solving problems related to mental disorders [2]. The same applies for mental health intervention research, where historically, efforts have centered around treating or intervening in mental disorders, invariably focusing on "mental health conditions" or "mental illnesses" that significantly affect cognition, emotion, and behavior that may lead to dysfunction or disability [3,4]. Concurrently, research into mental health has focused on the related outcome of psychological distress [5], a state of emotional suffering that is typically characterized by symptoms of depression and anxiety [6].

Although a predominant emphasis on addressing psychological distress and mental disorder still persists, the COVID-19 pandemic has made the need to focus beyond mental disorders in clinical populations more salient. The far-reaching societal consequences of the pandemic increased the need to investigate how the general population can maintain positive and adaptive states of mental health and how these positive and adaptive states can be utilized to buffer against developing more complex problems [7,8]. Although the pandemic brought promotion of positive mental health, or alternatively, states of "mental well-being," more front-of-mind, these outcomes have for decades already been advocated to be an important standalone mental health outcome and therapeutic avenue, in contrast to the "traditional" focus on merely reducing pathology [9,10]. Mental well-being specifically refers to a state where people generally feel good (ie, experience more positive than negative emotions, feel a sense of life satisfaction) and feel that they can function fully (eg, are able to self-actualize, self-realize, and have a sense of meaning) [11]. In other words, they perceive enjoyment and fulfilment with one's life as a whole [12]. Decades of research by well-being pioneers such as Diener [13], Ryff [14], and Keyes [15], followed by researchers operating in the field of positive psychology [16], broached the important role of promoting mental well-being in the general population. A now large and established body of research clearly links the presence of mental well-being to a range of desirable physical health (eg, longevity and healthy aging, reduced hospital use) and mental health (eg, lower rates of suicide ideation, more healthy coping) outcomes [17-23].

Psychological distress and mental well-being do not merely occupy opposite ends of a single continuum, and further research is required to understand the complex relationship between the constructs, particularly in intervention research [24,25]. For example, high well-being indicators do not simply equate to being mentally healthy, as both well-being *and* the absence of distress or disorder are required to be mentally healthy [24,26]. Similarly, mental well-being is not simply the opposite of mental disorder, but rather is an outcome that can co-occur and be juxtaposed to the presence of mental disorder and psychological distress. A scoping review conducted in 2020 identified over 80 scientific publications providing supportive evidence that well-being and disorder/distress are considered to be negatively related but independent outcomes, with both aspects associated with good mental health [27]. First, empirical studies have shown the importance of maintaining and improving the mental state of well-being for the *prevention* of potential mental disorder [28-30]. Second, studies have shown that improving states of mental well-being in people with current mental disorders can impact rates of recovery [31,32].

The Need for Scalable Interventions Designed to Address Both Well-being and Distress

While definitive research on the long-term impact of COVID-19 on mental health outcomes across the general population is heterogeneous and not clearly established, with more research needed to determine which population groups are most affected, academic research published since the outbreak of the pandemic generally points to a negative immediate consequence [33-39]. These adverse mental health consequences are often the result of societal restrictions and policies, rather than infection with (or fear thereof) the virus itself [40-42]. This is particularly the case for countries where COVID-19 caseloads have been comparatively low such as Australia. As of July 10, 2021, Australia had a total of 31,017 confirmed cases of COVID-19, resulting in 910 deaths (2.93% death rate) [43]. This death rate, 3.6 per 100,000, is very low compared with other countries such as the United States (184.9 per 100,000) and the United Kingdom (192.5 per 100,000) [44]. Despite this attenuated impact, various studies point to an immediate impact on outcomes of well-being and distress in Australia, particularly in at-risk population groups [45-48]. For instance, Batterham et al [49] found that participants in Australia who had financial distress, social impairment, and work impairment were most impacted. Similarly, Li et al [50] found that young people, who due to their age are already at higher risk of mental health problems, showed elevated mental health problems. University students, who generally display high rates of mental health problems and lower well-being [51], similarly demonstrated mental health problems immediately after the pandemic began [52].

As a result of the observed and anticipated consequences, there have been widespread calls to proactively intervene in mental health by targeting distress and the well-being of the general population [8]. The importance of addressing states of well-being and distress conjointly is advocated by proponents of dual-factor models [24,53], well-being therapy [54], the recovery movement [10], positive (clinical) psychology [2], and positive psychiatry [55]. These distinct streams in mental health care propose that, by taking both well-being and distress into account, the way we deliver mental health care across the spectrum of mental health, ranging from self-help options to treatment of recurrent lifetime disorders, can be improved. For example, mental health interventions incorporating a focus on well-being have the potential to prevent more severe mental disorder, can augment treatment, or can be used as early intervention for subclinical issues. In other words, such interventions can be used as a target to promote mental health in the general population using psychological interventions, addressing prodromal symptoms [26].

A range of behavioral and psychological interventions exist that have proven to positively impact mental well-being in nonclinical settings [56-58]. The most renowned of these psychological interventions stems from the work of positive psychology [59], but various distinct psychological interventions will have a significant impact, depending on a range of moderators including target population and delivery format [58]. One viable delivery format that has been shown to be able to have a sustainable impact in the general population is the use of internet-based solutions, which can be deployed at a larger scale and can be used irrespective of the presence of physical restrictions (eg, lockdowns) [60,61]. This is particularly the case for mental health interventions that target lower-intensity problems or issues related to well-being and mental health promotion, where support by mental health professionals is less warranted [62]. A rapid review by Rauschenberg et al [63] found good evidence for the short-term impact of online mental health interventions during COVID-19 for mental disorder, with evidence for mental health promotion interventions still being sparse.

A by-product of utilizing internet-based interventions with a stronger focus on well-being is that it can also help improve the current gap in service delivery for those experiencing symptoms of mental disorder, as it may help to address various challenges of the mental health system in clinical populations, including access issues, stigma, or "treatment resistance" to name a few [64,65]. For instance, providing complementary or integrated well-being intervention programs may reach clients and community members who do not respond to traditional treatment or do not access these due to associated stigma [66]. Adopting a strong emphasis on well-being also diminishes the reliance on using outcomes of distress and illness as the only indicators of treatment effectiveness. For instance, a poor response to psychological interventions is not uncommon, with nonresponder estimates of 30%-40% being documented [67]. Nonresponse in outcomes of distress is often seen as a lack of treatment impact, particularly in treatment models where the main focus is elimination of symptoms. As mental well-being is related to both prevention of mental disorder and recovery

from illness, it plays a fundamental role in personal and functional recovery, which may be considered to be a proxy for future treatment impact [18,27].

The Need to Look Beyond Group Averages

In order to determine the merit of psychological interventions on improving mental health outcomes, scholars increasingly stress the importance of measuring both states of distress and well-being to best evaluate mental health intervention impact, a recommendation that comes with an often-overlooked nuance [68]. The impact of an intervention is often determined by comparing an average shift in scores of a cohort of participants using specific outcome measures [69]. For instance, an intervention targeting distress is thought to be beneficial if it can demonstrate an average significant and meaningful change in average scores [70] using, for example, a validated depression outcome measure such as the Depression Anxiety and Stress Scale (DASS-21) [71]. While average improvements are an important way to assess the potential impact of interventions on *groups*, it does not indicate whether interventions are efficacious or even suitable on an individual level [72].

Comparison of average changes furthermore obscure any possible *differential* impact of interventions on outcomes of mental well-being or distress within individuals [73]. Average improvements in mental well-being and mental disorder outcome measures at a group level do not necessarily mean that each individual demonstrates equal changes in both measures after receiving an intervention. These types of analyses leave intra- and even interindividual responses unclear and limited in their ability to detect how different individuals may respond in relation to different mental health outcomes. Thus, these generic approaches obscure important results that provide information as to what interventions work, on what dimensions they apply, and who specifically benefits from them. Subsequently, these studies provide limited guidance for practitioners and other stakeholders who wish to understand the nuances of how different interventions affect outcomes within (as opposed to between) individuals and then applying this knowledge to the way they provide mental health care [73].

Scientific studies investigating mental health interventions have not readily reported analyses of intraindividual change across both dimensions of mental health. A notable recent exception is a study by Trompetter et al [68], who investigated the impact of a self-help Acceptance and Commitment Therapy (ACT) intervention for people with clinical depression or anxiety. The authors utilized reliable change indices (RCIs) [74,75] to determine whether individuals demonstrated a meaningful change in their mental health outcomes. The researchers found that improvements in mental health or mental disorder did not necessarily co-occur. While 31% of participants improved across both dimensions, only 12% improved in aspects of positive mental health, and 57% improved in symptoms of distress. Additionally, results further differed for participants with depression and anxiety, showing how outcomes of well-being can interact differently with different outcomes of illness. Thus, analysis of the results using RCI not just enabled assessment of the overall effectiveness of the intervention for these 2 clinical

populations but also gave better insight about for whom the intervention showed the most effect.

Additionally, approaches such as those taken by Trompetter et al [68] enable the assessment of change while taking baseline scores into consideration. Baseline scores have a clear impact on the summary of change that is potentially possible for each individual [76]. Positive reliable change cannot be expected if participants start at a baseline level that is not conducive to further improvement. Studies that focus on a reduction in pathology, both mental and physical, therefore typically use severity classifications to inform participant criteria for potential participant recruitment. For example, researchers might only include participants who meet the mild depression cutoff on measures such as the DASS-21 or Hamilton Anxiety and Depression Scales to ensure that participants actually show signs of current distress [77,78]. In contrast, studies that investigate the impact of interventions on mental well-being typically do not consider cutoffs as an important starting factor, neglecting the critical impact of baseline scores; this is an important relation to assess considering the precarious situation of mental health and mental health care and the calls for mental health promotion interventions for the general population during the COVID-19 pandemic [8,48,62].

This study aimed to advance the literature in a number of ways. First, it aimed to determine the impact of an internet-based psychological intervention on mental health outcomes during COVID-19 in Australia. It aimed to add to the currently lacking evidence [63] on the benefit of (internet-based) interventions to promote mental health and well-being, as opposed to targeting clinical symptoms in clinical populations. Second, it aimed to investigate whether the findings reported by Trompetter et al [68] can be replicated in a nonclinical, general population sample; the study aimed to determine differences in reliable change in outcomes of both mental well-being and psychological distress. Rather than using an intervention based on a clinical treatment approach (ACT in the case of the study by Trompetter et al [68]), our study aimed to show this differential impact of a universal, group-based, mental health intervention designed to promote mental health in the general nonclinical population. Finally, the study aimed to examine the effect of baseline differences in well-being and psychological distress on the effectiveness of the intervention.

Methods

Study Design

This study was designed to establish whether a range of mental health outcomes would increase due to exposure to an internet-based psychological intervention and to test whether individuals would display improvements differentially across these outcomes using reliable change analysis. The study was an uncontrolled intervention study comparing data collected using an internet-based measurement tool at the beginning of the intervention compared to data by the end of the intervention. The study was approved by the Flinders University Human Research Ethics Committee (PN 2163).

Participants

Participants for this study were from 2 cohorts. The first consisted of adults (18 years or older) from the general population, while the second cohort consisted of adult university students. Participants from the general population signed up via an online website, which was promoted via local print media and radio, an email newsletter for the South Australian Health and Medical Research Institute (SAHMRI), and social media posts on Facebook and Twitter. The second cohort consisted of students who were recruited through one of the major universities in South Australia. No specific inclusion or exclusion criteria applied other than the requirement to be adult, understand the English language, and have access to an internet-enabled device with Zoom [79]. There was no face-to-face contact with any of the participants.

Recruitment

Recruitment was conducted over 6 months from March 2020 until July 2020. Recruitment procedures for the general population and the student population differed slightly. At the university, the study was advertised as a tailored, free, online program to improve mental health and well-being developed by SAHMRI and Flinders University. Promotional information for students was distributed via university emails, student associations, and social media including details about the program, facilitators, and the delivery format. Recruitment material highlighted the importance of well-being and mental health, and importantly, this period coincided with the ongoing impact of COVID-19. Recruitment material provided information about the development and individual components of the program. Interested participants provided their email address, name, and college and were sent an invitation to complete a measurement about their mental health and well-being 1 week before starting the first online session. Measurement was to be completed prior to commencing the intervention. Participants were not obliged to participate in the research study in order to attend the individual sessions. Within the general population, participants could enroll via a website with detailed information about the program or were recruited via partner organizations who were interested in promoting a well-being program to their staff.

Participants were sent an invitation to complete a measurement about their mental health and well-being before starting the initial online session. All participants were invited to attend 5 2-hour weekly sessions hosted online. While initially the study was planned to be conducted in person, COVID-19 restrictions in Australia required online delivery of the program via Zoom [79]. By the final session, participants were invited to complete a second measurement, which was used to determine the post-intervention score outcomes. This was emailed to participants 1 week before the final session, to be completed prior to attending the final session so that participants could track any changes observed since the original measure.

Intervention

The "Be Well Plan" is a 5-week, group-based psychological program that helps participants create a personalized mental health and well-being plan by experimenting with a variety of

resources and evidence-based activities to improve mental health and well-being. The program can be delivered in person in small- to medium-sized group settings (ranging between 10 and 40 participants) or alternatively online via platforms such as Zoom [79], the format utilized for this study.

Program facilitators for the training do not need to be trained mental health professionals, but rather are upskilled to be able to facilitate the training in an engaging and safe way, thereby improving the scalability of the program without further constraining existing health care resourcing. The trained trainers are required to participate in a minimum of 26 hours of face-to-face training. For this study, 6 trained trainers were involved in the delivery of the intervention with a variety of professional backgrounds including well-being research, counselling, workplace development training, and clinical psychology. Facilitators were either staff involved in the development in the intervention (n=4) or colleagues who have

a professional training background and were involved in early testing rounds of the intervention (n=2).

The program was designed using a rigorous intervention development process called intervention mapping and among other techniques, relied on the use of co-design with end users and stakeholders [80]. The program aims to impact both outcomes of well-being and outcomes of distress by incorporating evidence-based activities aimed at promoting mental health. Included activities were derived from a large systematic review on distinct psychological interventions aimed at improving outcomes of well-being conducted by members of the research team [58]. A particular strength is that the program is tailored to participants' unique mental health needs and interests of individual participants. A detailed description of the program and its development will be published in a separate manuscript. A general overview of the intervention can be found in Table 1.

Table 1. Summary of the 5 sessions of the Be Well Plan.

Session	Description
Session 1: Getting on the same page	Participants explore reasons for participating in the program, including their personal drivers. They also acquire basic knowledge of mental health and its malleability. This aims to stimulate a mindset for change. They continue by exploring the evidence for different psychological interventions and start creating their first Be Well Plan. They do this by choosing one of many formats of practicing mindfulness and setting a goal on how to practice it during the week. They get introduced to the formation of tiny habits and implementation intentions as a technique to improve the chance of goal attainment.
Session 2: Using your mental health profile	Participants reflect on session 1. They are introduced to the concept of self-compassion (as opposed to self-criticism) and how it can be used to learn from failure and shape our thinking patterns. They practice a self-compassion activity. They subsequently use their own measurement result stemming from the integrated assessment to focus on an outcome they want to work on (well-being, resilience, mood, anxiety, stress, health) and are introduced to activity finders: flow charts that map evidence-based activities to each of the activities. They pick one activity from the activity bank to add to their Be Well Plan and set new goals for the week. They will be introduced to the use of prompts and reminders as another method to increase goal attainment.
Session 3: Your resources and challenges	Participants reflect on week 2. They work with (and are reminded of) existing resources to their own mental health via 2 practical activities. In the first one, participants choose pictures that display sources of meaning in their life; in the second one, participants identify core values that can be used to guide goals. They then use a simple questionnaire to identify a key resource or challenge they want to work on. They are introduced to a second activity finder that maps evidence-based activities to various challenges and resources. They pick a new activity from the activity bank to add to their Be Well Plan. They finish the session by adjusting their Be Well Plan.
Session 4: Stress, coping, and resilience	Participants reflect on week 3. This session focuses on stressful times and effective ways to cope (avoidance-focused coping versus more helpful ways, such as problem-focused coping). They are then walked through various ways of coping using psychological techniques and theories, including identification of cognitive traps and the use of thought defusion. They are asked to identify social supporters for challenging times and are reminded of various professional services. They then choose 1 new activity specifically focusing on stress and resilience. They are actively asked to reach out to a social supporter as part of their weekly activities.
Session 5: Future-proofing your Be Well Plan	Participants reflect on the past 4 weeks. They are asked to complete a new measurement and investigate how their outcomes have changed over the 4 weeks. The facilitators introduce the concept of realistic optimism, growth, and the fact that progress comes with ups and downs. Participants work on practicing positive reframing as a way to deal with mistakes and setbacks. They then build their final Be Well Plan, which aims to summarize key learnings from the previous weeks into a standalone plan. They summarize what their best possible mental health looks like, highlight their unique drivers and motivators, and existing resources and challenges in their life. They set a longer-term goal and choose the activities they wish to add to their Be Well Plan. They identify their key supporters and reflect on what support services they need in case of emergency.

Measures

Outcomes measured in this study included positive mental health and psychological distress, which are mental health outcomes that are most relevant to nonclinical populations.

Mental Well-being

Mental well-being was captured using the Mental Health Continuum Short-Form (MHC-SF) [81], which allows the

calculation of a generic well-being score as well as subscores for emotional (hedonic), psychological (eudaimonic), and social well-being. The scale showed high internal reliability, with a Cronbach α of 0.94. Furthermore, the Satisfaction With Life Scale (SWLS) [82] was used to provide an alternative measure of general well-being, which similarly showed good internal reliability: α=0.89.

Psychological Distress

Psychological distress was captured with the DASS-21, which offers clear cutoff points for the level of severity of symptoms. This facilitates grouping of scores into "normal," "mild," "moderate," "severe," and "extremely severe" symptoms of psychological distress for the domains of depression (α=0.91), anxiety (α=0.82), and stress (α=0.86).

Resilience

An additional outcome of interest was resilience, or the perceived ability to withstand stress, a relevant outcome considering the impact of COVID-19 on stress levels. Resilience was assessed using the Brief Resilience Scale [83], which looks at whether respondents feel they are able to deal with stressful situations. This tool also comes with cutoffs for low, normal, and high resilience. Internal consistency was high: α=0.89.

Statistical Analysis

Evaluating the Impact of the Intervention

Data analysis was conducted in RStudio and SPSS version 27. To determine the average change between baseline and the final session, a repeated measures multiple analysis of variance (MANOVA) was completed. A MANOVA was chosen in order to account for the considerable overlap between selected mental health outcome measures. Where needed, data were transformed to deal with the presence of nonnormality; as results did not change between analyses on transformed and untransformed data, the untransformed results were used in this article. One univariate outlier was excluded from the analysis as it significantly impacted the results. Multivariate outliers did not affect the results and were therefore left unchanged. Multicollinearity was assessed using bivariate correlations, revealing that the majority of outcomes showed a positive or negative correlation between .40 and .65. Partial eta squared was used as a measure of effect size, where 0.02 equals a small effect, 0.13 a medium effect, and 0.26 or higher a large effect [84].

Analysis of Within-Individual Changes Post-Intervention

Within-individual changes in outcomes were assessed by calculating an RCI using the traditional method for assessment of reliable change as suggested by Jacobson and Truax [75]. The RCI was calculated by subtracting an individual's post-intervention score from their baseline score and subsequently dividing this difference score by the standard error of the difference for the measurements used. The standard error of the difference was calculated using the following formula:

$$\text{SEdiff} = SD_x * \sqrt{(1-r_{xx})},$$

where SD_x refers to the SD of the difference scores and R_{xx} refers to the correlation between scores on the pre and post

measurements. Any change larger than 1.96 (2 SDs) was considered a reliable change.

Assessment of Baseline Differences in Intervention Outcomes

The impact of baseline well-being and psychological distress on outcome impact was assessed with independent samples t tests. Where distributions were nonparametric, both normal and parametric tests (ie, Mann-Whitney U-tests) were run. As the results for parametric and nonparametric tests returned similar results, results presented report the parametric results (ie, results for the t tests). Participants were grouped into "high" vs "low" well-being according to the cutoffs on the MHC-SF [81] as well as "high" vs "low" life satisfaction according to a cutoff on the SWLS [82]. Furthermore, participants were also grouped into "distressed" vs "no distress" if they met any of the cutoffs for "mild distress" on one of the DASS-21 subscales [71].

Results

A total of 240 participants took part in the training, of which 140 participants provided consent to be studied. Of these 140, a total of 90 participants provided data at both timepoints. A total of 89 participants were included in the analysis, after excluding a severe outlier.

Participant Characteristics

The average participant age was 38.67 (SD 13.06) years. A total of 59 participants (59/89, 66%) were female, who had an average age of 40.05 (SD 14.07) years. Of the participants, 19 (19/89, 21%) were male, with an average age of 37.37 (SD 10.43) years. "Prefer not to say" was answered by 11 participants (11/89, 12%). Most participants were employed (69/89, 77%; average age: 40.71, SD 13.26 years) and not studying (57/89, 64%; average age: 43.25, SD 12.40 years). When comparing students (32/89, 36%; average age: 30.53, SD 9.98 years) to participants from the general population, it was noted that mental health baseline values were significantly worse for students for all outcomes: $F_{6,82}$=3.94, P=.002; Wilks Λ=.78; partial η^2=.22.

Evaluating the Impact of the Intervention

Comparison of pre- and post-intervention scores showed a significant change in mental health variables across time: $F_{6,83}$=5.60, P<.001; Wilks Λ=.71; partial η^2=.29. Table 2 displays the positive changes in all individual domains and the relevant test statistics, showing a significant positive change in all outcomes measured. Effect sizes for significant outcomes ranged between small and moderate, with the largest significant improvement noted in life satisfaction and the smallest improvements in anxiety.

Table 2. Pre- and postintervention scores for outcomes of mental well-being, psychological distress, and resilience in the total sample (n=89).

Outcomes	Preintervention		Postintervention		Statistics		
	Score, mean (SD)	Participants with problematic scores[a], n (%)	Score, mean (SD)	Participants with problematic scores, n (%)	F (df)	P	η^2
Overall well-being	45.81 (11.18)	51 (57)	49.39 (12.19)	41 (46)	22.43 (1)	<.001	.20
Life satisfaction	22.01 (5.93)	26 (29)	24.46 (6.48)	21 (24)	25.29 (1)	<.001	.22
Distress due to mood	10.00 (8.91)	42 (47)	7.91 (7.37)	32 (36)	9.44 (1)	.003	.10
Distress due to anxiety	6.54 (6.77)	34 (38)	5.33 (5.71)	26 (29)	5.45 (1)	.02	.06
Distress due to stress	13.03 (8.18)	32 (36)	10.67 (7.94)	25 (28)	11.86 (1)	<.001	.12
Resilience	3.27 (0.76)	26 (29)	3.45 (0.75)	21 (24)	10.84 (1)	.001	.110

[a]Problematic scores refer to scores where participants did not meet the cut-off for high well-being, normal resilience, or no presence of distress.

Analysis of Within-Individual Changes Post-Intervention

Analysis of reliable change indicated that a total of 92% (82/89) of the participants demonstrated improvement in at least one of the domains of the outcomes measured. Of these 83 participants, 51% (42/82) showed both improvements in well-being and indicators of distress, whereas 29% (24/82) only showed improvement in well-being and 20% (17/82) only showed improvements in distress. Further, response patterns differed for the various distress categories.

Those who met the threshold for mild depressive symptoms and displayed a reliable improvement largely showed reliable change in both well-being and distress (25/35, 71%), with additional proportions demonstrating improvement in either well-being (5/35, 14%) or distress (5/35, 14%). Those participants who met the threshold for anxiety demonstrated reliable improvement in both anxiety and well-being (15/29, 52%) or well-being alone (13/29, 45%); only one participant

(1/29, 3%) demonstrated reliable change in anxiety scores only. The majority of those who met the threshold for stress showed reliable change in well-being outcomes only (19/31, 61%), with 7 participants (7/31, 23%) showing a reliable change in both distress and well-being and 5 participants (5/31, 16%) showing reliable change in distress only.

Assessment of Baseline Differences in Intervention Outcomes

Change in mental health outcomes significantly differed for those with "low" baseline values compared with those with "high" baseline scores before the intervention. As expected, significant changes were found for life satisfaction and distress across all categories, with those reporting lower baseline scores experiencing significantly lower change in outcome scores (see Table 3). Despite students showing significantly worse baseline mental health problems, no significant interaction effect was noted ($F_{6,82}$=1.70, P=.132; Wilks Λ=.89; partial η^2=.11), showing that the change in the mental health outcome was not significantly different for students versus nonstudents.

Table 3. Comparison of the outcomes of mental well-being, psychological distress, and resilience in the total sample of participants between participants with and without problematic scores at baseline.

Outcomes	Participants with problematic scores[a] at baseline			Participants with healthy scores at baseline			Statistics		
	Pre-intervention, mean (SD)	Post-intervention, mean (SD)	N	Pre-intervention, mean (SD)	Post-intervention, mean (SD)	N	t (df)	P	d
Well-being	38.18 (7.61)	42.47 (10.62)	51	56.05 (5.56)	58.68 (6.78)	38	1.02 (86)	.31	0.21
Life satisfaction	14.62 (3.20)	18.77 (6.56)	26	25.06 (3.65)	26.81 (4.80)	63	2.14 (87)	.04	0.50
Mood problems	17.76 (6.69)	13.05 (7.10)	42	3.06 (2.79)	3.32 (3.64)	47	3.79 (55)	<.001	0.84
Anxiety problems	13.35 (6.06)	8.53 (6.41)	34	2.33 (2.24)	3.35 (4.20)	55	6.23 (55)	<.001	1.46
Stress problems	22.06 (5.39)	16.44 (8.09)	32	7.96 (4.04)	7.44 (5.77)	57	3.37 (44)	.002	0.85
Resilience	2.29 (0.40)	2.69 (0.70)	25	3.66 (0.45)	3.74 (0.53)	64	2.86 (87)	.005	0.68

[a]Problematic scores refer to scores where participants did not meet the cut-off for high well-being, normal resilience, or no presence of distress.

Discussion

This study demonstrated that an internet-based mental health program could elicit differential change in outcomes of mental well-being and psychological distress in a nonclinical population

during COVID-19. Results demonstrated that mental health outcomes in the sample improved from the beginning to the end of the intervention and that participants with poorer baseline scores had a significantly better response compared to those with greater average baseline scores. Furthermore, the results highlighted that reliable change in outcomes of mental

well-being and psychological distress could occur independently, with type of distress (depression, anxiety, stress) resulting in differential response patterns.

The results here bolster the evidence that internet-based interventions can play a significant role in dealing with the mental health consequences of the pandemic [60,61,85,86]. This intervention was delivered over internet-based teleconferencing software using trained professionals outside of a clinical setting. The training, which focuses on promoting mental health, not the specific treatment of mental illness, was designed to be able to be delivered without the reliance on clinical staff. This approach of upskilling nonclinical staff to deliver mental health training has successfully been utilized by our team before and facilitates scalability and reach of the solution [87,88]. Mental health systems are typically under-resourced, which has further deteriorated during COVID-19, fueling calls for innovative solutions as the one presented in this article, particularly those that safeguard ethical principles [85,89]. Finding positive results for interventions that aim to promote mental health in both outcomes of well-being and distress in a general population under duress makes for promising standalone first-line interventions or as solutions to deal with existing system issues (eg, waitlists) [18].

While the significant impact of the intervention in a general nonclinical population was promising, the use of the term "nonclinical" warrants attention. This term mainly reflects the inclusion criteria rather than an actual lack of clinical symptoms among participants. As may be expected, the majority of participants did in fact show mild symptoms of distress (53/89, 60%). This proportion, at first glance, may appear higher than typically reported in the general population, such as the frequently cited "one in five who are struggling with symptoms of a common mental disorder" [90]. This increased rate may partly be attributed to the result of the pandemic but may also be explained by the fact that our sample stemmed from 2 different population pools: the general adult population and tertiary university students. Previous studies have demonstrated that mental health outcomes in students are worse across many domains than in the general population [51,91,92], which was supported in our study. These findings first elicit the need to thoroughly investigate and improve the mental health of, demands on, and lifestyle of our tertiary students [93], but second, highlights an area that requires the attention of researchers who may use student cohorts for their mental health research and wish to compare their findings to a sample of the general population.

The findings support previous research indicating that improvements in distress do not automatically result in improvements in well-being and vice versa. Similar to the findings by Trompetter et al [68], this study showed that, while participation in the intervention led to overall improved mental well-being and reduced psychological distress, not every individual improved in both domains. These results provide an additional piece of evidence that supports the independence of outcomes for mental well-being and mental disorder [27]. As research by dual-factor model scholars such as Keyes [24] and Greenspoon and Saklofske [53] proposes, the ultimate end goal of our mental health care system ought to strive for "complete"

states of mental health, that is states of high well-being and no distress or symptoms of mental disorder in as many people as possible. This indeed would be the expectation if we were to deliver mental health care that lived up to and met the contemporary definitions of mental health such as the one posited by the World Health Organization [1]. Results here show though, that in order to meet this aspirational international standard, it is critical to systematically measure both outcomes of well-being as well as psychological distress when assessing the impact of psychological interventions in research and practice [27].

The difference in intra-individual responses between psychological distress types furthermore points to the complex relationship between states of well-being and distress and their outcome measures [25]. Most participants who showed changes in depression had simultaneous improvements in well-being outcomes, which was not the case for anxiety or stress. A possible explanation for these patterns of change points to the inherent similarity between the construct of depression and happiness [29]. For instance, evidence for dual-factor models is less convincing for people with severe depression [94], and these models do not work as well when outcome measures specifically take advantage of the emotion of "happiness" or other affective states of hedonic well-being. In the data presented here, even the moderate correlation (r=.5) between the measure of life satisfaction (SWLS) and general well-being (MHC-SF), which captures the factors of hedonic, eudemonic, and social well-being, shows that these 2 well-being measures vary substantially. Therefore, it is essential to carefully consider the most appropriate measure when assessing the impact of interventions or treatment modalities, as this decision has consequences for the perceived impact of the intervention in both types of outcomes [95].

Our finding that effect sizes were higher for people meeting the threshold of psychological distress or low well-being is encouraging. In addition to providing insight into the impact of interventions for individuals with different states of mental health, promoting the importance of baseline mental health on interventions has practical implications for treatment models. There is an ever-increasing burden of mental health problems, with mental health systems around the globe feeling the strain [96,97]. Advocates of change have long been calling for new solutions to help support the provision of complementary services and group-based mental health interventions that can be delivered online and in person. The Be Well Plan program offers a solution that can be implemented to ameliorate current system pressures, complementing other accessible solutions such as low-intensity cognitive behavioral therapy [98,99]. Consequently, it is important to determine an effective model of universal programs that have the greatest impact on mental health outcomes, while reducing the burden of disease. While more research is needed to understand the particular effectiveness of each program component on different mental health outcomes [73], our findings support the need to improve and innovate lower tiers in evidence-based, stepped-care models or stimulate a stronger focus on well-being within integrated care models [100,101].

This research has limitations requiring comment. First, the results stem from an uncontrolled study, which means that the evidence is not conclusive in supporting the efficacy of the intervention. The intervention was delivered in response to the immediate mental health demands in the community during the pandemic; therefore, the team made a conscious call to deliver the intervention to anyone who signed on immediately, rather than randomize them into waitlists. This design limitation, however, does not impact the validity of the findings, as a core aim of the study was to explore a within-subject change design. That said, it is important to compare and verify reliable change between an active intervention and a comparable control condition in future studies. Uncontrolled studies, for example, do not account for various confounding factors (eg, the impact of extraneous events and lifestyle factors). In this case, the study was conducted while the COVID-19 pandemic was ongoing, which could have had a significant impact on mental health outcomes during this extraordinary period [45] and therefore would have impacted the results one way or the other.

Second, the results presented only refer to short-term outcomes, clearly warranting the need to examine long-term changes. For instance, improvement in well-being has been shown to be associated with long-term recovery of mental disorder in observational studies [31]. It is hypothesized that well-being may therefore be a therapeutic focus for long-term (symptom) recovery [18], but a rigorous body of research intervention studies is yet to be established [27].

Third, the current results apply to a general population cohort; extrapolation to clinical populations should be used with caution. Although the sample did include participants that showed higher distress levels, the presence of psychological symptoms does not equal the presence of disorder, which requires assessment using different outcome measures [5]. The results presented by Trompetter and colleagues [68], however, did apply to clinical populations and therefore pose a reference point for those working in the clinical area.

A fourth and similar limitation lies in the specificity of our outcome measures. This study used a general measure of distress implying that the results should not be generalized to determining the impact on explicit symptoms of mental disorder [102]. The current results only refer to the differential changes in well-being and distress, demonstrating that changes in outcomes of mental well-being and psychological distress do not automatically go hand in hand after participation in a mental health intervention. Both outcomes should be considered and assessed when investigating the impact of psychological interventions and changes in mental health outcomes.

Finally, the study did not collect in-depth data on intervention usage, which means the study is limited in being able to talk to the fidelity of the training or its short- or long-term use by the participants. This will be an important focus area for future studies on the Be Well Plan.

To conclude, this study provides evidence for the impact of an internet-based mental health intervention during a period of significant community need. The intervention resulted in improvements in both participant mental well-being and psychological distress. After analyzing within-individual effects of the program, a differential response pattern was observed, indicating that improvement in mental well-being and reduction in psychological distress were not necessarily congruent. This indicates the importance of assessing dimensions of both well-being and distress when determining intervention effectiveness, which in the case of the Be Well Plan, added evidence to the impact that internet-based mental health promotion interventions can have generally and during times of societal distress such as pandemics.

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Abbreviations

ACT: Acceptance and Commitment Therapy
DASS: Depression Anxiety and Stress Scale
MANOVA: multivariate analysis of variance
MHC-SF: Mental Health Continuum Short-Form
RCI: reliable change index
SAHMRI: South Australian Health and Medical Research Institute
SWLS: Satisfaction With Life Scale