

Older and More Mindful?
The Utility of Mindfulness and Meditation for
Well-Being in Older Adulthood

by

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Abstract

Mindfulness refers to paying attention to the present-moment in a purposeful, receptive, and nonjudgmental way. A significant body of research has demonstrated that mindfulness can be instrumental in reducing stress and promoting positive psychological outcomes. However, empirical research on the processes through which mindfulness affects well-being is limited and is recognised as a priority for the field. Furthermore, few studies have considered the positive effects of mindfulness on psychological functioning from a lifespan perspective. In particular, relatively few studies have focused on the utility of mindfulness for well-being among older adults, and none have examined the use of contemporary forms of mindfulness training (e.g., app-based programs) with this population. The overarching purpose of this thesis was to extend existing knowledge regarding mindfulness and its potential utility for adaptive ageing, through a series of three empirical studies.

The first cross-sectional study examined the role of age in moderating associations of mindfulness components with well-being in the context of a proposed model of mindfulness. Results showed that most mindfulness components were positively associated with age; and that the relationships between (1) present-moment attention and well-being, (2) nonjudgment and well-being, and (3) decentering and flexible goal adjustment became stronger with age and were significant for adults from middle-adulthood onwards.

The second experience-sampling study examined state-level mindfulness, hassles and uplifts, and well-being in the daily lives of middle-aged and older adults. Results showed that the state-mindfulness facets present-moment attention and nonjudgmental acceptance were predictive of greater affective well-being in later adulthood. Moreover, nonjudgmental acceptance appeared to buffer affective reactivity to daily hassles, and importantly, this effect

was stronger at older ages. Mindful states did not, however, appear to provide any extra boost to uplift-related mood.

The final study investigated the feasibility and acceptability of an app-based mindfulness-meditation program for community-based older adults and the effects of participation on well-being. Here, participants engaged with a 30-day app-based mindfulness-meditation program for 10-minutes daily on their smartphones. In general, older adults found app-based mindfulness-meditation training interesting, enjoyable, valuable, and useful. Results also showed significant improvements in positive affect, negative affect, and life satisfaction across the study interval; but no meaningful change in mindfulness or perceived stress.

Overall, the thesis extends existing knowledge on mindfulness and adaptive ageing. The empirical findings provide evidence that (a) the dispositional tendency to focus on the present-moment and adopt a nonjudgmental orientation may become especially important for well-being with advancing age, and the ability to appreciate the transitory nature of personal experiences may be particularly important for flexible employment of goal disengagement and reengagement strategies across the second half of life; (b) adopting a nonevaluative and accepting orientation toward momentary experiences may be a psychological strategy that has particular utility for mitigating emotional reactivity to daily stressors with increasing age; and (c) app-based mindfulness-meditation training with community-based older adults is feasible and acceptable and can potentially facilitate benefits for well-being. Together, these findings can inform the development of programs aimed at promoting mindful qualities and well-being for adults in midlife and beyond.

Declaration

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university, and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Leeann Mahlo

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List of Publications

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CHAPTER

1

INTRODUCTION*

**Note:* Content from this chapter appears in the introductions of the peer-reviewed journal articles accepted for publication in *Aging and Mental Health* (Chapter 2), *Psychology and Aging* (Chapter 3), and *The Gerontologist* (Chapter 4).

1.1 Overview

Mindfulness refers to focusing attention on one's immediate experience in the present moment in an open and nonjudgmental way (Baer, 2003; Kabat-Zinn, 1994). Over the past few decades, research has shown that mindfulness (as a trait, a state, and an intervention) can be instrumental in reducing stress and facilitating well-being (Creswell, 2017; Keng, Smoski, & Robins, 2011; Khoury, Sharma, Rush, & Fournier, 2015). Furthermore, mindfulness-based techniques are increasingly featured within psychological interventions (e.g., Mindfulness-Based Stress Reduction, Mindfulness-Based Cognitive Therapy, Acceptance and Commitment Therapy, and Dialectical Behaviour Therapy). Although there is a significant amount of empirical evidence supporting the relationship between mindfulness and a variety of positive psychological outcomes, questions remain regarding *how* mindfulness exerts its effects (Gu, Strauss, Bond, & Cavanagh, 2015; Hölzel et al., 2011; Keng et al., 2011; Shapiro & Jazaieri, 2015), and whether lifespan developmental processes could have implications for the efficacy of mindfulness across different phases of adulthood. To address these gaps in the literature, the first aim of this thesis was to examine a proposed model of mindfulness within a lifespan developmental perspective. Here, the thesis draws on key theories concerned with ageing and emotion to argue that normative developmental changes could make specific aspects of mindfulness particularly efficacious for supporting well-being in later life.

Within the field of mindfulness, there is increasing interest in extending empirical research beyond its current focus on dispositional or trait-level characteristics to a more fine-grained investigation of mindfulness as an experiential state that fluctuates from moment to moment (Blanke & Brose, 2017; Brown & Ryan, 2003). This is consistent with contemporary research focusing on intrapersonal momentary processes, which offers rich potential for insights into flexible responsiveness across situations and time; identification of potentially meaningful patterns of experience and behaviour; and further, a deeper understanding of

developmental processes across the lifespan that have consequences for well-being (Nofhle & Fleeson, 2015). Notably, almost no research with older adults has examined mindfulness as a state (vs. a stable and enduring trait) that can fluctuate from moment-to-moment in daily life. Therefore, a further aim of this thesis was to examine state-level mindfulness via experience-sampling methodology (i.e., intensive, repeated, real-time assessment) within the context of later adulthood. Furthermore, relatively few studies have focused on the utility of mindfulness and meditation for older adults' emotional well-being (Geiger et al., 2016; Klimecki et al., 2019; Li & Bressington, 2019), and to my knowledge, none have examined the use of contemporary forms of mindfulness training (e.g., app-based programs) with this population. Accordingly, the final aim of the thesis was to investigate the feasibility, acceptability, and preliminary efficacy of app-based mindfulness-meditation training for older adults.

1.2 Mindfulness and Meditation

The concept of mindfulness has its origins within the Eastern philosophy of Buddhism (Chiesa, 2013; Gethin, 2015). In this context, mindfulness practices and techniques (e.g., meditation) have been engaged in for over thousands of years with the aim of cultivating contemplation, equanimity, compassion, and insight, and as a means of transcending the suffering almost inevitably experienced at different times during life. Contemporary conceptualisations of mindfulness refer to the natural human ability to be aware of one's mind and surroundings and to pay attention to the present moment in a purposeful, receptive, and nonjudgmental way (Baer, 2003; Bishop et al., 2004; Brown, Ryan, & Creswell, 2007; Kabat-Zinn, 1994). Hence, intentional practice of mindfulness offers the opportunity to be present within each unfolding moment of life and provides a potential antidote to the habitual automaticity and distraction so prevalent within modern busy lifestyles (Creswell, 2017; Kabat-Zinn, 1994).

While a tendency toward mindfulness can be regarded as a naturally occurring trait or individual difference characteristic, mindfulness can be cultivated in both formal and informal ways. For example, applying mindfulness informally within everyday life might include bringing one's full and deliberate attention to activities such as household tasks (e.g., washing the dishes and gardening), eating (e.g., savouring a square of chocolate), or walking (i.e., focusing on one slow step at a time). In contrast, mindfulness-meditation is a formal practice that is designed to cultivate and facilitate an attentive and aware state of mind. Meditation typically involves dedicating a set period of time to sitting and focusing on a chosen object of attention (e.g., the rise and fall of one's breath or by maintaining a soft gaze on something within the immediate environment); while at the same time maintaining an open, accepting, and observant attitude toward whatever thoughts, emotions, and sensations arise (Bishop et al., 2004; Kabat-Zinn, 1994). This dual focus within meditation is sometimes delineated in the literature as representing 'focused attention' and 'open monitoring' styles of meditation. However, both processes are integral to the skill of mindfulness-meditation and are activated to varying degrees at any one time (Chiesa, 2013; Esch, 2014; Gethin, 2015; Lutz, Jha, Dunne, & Saron, 2015; van Vugt, 2015).

The growing popularity of mindfulness within modern Western culture has stemmed in part from the work of Jon Kabat-Zinn (Baer, 2010; Bishop et al., 2004; Kabat-Zinn, 1990). Having practised and studied meditation and mindfulness for many years prior, Kabat-Zinn developed the now well-known program, Mindfulness-Based Stress Reduction (MBSR; 1982, 1990). MBSR was originally designed to assist patients experiencing chronic stress, pain, and illness. The program is typically conducted in a group format over 8 weeks and consists of both psychoeducation and intensive instruction in the application of mindfulness through informal (e.g., mindfully eating a raisin) and formal (e.g., meditation and yoga) practices. Adaptations of the program have since been developed including Mindfulness-

Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002) for the treatment of vulnerability to depression, Mindfulness-Based Relapse Prevention (MBRP; Witkiewitz, Marlatt, & Walker, 2005) for recovery from substance abuse, and Mindfulness-Based Eating Awareness Treatment (MB-EAT; Kristeller, 2003; Kristeller & Wolever, 2010) for the treatment of compulsive overeating.

Mindfulness is also being integrated more generally within psychological therapies and clinical practice. For example, informal mindfulness techniques (e.g., observing the natural rise and fall of emotions within everyday life; engaging in everyday tasks with mindful attention) are used in Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2012). Here, clients develop the skill of being present with whatever life may bring rather than engaging in distraction or avoidance when difficult thoughts, feelings, and sensations arise. Similarly, mindfulness is a core component of Dialectical Behaviour Therapy (DBT; Linehan, 1993) through which clients can develop awareness and insight that helps to facilitate adaptive responses to life and its challenges. Both ACT and DBT share the premise that developing mindfulness skills helps clients to behave in ways that are more aligned with their personal goals and core values.

1.2.1 Mindfulness and Meditation: Empirical Research

The burgeoning public and clinical interest in mindfulness over the past four decades has been well-supported by empirical research within the fields of both neuroscience and psychology. A significant body of cross-sectional, laboratory-based, and intervention research shows that meditation is consistently associated with beneficial changes in brain function and structure, for both experienced meditation practitioners and novices following relatively brief meditation training over a few hours or days (Boccia, Piccardi, & Guariglia, 2015; Esch, 2014; Fox et al., 2014; Gotink, Meijboom, Vernooij, Smits, & Hunink, 2016; Hölzel et al., 2011; Tang, Hölzel, & Posner, 2015; Wheeler, Arnkoff, & Glass, 2017). These

changes include differential activation of large-scale brain networks (e.g., the insula, amygdala, and prefrontal cortex); and increased regional grey matter volume in areas of the brain (e.g., the hippocampus and temporo-parietal junction) associated with attention, memory, executive functioning, and self-referential processing (e.g., self-awareness, self-regulation; Boccia et al., 2015; Hölzel et al., 2011; Tang et al., 2015). Further, mindfulness-based therapies have been found to be effective in reducing psychopathology (e.g., anxiety, depression, stress-related symptoms, pain conditions, addictive disorders, etc.) and enhancing psychological well-being and quality of life (Brown, 2015; Creswell, 2017; de Abreu Costa, de Oliveira, Tatton-Ramos, Manfro, & Salum, 2019; Goldberg et al., 2018; Gu et al., 2015; Hölzel et al., 2011; Keng et al., 2011; Khoury et al., 2015; Querstret, Morison, Dickinson, Cropley, & John, 2020; Schumer et al., 2018; Wielgosz, Goldberg, Kral, Dunne, & Davidson, 2019).

While there is an upswell of research investigating the effects of mindfulness-based interventions, there is concurrent interest in dispositional or trait mindfulness as an inherent human characteristic (Brown & Ryan, 2003). Although contention exists regarding the accurate conceptualisation and measurement of mindfulness as a construct (Grossman, 2019), research has demonstrated positive relationships between trait mindfulness and psychological health in the general population, including adaptive cognitive processes (e.g., reduced rumination and pain catastrophising), enhanced emotional processing and regulation, and reduced psychopathology (e.g., depressive symptoms; Tomlinson, Yousaf, Vittersø, & Jones, 2018).

1.2.2 How Does Mindfulness Work?

There is now a well-established evidence base demonstrating the positive effects of mindfulness and meditation for stress, depression, anxiety, chronic pain management, substance use, and quality of life; and preliminary evidence that mindfulness-oriented

interventions can be effective in ameliorating symptoms of traumatic stress and dysregulated eating, as well as enhancing relational outcomes (i.e., relationship satisfaction and prosocial behaviours; see Creswell, 2017; Goldberg et al., 2018; Hilton et al., 2017; Khoury et al., 2015; Khoury, Knäuper, Schlosser, Carrière, & Chiesa, 2017; Wielgosz et al., 2019).

Scientific attention is now turning toward the question of *how* mindfulness works. Overall, a multitude of underlying mechanisms are hypothesised to play a key role in the way that mindfulness confers benefits (e.g., Baer, 2003, 2010; Bishop et al., 2004; Holas & Jankowski, 2013; Hölzel et al., 2011; Shapiro & Carlson, 2017; Shapiro, Carlson, Astin, & Freedman, 2006). However, empirical research investigating mindfulness and associated psychological mechanisms has been limited to date and represents a current priority for the field (Creswell, 2017; Wielgosz et al., 2019).

Table 1.1 presents a summary of key mechanisms theorised to account for links between mindfulness and positive psychosocial outcomes. In particular, the practice and development of mindfulness is proposed to have potential utility across a range of clinical presentations via transdiagnostic processes related to enhanced attentional, cognitive, affective, and behavioural regulation (Keng et al., 2011; Wielgosz et al., 2019). So far, empirical support for some mechanisms has been demonstrated via systematic review.

In the first known systematic review and meta-analysis specifically focused on mindfulness-oriented mechanistic research, Gu et al. (2015) evaluated 20 studies based on the MBSR and MBCT programs. The results showed moderate and consistent evidence for mindfulness, rumination, and worry as mediators of the relationship between mindfulness-based interventions and mental health outcomes, including depression, stress, anxiety, and mood. In addition, preliminary evidence for cognitive and emotional reactivity, self-compassion, and psychological flexibility as further mechanisms was indicated. Gu et al. also

Table 1.1

Overview of Potential Psychological Mechanisms Associated with Beneficial Effects of Mindfulness

Mechanisms of Mindfulness	Description
Acceptance	Calm reception and tolerance of internal and external experiences.
Attention regulation	Ability to selectively orient and sustain attention.
Body awareness	Ability to notice subtle internal bodily sensation.
Change in self-perspective	De-identification from narratives <i>about</i> the self and development of a more direct experiential self.
Cognitive & emotional reactivity	Cognitive elaboration, emotional arousal, and habitual responding to situations and events.
Compassion	Openness, empathic understanding, and benevolence toward oneself and others.
Decentering or Metacognitive awareness	Psychological distancing; ability to observe mental events from an objective perspective.
Emotion regulation	Ability to effectively influence emotions and emotional responses to situations and events.
Exposure	Sustained contact with previously avoided stimuli and experiences.
Memory functions	Working memory capacity; autobiographical memory; memory for negative stimuli.
Mindfulness	Nonjudgmental awareness of present moment experiencing.
Psychological flexibility	Ability to flexibly adapt and respond to situations and events.
Rumination	Repetitive negative thinking about past events.
Values clarification	Identification of personal, societal, and cultural values.
Worry	Persistent concern about potential or perceived problems.

Note. Sourced from Alsubaie et al. (2017); Gu et al. (2015); Hölzel et al. (2011); Keng et al., (2011); and Khoury et al. (2017).

identified several key proposed mechanisms (e.g., attention regulation and body awareness) that had not been investigated in the studies included within the review.

More recently, Alsubaie et al. (2017) conducted a systematic review of the evidence base for mechanisms underlying the relationship between mindfulness-based interventions (i.e., MBSR and MBCT) and diagnosed physical and/or psychological conditions. Overall, they evaluated 18 studies focusing on a broad range of potential mechanisms. Results showed consistent evidence for self-reported mindfulness (i.e., assessed as mindful awareness and related skills) as an active mechanism across multiple psychological health outcomes (e.g., depression, anxiety, stress, and psychological adjustment to illness), along with preliminary evidence for other mechanisms, including rumination, worry, decentering, and self-compassion.

Diverging from a focus on structured mindfulness-based intervention programs and clinical samples, Khoury et al. (2017) examined potential mechanisms of action in their systematic review and meta-analytic evaluation of 21 studies involving traditional meditation retreats (i.e., intensive daily meditation practice over several days, weeks, or months). In this context, evidence was found for mindfulness, compassion, and acceptance as mechanisms associated with psychological outcomes (i.e., symptoms of stress, anxiety, and depression).

Together, these reviews highlight the range of different processes proposed to underlie links between mindfulness and positive outcomes. However, much of the associated research is considered preliminary and methodologically limited, and thus precludes drawing definitive conclusions (Alsubaie et al., 2017; Baer, 2010; Creswell, 2017; Gu et al., 2015; Khoury et al., 2017). For example, Alsubaie et al. (2017) stated that most of the studies included in their review were underpowered (*ns* ranged from 29 to 219), with insufficient sample sizes for the analytic strategies employed. Also, of the studies included in Gu et al.'s (2015) meta-analysis, not all employed a randomised control design and only four included

an active (rather than a wait-list) control group. Therefore, it cannot be claimed with certainty that the positive effects of the interventions were specifically due to the mindfulness-meditation component of the programs and not to more general factors such as participation expectations, attention from researchers, psychoeducation, and/or group support.

A further limitation of mindfulness-oriented research to date is that potential mechanisms of interest are often examined independently in separate studies rather than as part of an integrated analysis (Alsubaie et al., 2017; Gu et al., 2015; Hölzel et al., 2011). Consequently, research examining sequential pathways within well-developed multiple-mediator models is needed. In addition, few studies have focused specifically on well-being outcomes as opposed to psychopathology or ill-health (Chiesa, Fazio, Bernardinelli, & Morandi, 2017). Importantly, the concept of well-being reflects more than just the absence of ‘dis-ease’ and more than just one end of an ill-being/well-being continuum, with high levels of well-being distinctly possible despite psychopathology and mental illness (see Iasiello, van Agteren, & Cochrane, 2020). Moreover, well-being encompasses the potential for optimum human functioning and the capacity to thrive (Kobau et al., 2011).

1.2.3 The Mindfulness Model of Emotion Regulation

In the context of growing interest in the development of models that can account for the beneficial effects of mindfulness, experts in the field of cognitive-affective neuroscience and mindfulness-based interventions have come together to propose new directions forward. Following the present author’s review of existing models of mindfulness, Farb, Anderson, Irving, and Segal (2014) were found to have integrated prominent paradigms of mindfulness and self-regulation (e.g., Bishop et al., 2004; Gross, 2002; Shapiro et al., 2006) to develop a process model that proposes key mechanisms through which mindfulness is hypothesised to support effective emotion regulation. In particular, the components within Farb et al.’s model were determined to reflect adaptive psychological processes suitable for empirical testing

within the scope of the present thesis and to support a focus on emotional well-being outcomes as opposed to psychopathology. Importantly, the ability to effectively regulate emotions and emotional responses is considered a key aspect of positive psychological functioning and well-being (Aldao, Sheppes, & Gross, 2015; Gratz & Roemer, 2004; Gross, 1998, 2013; Quoidbach, Mikolajczak, & Gross, 2015). Concomitantly, emotion dysregulation is proposed to be a transdiagnostic feature of many forms of psychopathology (Aldao & Nolen-Hoeksema, 2010; Sheppes, Suri, & Gross, 2015; Sloan et al., 2017; Werner & Gross, 2010). Figure 1.1 provides an adapted illustration of the pathways through which Farb et al.'s mindfulness model components work together to inhibit maladaptive patterns of reactivity and facilitate psychological flexibility and novel responding to events; thus, promoting adaptive emotion regulation and well-being.

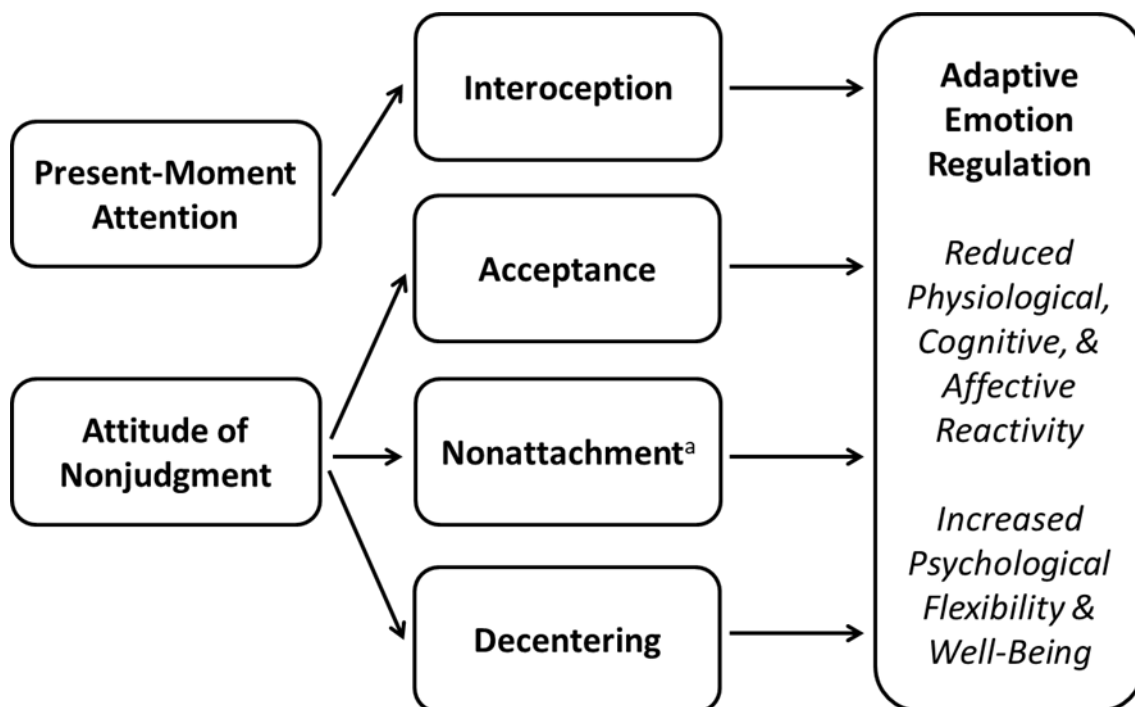


Figure 1.1. An adaptation of Farb et al.'s (2014) mindfulness model of emotion regulation.

^a Nonattachment has been incorporated within the model by the current author.

The two foundational principles in Farb et al.'s (2014) mindfulness model are *attention to the present* and an *attitude of nonjudgment*. The practice of mindfulness involves intentionally focusing on one's immediate sensory experience (i.e., internal cues) while also maintaining a broader awareness of the surrounding environment (i.e., external cues). For example, in formal mindfulness practice, individuals are encouraged to notice when they have become engaged in cognitive deliberation (about the past, future, or events), and to gently reorient their attention to a chosen object of focus in the present moment (e.g., the sensation of breathing, or movement or perception of sound) and/or to develop a broader attentional state. According to Farb et al. (2014), explicitly focusing attention on momentary sensory experience facilitates *interoception*, or enhanced body awareness. This awareness then functions as an attentional anchor, helping to inhibit engagement with potentially harmful cognitive elaboration. Further, through heightened awareness of dynamic body processes (e.g., breathing, heart rate, muscle tone, and digestion), insight can be gained into habitual physiological patterns of responding.

Mindfulness also requires cultivation of an attitude of nonjudgment toward experience. That is, thoughts, feelings, and sensations are not evaluated and judged as intrinsically good or bad but are instead noted with an attitude of openness and receptivity (Kabat-Zinn, 1990, 1994). According to Farb et al. (2014), this nonjudgmental attitude allows a move toward (potentially unpleasant) experiences with *acceptance* (and tolerance) rather than trying to change, hold onto, or avoid them in some way. Further, adopting a nonjudgmental attitude and noticing experiences rather than evaluating them also allows for the process of *decentering* to occur. This is a form of psychological distancing where awareness of the transient and impermanent nature of all things increases and events can be viewed from a more objective perspective (Bernstein et al., 2015; Fresco et al., 2007). Rather than becoming over-identified with or 'caught up' in thoughts, feelings, and situations, both

internal cognitions and emotions and external situational-contextual factors can be observed with equanimity and as temporary ‘objects’ that come and go over time (Farb et al., 2014).

Nonattachment is a construct closely related to decentering that has gained recent research attention (Feliu-Soler et al., 2016; Sahdra, Ciarrochi, & Parker, 2016; Sahdra, Shaver, & Brown, 2010). Nonattachment refers to the propensity to flexibly engage with experiences and situations (including pleasant ones) without becoming fixated or attempting to hold onto or alter them (Sahdra et al., 2016). Research has demonstrated positive links between nonattachment and well-being, and that nonattachment appears to be an important mechanism in the relationship between mindfulness and mental health (Burzler, Voracek, Hos, & Tran, 2018; Ciarrochi, Sahdra, Yap, & Dicke, 2020; Sahdra et al., 2016, 2010; Whitehead, Bates, Elphinstone, Yang, & Murray, 2019). Importantly, nonattachment has also been shown to be empirically distinct from acceptance (Sahdra, Ciarrochi, Parker, Marshall, & Heaven, 2015) and decentering (Montero-Marin et al., 2016), and to be uniquely predictive of both psychopathology and resilience over and above decentering (Bhambhani & Cabral, 2016; Feliu-Soler et al., 2016). Specifically, while decentering reflects an objective appreciation for the transient nature of experience, nonattachment is characterised by reduced mental fixation on acquiring, maintaining, or removing experiences and/or objects (Brown et al., 2007). In this thesis, Farb et al.’s (2014) model has been adapted to include nonattachment as an additional possible mechanism linking nonjudgment with positive psychological outcomes (see Figure 1.1).

According to Farb et al. (2014), intentionally focusing attention on present-moment experience with an attitude of nonjudgment gradually supports the reconfiguration of attention and cognition. These reconfigurations then facilitate increased awareness of, and reduction in, habitual and maladaptive patterns of reactivity, and promote psychological flexibility in responses to experiences and events. Consequently, mindfulness can potentially

inspire novel ways of perceiving and engaging with experiences, thus promoting an enhanced self-regulatory capacity and an increased sense of well-being. The first aim of this thesis was to use an individual-differences approach to provide the first known empirical test of Farb et al.'s proposed mechanisms (with inclusion of nonattachment) in the context of adaptation and well-being.

1.3 Mindfulness, Adaptation, and Well-Being in Older Adulthood

The principles and processes outlined in Farb et al.'s (2014) mindfulness model may have particular relevance for well-being in older adulthood. Over the past thirty years, empirical research has demonstrated that emotional well-being does not follow the well-established normative trajectory of physiological decline with increasing age, but instead is typically maintained, and in some ways improves, into older adulthood (Charles & Carstensen, 2014). Contemporary theories of adaptive ageing explain why older adults (i.e., aged 65 years and older) consistently report high levels of emotional well-being (at least prior to very old age; see Gerstorf et al., 2010) despite being vulnerable to the unique stressors of later life (Charles & Carstensen, 2009, 2014). In the context of this so-called “paradox of ageing”, Farb et al.'s mechanisms of mindfulness may represent qualities or strategies that (1) require a relatively modest investment of those resources that are important for adaptation but may become scarcer with advancing age (e.g., physiological and cognitive flexibility; see Charles, 2010; Hobfoll, 2002), (2) capitalise on age-related regulatory strengths, and (3) serve a protective function for older adults exposed to common ageing-related losses (e.g., declines in health, see Baltes & Smith, 2003). In the section that follows, key lifespan developmental theories concerned with ageing and emotion are outlined to argue how normative developmental changes could make specific components of mindfulness particularly efficacious for supporting well-being in later life.

First, *Socioemotional Selectivity Theory* (SST; Carstensen, 2006; Carstensen, Fung, & Charles, 2003; Carstensen, Isaacowitz, & Charles, 1999) outlines how motivational changes affect social and emotional functioning across the lifespan, and in particular, highlights the role of changing perceptions of future time remaining in underlying such motivational changes. In contrast to the expansive and unlimited view of the future generally held in youth, the process of ageing is typically accompanied by a heightened awareness that one's future time remaining is increasingly limited. Because of this shift in perspective, goals associated with positive present-moment experiences (e.g., spending time with close others who promote emotional well-being) come to be increasingly prioritised over future-oriented goals (e.g., knowledge and information acquisition) that predominate earlier in the lifespan. As Carstensen and colleagues (Carstensen, 2006; Carstensen et al., 1999, 2003) describe, the process of ageing intensifies motivation to savour the present moment in order to derive meaning and satisfaction from life.

The fundamental principle in mindfulness of focusing attention on immediate experience is consistent with this apparent normative tendency of older adults to be more present-moment oriented. Furthermore, while intentional cultivation of mindfulness can promote a variety of beneficial outcomes (e.g., reduced symptomatology and enhanced well-being; Creswell, 2017; Gu et al., 2015, 2016; Hölzel et al., 2011; Keng et al., 2011; Khoury et al., 2015), the process of 'meeting the present moment in all its fullness' is commonly experienced as inherently rewarding in and of itself (Berk, Hotterbeekx, van Os, & van Boxtel, 2018; Laurie & Blandford, 2016; Morone, Lynch, Losasso, Liebe, & Greco, 2012). This may particularly be the case for those older adults who are keenly aware of the passage of time and the preciousness of each of life's individual moments. Accordingly, mindfulness—and in particular the focus on present-moment attention—may be a valuable

resource or strategy for older adults who are increasingly motivated to self-regulate emotion and behaviour in ways that optimise present-moment experience.

Second, Brandtstädter and colleagues' *Dual-Process Model* (Brandtstädter, 2009; Brandtstädter & Renner, 1990; Brandtstädter & Rothermund, 2002) identifies self-regulatory processes that underlie coping and resilience in response to resource gains and losses. In particular, this approach highlights how individuals manage goals in ways that facilitate adaptation to the changes in resources and capacities that typically occur as a result of ageing (Brandtstädter, Rothermund, Kranz, & Kühn, 2010). Here, successful or adaptive ageing involves shifting toward a more *accommodative* style of coping characterised by engagement with goals that are aligned with existing resources and constraints, and by psychological and behavioural disengagement from goals that have become unviable. For example, when individuals approach retirement or experience irreversible loss of some kind (such as with the onset of chronic health conditions that limit functional ability or the death of network members), a restructuring of life plans is required where blocked goals must be relinquished and constructive meaning found in the new status quo (Brandtstädter, 2009, 2015; Brandtstädter et al., 2010). This contrasts with a more *assimilative* style of coping that tends to be employed more frequently earlier in life. With assimilative coping, goals are pursued with persistence and individuals seek to actively modify aspects of the environment or themselves in the service of tenaciously fulfilling their ambitions. The ability to adjust to a more accommodative mode of self-regulatory behaviour and cognition requires the capacity to acknowledge and accept one's current circumstances and to let go of unattainable, yet previously valued ambitions.

In this context of increasing processes of goal adjustment and the devaluing of blocked goals, mindfulness may be particularly helpful through its proposed facilitation of acceptance, nonattachment, decentering, and psychological and behavioural flexibility (Farb

et al., 2014). Specifically, by cultivating openness and receptivity to one's changing landscape (acceptance) and adaptive psychological disengagement from pursuits that are no longer feasible (nonattachment and decentering), mindfulness could potentially promote older adults' capacities to flexibly adapt and accommodate to their changing circumstances. Furthermore, according to Farb et al. (2014), mindfulness may promote enhanced awareness of previously unnoticed aspects of situations and experiences. This may help older adults to identify and reorientate toward new goals and meaningful pursuits that are in line with available resources and capacities; an equally important element of effective coping (Brandtstädter et al., 2010; Wrosch, Scheier, & Miller, 2013).

Third, according to the model of *Strength and Vulnerability Integration* (SAVI; Charles, 2010), older adults become better at selectively avoiding or limiting their exposure to negative experiences as a result of both motivational changes (as posited by SST) and acquired expertise through lived experience (see also Blanchard-Fields, 2007). However, when older adults are exposed to high levels of unavoidable stress (e.g., significant loss, functional limitations, financial challenges, or caregiving demands), selective avoidance strategies become ineffective and well-being can become compromised (Mroczek & Almeida, 2004). In particular, as biological systems decrease in flexibility with age, the potential for elevated and sustained physiological arousal in response to stress increases (Piazza, Charles, Stawski, & Almeida, 2013; Wrzus, Müller, Wagner, Lindenberger, & Riediger, 2013). Here, the SAVI model is consistent with research showing comparatively high well-being in young-old adulthood (reflecting the 'paradox of well-being') followed by more precipitous declines in well-being near the end of life (Gerstorf et al., 2010).

In the context of this vulnerability to heightened reactivity and decreased well-being in response to unavoidable stressors in later life, certain aspects of mindfulness may serve both protective and restorative functions. Specifically, the capacity to adopt a nonjudgmental

and non-evaluative attitude towards *any* experience may then provide an effective strategy for managing prolonged and potentially aversive experiences (e.g., chronic illness or caregiving demands). According to Farb et al. (2014), repeated adoption of such an attitude facilitates a different relationship with one's (potentially aversive) experiences that is characterised by increased acceptance and tolerance, and an ability to gain psychological distance or a more objective perspective. Importantly for older adults, this is proposed to then lead to reduced physiological, cognitive, and affective reactivity, and ultimately, greater equanimity (Farb et al., 2014). Of further note, in general, older adults appear to preference low-arousal positive states that provide a sense of calm, peace, and relaxation over high-arousal states such as excitement and exhilaration (Mogilner, Kamvar, & Aaker, 2011; Sands & Isaacowitz, 2017; Scheibe, English, Tsai, & Carstensen, 2013). Thus, mindfulness may be increasingly effective for regulating emotions with ageing, given that it is commonly associated with experiences of calm, contentment, and serenity (Berk et al., 2018; Laurie & Blandford, 2016; Lomas, Ivrtzan, & Yong, 2016; Morone et al., 2012).

The integration of perspectives on both mindfulness and socio-emotional ageing points to older adults being able to sustain high levels of well-being through adopting a present-moment orientation, actively avoiding exposure to potentially stressful events, and engaging in meaningful pursuits that are adequately supported by available resources (Brandtstädter, 2009; Carstensen, 2006; Carstensen et al., 1999, 2003; Charles, 2010). At the same time, among those particularly vulnerable to ageing-related stressors (Charles, 2010), Farb et al.'s (2014) mechanisms of mindfulness also represent specific processes that can potentially complement older adults' natural regulatory abilities and support flexible adaptation and effective coping in response to challenges. Thus, two important empirical questions are whether certain characteristics of mindfulness (i.e., present-moment attention,

nonjudgment, etc.) are (1) positively associated with age, and (2) more strongly associated with well-being outcomes with increasing age.

1.3.1 Mindfulness and Meditation in Older Adulthood: Empirical Evidence

Within the burgeoning field of mindfulness, relatively few studies have investigated links between mindfulness and/or meditation and psychological functioning in the context of older adulthood. A review of relevant empirical evidence is provided in the sections that follow.

Dispositional or trait mindfulness. In keeping with the postulates of SST, a growing body of research points to mindfulness increasing with age. For example, a few studies have demonstrated a small positive association between age and dispositional or trait mindfulness (i.e., the general tendency to be mindful in everyday life; Lehto, Uusitalo-Malmivaara, & Repo, 2015) and that older adults are relatively more mindful when compared with younger adults (Fountain-Zaragoza, Puccetti, Whitmoyer, & Prakash, 2018; Mackenzie, Karaoylas, & Starzyk, 2018; Mahoney, Segal, & Coolidge, 2015). Moreover, in samples of older adults, dispositional mindfulness has been found to be associated with better mental health and enhanced mood (de Frias & Whyne, 2015; Elliot, Gallegos, Moynihan, & Chapman, 2019; Fiocco & Mallya, 2015), as well as positive expectations regarding ageing (Fiocco & Meisner, 2020).

A relatively small number of studies have considered the implications of dispositional mindfulness for well-being within the context of developmental differences across the lifespan. Here, two separate studies have found that unidimensional trait mindfulness mediates the relationships between age and negative affect (Raes, Bruyneel, Loeys, Moerkerke, & De Raedt, 2015), and between age and positive affect (but not negative affect; Shook, Ford, Strough, Delaney, & Barker, 2017); thus, demonstrating that mindful attention could play an instrumental role in the link between age and affective experience. Little

research has focused specifically on examining whether associations of mindfulness with well-being vary as a function of age. So far, existing studies examining the relationships between mindful attention and perceived stress (via emotion regulation; Prakash, Hussain, & Schirda, 2015), and between a study-specific measure of mindfulness linked to religion/spirituality and positive and negative affect (Imel & Dautovich, 2018), have found no evidence for a moderating role of age. However, the lifespan developmental perspectives outlined above suggest that different specific aspects of mindfulness (e.g., present-moment attending, nonjudgment, acceptance, etc.) may both complement older adults' motivational preferences and promote flexible adaptation in response to age-related challenges, thus becoming increasingly relevant to maintaining well-being with ageing.

Mindfulness-based interventions. Interventions that provide training in the use of mindfulness-based practices appear to be acceptable to older adults (Berk, van Boxtel, & van Os, 2017; Gard, Hölzel, & Lazar, 2014; Geiger et al., 2016; Lomas et al., 2016; Moss et al., 2015; Szanton, Wenzel, Connolly, & Piferi, 2011; Wahbeh, Goodrich, & Oken, 2016). Moreover, there is promising evidence for the beneficial effects of mindfulness-based practices on older adults' psychological functioning, including reduced symptoms of anxiety, depression, stress, and insomnia, and increased pain acceptance and quality of life (Fountain-Zaragoza & Prakash, 2017; Geiger et al., 2016; Hazlett-Stevens, Singer, & Chong, 2019; Klimecki et al., 2019; Li & Bressington, 2019; Perach et al., 2019). However, so far, these conclusions are considered preliminary due to the relatively small body of literature and various methodological limitations, including inconsistent protocols and high attrition within samples (Fountain-Zaragoza & Prakash, 2017; Geiger et al., 2016; Klimecki et al., 2019; Li & Bressington, 2019). Of further note, existing intervention studies with older adults have mainly focused on outcomes related to psychopathology (Geiger et al., 2016; Klimecki et al., 2019) and/or neurocognitive decline (e.g., Berk et al., 2017; van Boxtel, Berk, de Vugt, &

van Warmenhoven, 2019; Wang et al., 2020), as opposed to distinct measures of emotional well-being. As discussed above, empirical evidence strongly suggests that well-being and psychopathology are not just opposite ends of the same continuum but are instead distinct, yet related, aspects of mental health (Iasiello et al., 2020). Thus, research investigating the potentially positive relationships between mindfulness practice and well-being for older adults is warranted.

In a comprehensive narrative review focusing on mindfulness-based interventions in the context of older adulthood, Geiger et al. (2016) reported evidence of promising outcomes on measures of anxiety, depression, stress, and pain acceptance in samples of (mostly) community-dwelling older adults. However, out of 14 studies that investigated psychological outcomes, only eight employed a randomised controlled design and, of these, only three included an active comparison group (e.g., psychoeducation or social support; i.e., Morone, Rollman, Moore, Qin, & Weiner, 2009; Mularski et al., 2009; and Teixeira, 2010). Notably, these three studies found no significant benefits for participants of mindfulness-based interventions over those in active control conditions.¹ This is important because in most studies with older adults to date, meditation is one aspect of a more comprehensive intervention (e.g., MBSR) that incorporates additional elements such as psychoeducation, social support, physical activity, and poetry readings. Thus, it is difficult to ascertain the effects of meditation per se, as distinct from the influence of non-meditation specific factors (Geiger et al., 2016).

More recently, Li & Bressington (2019) conducted the only known systematic review focused on randomised control trials of MBSR with older adults. This review evaluated a total of just six studies—including five new trials conducted since the review by Geiger et al.

¹ Geiger et al. (2016) reviewed 15 studies in total and also reported mixed and contradictory evidence for the effects of mindfulness-based interventions on older adults' physical well-being.

(2016)—and found evidence of the effectiveness of MBSR for reducing depressive symptomatology compared with wait-list controls, but no evidence of symptom reduction in anxiety or perceived stress. Moreover, Li and Bressington concluded that the existing evidence-base was limited and of low quality, due to a small number of studies, small sample sizes, and heterogeneity in sample age, settings (i.e., clinical and non-clinical), outcome measures, protocols, and control groups. For example, three studies utilised active control groups comprising health education, karate training, and reading/relaxation that potentially overlapped in some ways with the mindfulness-based intervention. Furthermore, in most studies, there was a lack of screening for extra-curricular engagement in mindfulness-based activity.

The present research. The present thesis aimed to extend the existing knowledge base on mindfulness, meditation, and well-being by considering interrelationships among these variables from a lifespan developmental perspective. First, a cross-sectional survey examined the role of age in moderating associations of mindfulness components with well-being within the context of Farb et al.'s (2014) process model. Second, an experience-sampling study examined state-level mindfulness and everyday affective experience across older adulthood. Third, a pilot study investigated the feasibility, acceptability, and efficacy of an app-based mindfulness-meditation program for community-dwelling older adults and their well-being.

1.4 State-Level Mindfulness

An ever-increasing accessibility of technology suitable for use in experience-sampling research has facilitated the more ecologically valid study of processes such as mindfulness within real world contexts (Mehl & Conner, 2012). For example, smartphones can now be readily used as a form of electronic diary where participants can repeatedly record details of their current or recent experiences, effectively capturing the dynamic flow of mood,

behaviour, and events across time and context. Such methods minimise retrospective biases and contribute to a more nuanced understanding of the processes and experiences of interest beyond that obtained via generalised self-report at the trait-level (Reis, 2012).

In particular, examination of intrapersonal (within-person) moment-to-moment processes can lead to insights about flexible responsiveness across situations and time as well as identification of potentially meaningful patterns of behaviour (Nofle & Fleeson, 2015). Such investigations can answer questions about situational contingencies at the state level (e.g., involving affective experience and/or behaviour), and further, contribute to a deeper understanding of developmental processes across the lifespan and consequences for well-being (e.g., see Mroczek & Almeida, 2004). Moreover, due to the nature of the information being assessed (i.e., generalised averages vs. more immediate experience), trait- and state-level reports are often divergent and demonstrate differential predictive value (Blanke, Riediger, & Brose, 2018; Schwarz, 2012). Of particular relevance, while trait- and state-level mindfulness may be structurally similar in terms of the underlying dimensions, they may also be considered as conceptually and statistically independent (Blanke & Brose, 2017; Brown & Ryan, 2003).

So far, a small amount of research suggests that state mindfulness in the context of everyday life is linked with lower levels of stress and negative affect and higher levels of positive affect (Brown & Ryan, 2003; Blanke et al., 2018; Snippe, Nyklíček, Schroevers, & Bos, 2015). State mindfulness has also been linked with more adaptive coping (Donald, Atkins, Parker, Christie, & Ryan, 2016; Weinstein, Brown, & Ryan, 2009), reduced rumination and greater life satisfaction (Felsman, Verduyn, Ayduk, & Kross, 2017), and reduced emotional exhaustion, increased job satisfaction, and better sleep quality in workers (Hülshager, Alberts, Feinholdt, & Lang, 2013; Hülshager et al., 2014). In the majority of these studies, state mindfulness was operationalised as unidimensional and most often

captures present-focused attention and awareness, either via the state Mindful Attention Awareness Scale (state-MAAS; Brown & Ryan, 2003) or with single-item measures (e.g., Donald et al., 2016; Felsman et al., 2017). Other researchers have approached state mindfulness as multidimensional using selected items from existing trait measures and have demonstrated differential relationships between facets such as present-moment attention, nonjudgmental acceptance, and nonreactivity with the outcomes of emotional granularity (Van der Gucht et al., 2019), anger and aggression (Eisenlohr-Moul, Peters, Pond, & DeWall, 2016), and borderline personality characteristics (Eisenlohr-Moul, Peters, Chamberlain, & Rodriguez, 2016).

1.4.1 Measuring State Mindfulness

In response to the emerging interest in assessing facet-level state mindfulness, and lack of an existing psychometrically sound measure for examining daily experiences within meditation-naïve populations, Blanke and Brose (2017) recently developed the Multidimensional State Mindfulness Questionnaire (MSMQ). While other measures of state mindfulness are designed for use in the specific context of mindfulness training (i.e., the Daily Mindful Responding Scale [DMRS; Lacaille, Sadikaj, Nishioka, Flanders, & Knäuper, 2015]; and the Toronto Mindfulness Scale [TMS; Lau et al., 2006]) or are comparatively lengthy and focus only on mindfulness of mind and body (i.e., the State Mindfulness Scale [SMS; Tanay & Bernstein, 2013]), the MSMQ is a relatively brief measure for use with the general population that was developed through multilevel confirmatory factor analysis and corroboration with existing trait-level measures (Blanke & Brose, 2017).

Recent research using the MSMQ and experience-sampling methodology in the daily lives of university students has demonstrated differential beneficial links between present-moment attention and positive affect, and between nonjudgmental acceptance and negative affect, and further, a specific buffering effect of nonjudgmental acceptance on affective

reactivity to daily hassles (Blanke et al., 2018). These findings extend previous research by contributing a more fine-grained understanding of relationships between different dimensions of mindfulness and emotional well-being at the level of moment-to-moment experience (Blanke et al., 2018). A further aim of this thesis was to investigate the predictive value, and potential buffering effect, of different state-level mindfulness facets for affective well-being within a community-based sample of older adults.

1.4.2 State-Level Mindfulness and Adaptive Ageing

Blanke et al. (2018) demonstrated that higher within-person levels of present-moment attention in daily life (i.e., occasions when an individual's present-moment attention was higher than their own personal average) corresponded with higher levels of positive affect above and beyond other mindfulness facets (i.e., nonjudgmental acceptance and acting with awareness).² Consistent with SST (Carstensen, 2006; Carstensen et al., 1999, 2003), this beneficial coupling of present-moment focusing and affective well-being may well become stronger with age as individuals experience an increased motivation to pursue goals that maximise the quality of their current emotional experiences. Importantly, positive affect is a fundamental aspect of well-being in older adulthood and individuals with higher levels of positive relative to negative affect have demonstrated enhanced psychosocial functioning (Fredrickson, 2013) and greater longevity (Carstensen et al., 2011). Furthermore, positive affect has been shown to predict greater meaning in life with both increasing age and as perception of future time becomes more limited (Hicks, Trent, Davis, & King, 2012; King, Hicks, Krull, & Del Gaiso, 2006).

A potential mechanism linking present-moment attention with positive affect could involve increased appreciation for uplifts (i.e., positive or pleasant events in daily life;

² According to Blanke and Brose (2017, p. 741), while “present-moment attention is related to acting with awareness, the latter mainly refers to [one's] own actions, whereas present-moment attention covers attention to the present moment beyond [one's] own activities”.

Kanner, Coyne, Schaefer, & Lazarus, 1981). Specifically, a tendency to be in the ‘here-and-now’ may increase the salience of uplifting experiences (e.g., a pleasant exchange with a friend, time spent in nature, etc.), potentially increasing positive affect. This is in line with Fredrickson's (2004, 2013) *broaden-and-build theory* which posits a reciprocal relationship between states of broadened present-moment awareness and positive emotions, ultimately contributing to personal resource gain and enhanced well-being over time. In particular, Fredrickson and colleagues (Garland, Farb, Goldin, & Fredrickson, 2015; Garland & Fredrickson, 2019) suggest that mindfulness (as a state, trait, and practice) contributes to emotional well-being by promoting both positive appraisals and savouring in the context of stressful and/or pleasant experiences. Relatedly, savouring (i.e., mindful appreciation of positive experiences) is suggested to be a particularly pertinent means for deriving meaning in later adulthood (Bryant & Smith, 2015). As outlined in SST (Carstensen, 2006; Carstensen et al., 1999, 2003), the process of ageing intensifies motivation to optimise present-moment experiencing in order to derive meaning and satisfaction from life. Overall, attending to the present moment could provide a potential ‘boosting’ effect of the relationship between uplifting experiences and positive affectivity, particularly in the context of increasing age.

On the other hand, adopting a nonjudgmental and accepting attitude towards experiences may promote feelings of equanimity or reduced affective reactivity to both pleasant and unpleasant events. Providing indirect support for this proposition, Shao, Keuper, Geng, and Lee (2016) found that older adults (aged 60–68 years) who underwent 8 weeks of attention- and compassion-based meditation training demonstrated relatively more neutral responding when viewing both negative and positive pictures, compared with those who underwent relaxation training. That is, negative pictures were rated as more positive, and positive pictures as less positive, and these ratings were accompanied by lower perceived arousal (i.e., greater feelings of calm). These findings are consistent with the notion that

mindfulness, and nonjudgmental acceptance in particular, can promote a sense of affective stability or equanimity across a range of contexts, whether they be negatively, neutrally, or positively valenced (Desbordes et al., 2015). Thus, higher levels of nonjudgmental acceptance could temper the relationship between potentially uplifting experiences and positive affect, where levels of positive affect are maintained rather than boosted. These contrasting propositions regarding the effects of state mindfulness on the coupling between uplifts and positive affect were investigated in the second study of the present thesis.

As posited in the discussion of *Strength and Vulnerability Integration* (SAVI; Charles, 2010) above, when older adults encounter unavoidable and sustained stressors (e.g., chronic illness or caregiving demands), they may experience elevated negative affect and prolonged physiological arousal due to age-related reductions in biological regulation capacity (Wrzus et al., 2013). In the context of this vulnerability to unavoidable stressors in later life, the adoption of a nonjudgmental and accepting attitude toward experiences could potentially buffer the adverse effects of prolonged stress on emotional well-being (Creswell & Lindsay, 2014; Feldman, Lavalley, Gildawie, & Greeson, 2016). Offering some indirect support for this notion, Blanke et al. (2018) found that on occasions when university students' nonjudgmental acceptance was higher than average, this corresponded with lower negative affect over and above other mindfulness facets, and importantly, attenuated the association between daily hassle exposure and affective well-being. Nonjudgmental acceptance may be a particularly effective psychological resource for managing potentially aversive experiences with increasing age, and importantly for older adults, could contribute to faster physiological recovery (i.e., return to baseline levels) following adverse events (Desbordes et al., 2015).

1.4.3 Research on Facet-Level and State Mindfulness with Older Adults

As discussed above, only a small amount of research has investigated naturally occurring (vs. intentionally cultivated through intervention) links between mindfulness and

psychological functioning in the context of older adulthood. In a recent validation study of a commonly used trait mindfulness measure (i.e., the Five Facet Mindfulness Questionnaire - Short Form [FFMQ-SF]; Baer et al., 2006; Bohlmeijer, ten Klooster, Fledderus, Veehof, & Baer, 2011) with a sample of community-dwelling older adults (i.e., aged 60–89 years), Brady, Kneebone, and Bailey (2019) went beyond the global assessment of mindfulness. They demonstrated that while most facets were independently associated with both positive and negative affect, the facet observe (assessing awareness of internal and external experiences) was not significantly associated with negative affect, and the facet nonjudgment (i.e., of one's thoughts and feelings) was not significantly related to positive affect. These findings mirror prior studies with relatively younger samples (Baer et al., 2008; Brady et al., 2019) and highlight that present-moment awareness appears more relevant for positive affectivity, while nonjudgmental acceptance seems to have particular utility in the context of stress and negative experiences (Blanke et al., 2018; Creswell & Lindsay, 2014). Another recent study by Fiocco and Meisner (2020) found that older adults (aged 55–79 years) with higher levels of nonjudgmental acceptance reported more positive expectations about ageing, an important factor underlying health, well-being, and longevity in older adulthood. Together, these studies highlight how the predictive value of different mindfulness facets likely depends on the outcomes being investigated (Blanke et al., 2018).

While experience-sampling has been well-used to investigate the affective experiences of older adults in daily life (e.g., Carstensen et al., 2011), not much research has employed similar methodology to examine state-level mindfulness in older populations. To my knowledge, Moore, Depp, Wetherell, and Lenze (2016) conducted the only such study with 67 older adults (aged 65–79) who participated in a mindfulness-based intervention. This study required participants to complete a paper-and-pencil assessment together with a ten-day online experience-sampling phase comprising the same measures, both before and after

participation in an 8-week mindfulness-based treatment program (or health education control group). The study utilised four items from an existing trait measure of mindfulness (i.e., the Cognitive Affective Mindfulness Scale-Revised [CAMS-R]; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007) and demonstrated significantly greater improvements in mindfulness, depression, and anxiety for participants of the mindfulness intervention (compared to the active control group) when using data collected online via experience-sampling, but not by paper-and-pencil. Moreover, when analysing data from the paper-and-pencil tests, there was no evidence of the beneficial effects for mindfulness and depression. Moore et al., concluded that experience-sampling appears to outperform traditional pencil-and-paper assessment in terms of precision and sensitivity to change in key outcomes; and that the benefits of its use may outweigh any increased procedural burden for researchers and participants.

More recently, in twin studies, Blanke, Schmidt, Riediger, and Brose (2020) used experience-sampling to investigate associations between present-moment attention and nonjudgmental acceptance, rumination and reflection (as emotion regulation strategies), and positive and negative affect in the daily lives of 70 university students (average age 26 years) and 179 middle-aged adults (average age 51 years) from Germany, respectively. The findings from both samples consistently showed that present-moment attention uniquely predicted concurrent reflection, and that of the two mindfulness facets, nonjudgmental acceptance was more strongly related to reduced rumination. Furthermore, when participants were in a more mindful state (i.e., exhibiting elevated present-moment attention and nonjudgmental acceptance), rumination was less strongly linked with affective well-being. In addition, in moments of higher nonjudgmental acceptance, reflection was no longer linked with changes in affect; that is, in this context, reflection offered little regulatory value. The authors concluded that state-level mindfulness influences whether regulatory strategies such as

rumination and reflection are more or less adaptive; and can inhibit the negative impact of maladaptive emotion regulation (e.g., rumination) on emotional well-being. Of note, each of these studies utilised just two items from the nine-item MSMQ (i.e., one item for each of the present-moment attention and nonjudgmental acceptance facets) and did not examine age effects. Thus, to date, no research has utilised the complete MSMQ to investigate links between facet-level mindfulness and affective well-being in community-dwelling adults across the second half of the lifespan; hence, setting the scene for the second study of the present thesis.

The overarching aims of the second study were to: (1) examine associations of state-level mindfulness facets with everyday affective experience in a community-based sample of middle-aged to older adults (i.e., aged 50 and above); (2) extend previous research (Blanke et al., 2018) by examining affective responses to daily uplifts (in addition to daily hassles); and (3) examine the potential roles as moderators of both age and future-time perspective on the relationships between mindfulness facets and within-person couplings of daily hassles/uplifts and affect.

1.5 App-Based Mindfulness-Meditation Training

Mindfulness-meditation techniques may be thousands of years old but modern-day advances offer innovative ways of engaging with these ancient practices. The increasingly widespread use of electronic devices such as smartphones, tablets, and computers, together with the advance of application technology (i.e., “apps”) has provided a new and unprecedented platform for the delivery of meditation instruction and guidance. Advantages of digitally delivered mindfulness-based practice include enhanced dissemination within the general community and the provision of flexible access for participants at a time and place of their own choosing. Moreover, an accumulating body of research is now showing that digital mindfulness-based interventions (d-MBIs; i.e., delivered via smartphone applications and

web-based platforms) can produce meaningful improvements in relation to attention, stress, depression, and anxiety (Mrazek et al., 2019).

1.5.1 The Headspace Mindfulness-Meditation Program

In a comprehensive review and evaluation of available mindfulness-based apps, *Headspace* (Headspace Inc., 2020b) was rated as the most high-quality and easy-to-use with high scores on engagement, functionality, visual aesthetics, information quality, and user satisfaction (Mani, Kavanagh, Hides, & Stoyanov, 2015). The Headspace mindfulness and meditation app-based training program is used by millions of people worldwide (Creswell, 2017; Headspace Inc., 2020a) and consists of audio-guided meditation sessions together with short animated videos illustrating the key concepts of mindfulness and meditation. Each meditation session comprises focusing on the breath, mentally scanning the body, monitoring the mind's activity, and cultivating a nonjudgmental attitude toward experiences.

With a relatively small time commitment of 10 to 20 minutes per day, the Headspace training is designed to be easily integrated within users' daily routines. This is important given that the substantial time commitment involved with established face-to-face programs (e.g., 2.5-hour weekly meetings plus 45 minutes of daily practice in MBSR) can be perceived as prohibitive (e.g., Mallya & Fiocco, 2016); and is not necessarily conducive to developing a sustained meditation practice (Lindsay & Creswell, 2015; Malinowski & Shalamanova, 2017). The accessibility of the Headspace application is likely to be appealing for individuals who prefer the convenience, flexibility, and privacy of home-based training rather than needing to travel to attend more intensive (and more expensive) group-based programs (Kabat-Zinn, 1994; Wahbeh, Svalina, & Oken, 2014). This is particularly relevant for older adults who may be experiencing resource constraints making out-of-home travel difficult (e.g., mobility and/or financial limitations, or indeed societal restrictions due to the 2020

pandemic) or who just prefer to pursue activities that can easily fit into their existing routines (Lomas et al., 2016).

A growing number of randomised controlled trials have now demonstrated that the Headspace meditation program can produce salutary effects, including: greater mindfulness and psychosocial well-being after 10 days of use (Economides, Martman, Bell, & Sanderson, 2018; Flett, Hayne, Riordan, Thompson, & Conner, 2019; Howells, Ivtzan, & Eiroa-Orosa, 2016); increased sustained attention (Bennike, Wieghorst, & Kirk, 2017), less aggressive responding (DeSteno, Lim, Duong, & Condon, 2018), more compassionate behaviour (Lim, Condon, & De Steno, 2015), and less perceived stress and greater well-being for medical students (Yang, Schamber, Meyer, & Gold, 2018) after 3–4 weeks of use; and reduced work-related stress and enhanced well-being following 8 weeks of use (Bostock, Crosswell, Prather, & Steptoe, 2019). Moreover, some of these studies have incorporated active control groups and demonstrated unique effects attributable to use of the Headspace application compared with note-taking apps (Flett et al., 2019; Howells et al., 2016) and online brain games (Bennike et al., 2017; DeSteno et al., 2018; Lim et al., 2015). However, one study demonstrated comparable beneficial effects (i.e., reduced stress and irritability, and improved affect) attributable to a psychoeducational audiobook on the topic of mindfulness (Economides et al., 2018). Other controlled trials using Headspace have found no significant effects on critical thinking for university students (Noone & Hogan, 2018) and no reliable effects on some measures of well-being among a sample of so-called ‘happiness seekers’ with a particular interest in self-development (Howells et al., 2016).

Further evidence for the efficacy of the Headspace program comes from pilot and feasibility studies demonstrating lower perceived stress and improved resilience and life satisfaction after both 10 and 30 days of Headspace (Champion, Economides, & Chandler, 2018); increased mindfulness for resident physicians after 4 weeks (Wen, Sweeney, Welton,

Trockel, & Katznelson, 2017); and that the Headspace application is generally found to be engaging and easy to use (Champion et al., 2018; Mistler, Ben-Zeev, Carpenter-Song, Brunette, & Friedman, 2017). However, to my knowledge, only two studies using Headspace have included participants aged 65 and over. Rosen, Paniagua, Kazanis, Jones, and Potter (2018) reported improved quality of life for a sample of breast cancer patients (aged 25–70+) following 4–8 weeks of use; and Kubo et al. (2018) demonstrated reduced distress and greater quality of life for a sample of cancer patients and their caregivers (aged 38–78) after 8 weeks of use. However, targeted research focusing on use of the Headspace training-program with non-clinical community-dwelling older adults is needed.

1.5.2 Older Adults and Technology

Digital technology is increasingly accessed by older adults. Currently, in the United States, approximately 65% of adults aged 65 and over, and 89% of older adults with higher educational attainment and affluence (i.e., some college education and incomes over \$50,000), use computers and/or access the internet (The Gerontological Society of America [GSA], 2019). While older adults tend to report less comfort and self-efficacy in relation to computer use relative to younger adults, recent birth cohorts are exhibiting more positive attitudes (Lee et al., 2019). Moreover, mobile phone adoption by older adults aged 65 and over is on the rise, with at least 91% owning a mobile phone and 53% owning a smartphone in the United States (Pew Research Center, 2019). Rates of smartphone use tend to be higher in Australia (Oviedo-Trespalacios, Nandavar, Newton, Demant, & Phillips, 2019) where 88% of adults aged 18–75 and 78% of 65–75 year olds report ownership (Deloitte, 2017). In general, smartphone adoption rates are higher among well-educated, affluent, and young-old adults (Pew Research Center, 2017).

The rapid increase in digital and mobile uptake by older adults, together with projected estimates of this age-group accounting for around 20% of the world's population

over the coming decades (World Health Organisation [WHO], 2018), make digital interventions for older adults an important area for research. Moreover, currently, older adults tend to have comparatively lower technological literacy and less inclination to incorporate technology within their everyday lives than their younger counterparts (Hülür & Macdonald, 2020). Therefore, it is important to assess the acceptability of applications such as Headspace with this population. Accordingly, the focus of the final study in this thesis was to collect data on the acceptability of applications such as Headspace for older adults, in addition to tracking changes in aspects of mindfulness and well-being that corresponded with use of the app over a 30-day period.

1.6 Research Aims and Hypotheses

The overarching purpose of this thesis was to extend existing knowledge regarding mindfulness and meditation, and more specifically, their particular relevance to well-being in older adulthood. This was achieved through a series of three studies:

1.6.1 Study 1

The primary aim of the first study was to examine the potential moderating effects of age on mechanisms derived from Farb et al.'s (2014) process model (see Figure 1.1) linking mindfulness components to flexible goal adjustment and emotional well-being. To this end, cross-sectional data collected from a large community sample of adults aged 18 to 86 years was analysed. Indices of goal disengagement and goal reengagement (Wrosch et al., 2013; Wrosch, Scheier, Miller, Schulz, & Carver, 2003) were combined to operationalise flexible coping (see Cheng, Lau, & Chan, 2014); in line with a growing interest in regulatory flexibility over single coping strategy use which does not take varying contextual demands into account (Bonanno & Burton, 2013). Further, while Farb et al.'s model of mindfulness is directly posited within the context of emotion regulation, the present study focused on the multifaceted assessment of well-being (i.e., via affect balance, life satisfaction, and

psychological flourishing) as a primary outcome. Given that the effectiveness of emotion-regulation strategies is inherently context specific and depends on the regulatory goals being served (Tamir, 2016), more general assessments of well-being were preferred over a self-report measure of emotion regulation strategy use in this study. Consistent with previous research outlined above, it was predicted that older age would be associated with higher levels of the components of mindfulness specified in the adapted Farb et al. (2014) model. Further, it was predicted that associations of the mindfulness components with flexible goal adjustment and emotional well-being would be stronger among older, relative to younger adults. (See Chapter 2).

1.6.2 Study 2

The primary aim of the second study was to investigate the predictive value, and potential buffering effect, of different state mindfulness facets for affective well-being within a community-based sample of people in late midlife to older adulthood. This was achieved using an intensive experience-sampling design where participants aged 53 to 86 years were asked a series of brief questions relating to mindfulness (via the MSMQ), positive and negative affect, and daily hassle and uplift occurrence, four times a day for ten consecutive days. Thus, participants completed up to forty in situ assessments. In addition, participants completed a psychosocial questionnaire comprising demographic questions and a trait measure of future time perspective prior to the experience-sampling phase.

The study considered whether higher-than-usual mindfulness is associated with affective reactivity to daily events (i.e., hassles and uplifts) and whether these effects vary as a function of age. First, it was expected that mindfulness characteristics would be associated with higher positive affect and lower negative affect at each time point. Second, it was expected that daily hassle occurrence at each assessment point would be associated with higher and lower levels of negative and positive affect, respectively; and that uplift

occurrence would be associated with increased positive affect. Third, it was expected that higher levels of nonjudgmental acceptance would buffer the association of daily hassle occurrence with affective well-being. It was further predicted that the coupling between uplifts and positive affect would be either (a) boosted by higher levels of present-moment attention (evidenced by larger increases in uplift-related positive affect) *or* (b) tempered by higher levels of nonjudgmental acceptance (evidenced by smaller increases in uplift-related positive affect). Finally, considering the lifespan developmental perspectives outlined above and the view that mindfulness characteristics may become especially important for maintaining well-being with increasing age, it was predicted that both age and future time perspective (as individual differences) would also act as moderators. Here, it was expected that the beneficial effects of both present-moment attention and nonjudgmental acceptance on affective well-being and on daily hassle/uplift-affect coupling would become stronger with increasing age; and that positive associations of present-moment attending with positive affectivity would be stronger among those with a more limited future time perspective. (See Chapter 3).

1.6.3 Study 3

The purpose of the third and final study was to assess the feasibility and acceptability of an app-based mindfulness-meditation program among community-dwelling older adults and to investigate the effects of participation on mindfulness and well-being. Here, in the first study of its kind, older adults (aged 63 to 81) were invited to engage with a 30-day app-based mindfulness-meditation program for 10-minutes daily on their smartphones. As described above, each meditation session comprised focusing on the breath, mentally scanning the body, monitoring the mind's activity, and cultivating a nonjudgmental attitude toward experiences. Participants completed psychosocial questionnaires related to mindfulness and well-being at baseline, day 10, and day 30 of their study participation.

In line with the integrated perspective of mindfulness-meditation and lifespan developmental theories outlined above, it was hypothesised that older adults who participated in the app-based mindfulness-meditation program would demonstrate increased levels of mindfulness, emotional well-being (including lower perceived stress and negative affect, and higher positive affect), and life satisfaction over a 30-day period. In addition, the study explored whether individual differences such as participants' attitudes toward smartphones and/or frequency and duration of application use (an index of both study compliance and the 'dose' of meditation undertaken) predicted rates of change across the study interval. Moreover, in addition to assessing within-person changes in the outcome measures described above, intrinsic motivation to meditate was assessed at study completion, along with older users' evaluations of the acceptability and usability of the app-based program via questions used in previous feasibility studies (see Mistler et al. 2017). Objective data regarding the frequency and duration of meditation sessions was also collected. (See Chapter 4).

The research materials and measures used in each of the respective studies are presented in Appendices A through X.

CHAPTER

2

**OLDER AND MORE MINDFUL? AGE DIFFERENCES IN
MINDFULNESS COMPONENTS AND WELL-BEING**

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LM contributed 75% and TDW contributed 25% to the research design, data collection and analysis, and writing and editing of the manuscript, respectively.

2.1 Abstract

Objectives: Empirical research on the processes through which mindfulness affects well-being is in its infancy. Furthermore, few studies have considered the positive effects of mindfulness on psychological functioning from a lifespan perspective. The present study aimed to examine the role of age in moderating associations of mindfulness components with well-being in the context of a proposed model of mindfulness. **Methods:** A community-based sample of 623 participants aged between 18 and 86 years ($M = 48.78$, $SD = 16.74$) was recruited via an internet-based research platform. Participants completed questionnaire measures of mindful characteristics (i.e., present-moment attention, nonjudgment, interoception, acceptance, nonattachment, and decentering), flexible goal adjustment, and well-being. **Results:** Parallel mediation analyses showed that both present-moment attention and nonjudgment provided significant pathways to (a) flexible goal adjustment through nonattachment and decentering; and (b) well-being through acceptance, nonattachment, and decentering. Furthermore, present-moment attention, nonjudgment, acceptance, nonattachment, and decentering were all positively associated with age. Conditional process analyses revealed that the direct relationships between (1) present-moment attention and well-being, (2) nonjudgment and well-being, and (3) decentering and flexible goal adjustment became stronger with age and were significant for adults from around 40 years of age and older. **Conclusions:** The findings suggest that the tendency to focus on the present-moment and adopt a nonjudgmental orientation may become especially important for well-being with advancing age, and the ability to appreciate the transitory nature of personal experiences may be particularly important for flexible employment of both goal disengagement and reengagement strategies across the second half of life.

Keywords: mindfulness; mindfulness components; age; flexible goal adjustment; well-being

2.2 Introduction

Mindfulness refers to the natural human ability to be aware of one's experiences and to pay attention to the present moment in a purposeful, receptive, and nonjudgmental way (Kabat-Zinn, 1994). Over the past four decades, a significant body of research has demonstrated that mindfulness can be instrumental in reducing stress and promoting positive psychological outcomes (Creswell, 2017). So far, few studies have considered the positive effects of mindfulness on psychological functioning from a lifespan perspective. Mindful qualities, such as present-moment attending and adopting a nonjudgmental orientation to experiences, may have particular utility for well-being in older adulthood. The purpose of the present study was to determine whether the importance of different mindfulness components for well-being varied as a function of age.

2.2.1 Mindfulness, Adaptation, and Well-Being in Older Adulthood

In this section we refer to key lifespan developmental theories concerned with ageing and emotion to argue that normative developmental changes could make specific components of mindfulness particularly efficacious for supporting well-being in later life. First, *Socioemotional Selectivity Theory* (SST; Carstensen, 2006) outlines how the process of ageing is accompanied by a heightened awareness that future time remaining is increasingly limited. Because of this shift in perspective, goals associated with positive present-moment experiences are increasingly prioritised over future-oriented goals (e.g., acquiring new knowledge) that predominate earlier in the lifespan. Thus, ageing intensifies motivation to savour the present moment in order to derive meaning and satisfaction from life (Carstensen, 2006). The fundamental principle in mindfulness of focusing attention on immediate experience is consistent with this age-related tendency to be more present-moment oriented. Accordingly, mindfulness—and in particular the focus on present-moment attention—may be a valuable resource or strategy for older adults who are increasingly motivated to self-

regulate in ways that optimise present-moment experience.

Second, Brandtstädter's (2009) *Dual-Process Model* highlights how individuals manage goals in ways that facilitate adaptation to ageing-related losses, such as declining health. In particular, adaptive ageing involves a shifting balance away from a more *assimilative* style of coping characterised by tenacity and persistence in the pursuit of goals, toward a more *accommodative* style of coping. Accommodative coping is characterised by engagement with goals that are aligned with existing resources and by psychological and behavioural disengagement from goals that have become unviable (Brandtstädter, 2009). For example, when individuals approach retirement or experience irreversible loss of some kind (e.g., functional or relational), a restructuring of life plans is required where blocked goals and objectives must be relinquished and constructive meaning found in the new status quo (Brandtstädter, 2009).

Adjusting to a more accommodative mode requires acknowledging and accepting one's current circumstances and letting go of unattainable ambitions. Mindfulness may serve accommodation by facilitating characteristics such as acceptance, decentering (i.e., the ability to adopt an objective perspective), and psychological and behavioural flexibility (Farb, Anderson, Irving, & Segal, 2014). Furthermore, according to Farb et al. (2014), mindfulness may promote enhanced awareness of previously unnoticed aspects of situations and experiences. This may help older adults to identify and reorientate toward new goals (Brandtstädter, 2009; Wrosch, Scheier, & Miller, 2013).

Third, according to the model of *Strength and Vulnerability Integration* (SAVI; Charles, 2010), older adults become better at selectively avoiding or limiting exposure to negative experiences as a result of both motivational changes (as posited by SST) and acquired expertise through lived experience (see also Blanchard-Fields, 2007). However, when stress is unavoidable, older adults are particularly vulnerable as biological systems

decrease in flexibility with age and the potential for elevated and sustained physiological arousal in response to stress increases (Wrzus, Müller, Wagner, Lindenberger, & Riediger, 2013).

In the context of this vulnerability to unavoidable stressors in later life, mindfulness may serve both protective and restorative functions. Specifically, the capacity to adopt a nonjudgmental and non-evaluative attitude towards *any* experience may provide an effective strategy for managing prolonged and potentially aversive experiences (e.g., chronic illness or caregiving demands). Repeated adoption of such an attitude can facilitate a different relationship with one's (potentially aversive) experiences that is characterised by acceptance and tolerance, and an ability to gain a more objective perspective (Farb et al., 2014). Importantly for older adults, this may lead to reduced physiological, cognitive, and affective reactivity, and ultimately, greater equanimity (Farb et al., 2014). Furthermore, older adults appear to preference low-arousal positive states that provide a sense of peace and relaxation over high-arousal states such as excitement and exhilaration (Scheibe, English, Tsai, & Carstensen, 2013). Thus, mindfulness may be increasingly effective for regulating emotions with ageing, as it is commonly associated with experiences of calm, contentment, and serenity (Morone, Lynch, Losasso, Liebe, & Greco, 2012).

Growing empirical research also points to mindfulness increasing with age. For example, a few studies have demonstrated a small but consistent association between age and dispositional mindfulness (Lehto, Uusitalo-Malmivaara, & Repo, 2015; Smoski, Suarez, Brantley, Wolever, & Greeson, 2015), and that older adults are relatively more mindful when compared with younger adults (Fountain-Zaragoza, Puccetti, Whitmoyer, & Prakash, 2018; Mahoney, Segal, & Coolidge, 2015). Furthermore, dispositional mindfulness in older adulthood is associated with better mental health and emotional well-being (de Frias &

Whyne, 2015; Fiocco & Mallya, 2015; Raes, Bruyneel, Loeys, Moerkerke, & De Raedt, 2015; Shook, Ford, Strough, Delaney, & Barker, 2017).

Little research has examined whether associations of mindfulness with well-being become *stronger* with advancing age. So far, existing studies examining the relationships between mindful attention and perceived stress (via emotion regulation; Prakash, Hussain, & Schirda, 2015), and between a study-specific measure of mindfulness linked to religion/spirituality and positive/negative affect (Imel & Dautovich, 2018), have found no evidence for a moderating role of age. However, the lifespan developmental perspectives outlined above suggest that different aspects of mindfulness (e.g., present-moment attending, nonjudgment, acceptance, etc.) may both complement older adults' motivational preferences and promote flexible adaptation in response to age-related challenges, thus becoming especially important for maintaining well-being with increasing age.

2.2.2 The Present Study

Mindfulness is a multifaceted construct, and there is currently some debate in the literature regarding its optimal measurement (Grossman, 2019). Moreover, research on the processes through which mindfulness affects well-being is recognised as a priority for the field but remains in its infancy (Gu, Strauss, Bond, & Cavanagh, 2015). Following Grossman (2019), we focused on specific elements of mindfulness rather than using a unidimensional or overarching measure of mindfulness. We chose to frame our conceptual and analytical approach to the examination of age differences by applying Farb et al.'s (2014) process model that proposes key mechanisms through which mindfulness is hypothesised to support adaptive emotion regulation. Figure 1.1 provides an adapted illustration of the pathways through which Farb et al.'s mindfulness model components work together to reconfigure attention and cognition, inhibit maladaptive patterns of reactivity, and facilitate psychological

flexibility and novel responding to events; thus, promoting an enhanced self-regulatory capacity and an increased sense of well-being.

The two foundational components in Farb et al.'s (2014) mindfulness model are *attention to the present* and an *attitude of nonjudgment*. According to Farb et al., explicitly focusing attention on momentary sensory experience facilitates *interoception*, or enhanced body awareness. This awareness then functions as an attentional anchor, helping to inhibit engagement with potentially maladaptive cognitive elaboration. Further, through heightened awareness of dynamic body processes (e.g., breathing, heart rate, muscle tone, and digestion), insight can be gained into habitual physiological patterns of responding (Farb et al., 2014). Adopting an attitude of nonjudgment (i.e., experiences are not evaluated as intrinsically good or bad but are instead noted with an attitude of openness and receptivity) allows (a) a move toward potentially unpleasant experiences with *acceptance*, and (b) facilitates *decentering* - where awareness of the transient nature of things increases and events can be viewed with equanimity and objectivity (Fresco et al., 2007)³. In the current study, we have included *nonattachment* (i.e., flexible engagement with experiences and situations without becoming fixated or attempting to hold onto or alter them) as an additional possible mechanism linking nonjudgment with positive psychological outcomes, as recent research has demonstrated positive links between nonattachment and well-being (Sahdra, Ciarrochi, & Parker, 2016; Sahdra, Shaver, & Brown, 2010; Whitehead, Bates, Elphinstone, Yang, & Murray, 2019). Importantly, nonattachment has been shown to be empirically distinct from acceptance (Sahdra, Ciarrochi, Parker, Marshall, & Heaven, 2015), and to be uniquely predictive of both psychopathology and resilience over and above decentering (Feliu-Soler et al., 2016).

Our primary aim was to examine moderating effects of age on possible mechanisms linking mindfulness components to flexible goal adjustment and emotional well-being

³ For a discussion of decentering-related constructs, see Bernstein et al. (2015).

derived from Farb et al.'s (2014) process model. To this end, we analysed cross-sectional data collected from a large community sample of adults. Indices of goal disengagement and goal reengagement (Wrosch et al., 2013; Wrosch, Scheier, Miller, Schulz, & Carver, 2003) were combined to operationalise flexible coping (see Cheng, Lau, & Chan, 2014). This is in line with a growing interest in regulatory flexibility over single coping strategy use which does not take varying contextual demands into account (Bonanno & Burton, 2013).

Consistent with previous research outlined above, we predicted older age would be associated with higher levels of the components of mindfulness specified in Farb et al.'s (2014) model. Further, we predicted that associations of the mindfulness components with flexible goal adjustment and emotional well-being would be stronger among older, relative to younger adults.

2.3 Method

2.3.1 Participants

A total of 780 participants were recruited via the internet-based research platform, TurkPrime (Litman, Robinson, & Abberbock, 2017). Eligibility criteria required participants to be: 1) aged 18 years or older; 2) fluent in English; and 3) a resident of the United States. TurkPrime's 'Prime Panels' (see Prime Research Solutions, 2019) was employed to ensure both a good distribution of age and enhanced research participation naivety across the sample. Twenty percent of participant responses were discarded due to failing speed (i.e., completion of the survey in under 7 minutes) and/or attentional checks; there were no other exclusion criteria. The final sample consisted of 623 participants aged between 18 and 86 ($M = 48.78$, $SD = 16.74$).⁴ Sample characteristics are shown in Table 2.1.

⁴ According to the accuracy in parameter estimation (AIPE; Kelley & Maxwell, 2003) approach and based on a 10-predictor model with an intercorrelation value of .40, a sample size of 400 would provide sufficient power (.80) to detect a small to medium effect (.2) as significant at the 5% level (two-tailed) with an expected confidence interval half-width of 0.12 of a standard deviation.

Table 2.1

Demographic Characteristics of 'Well-Being Across the Lifespan' Survey Participants

Characteristics		<i>N</i> = 623
Age (Years)	Mean (SD)	48.78 (16.74)
Gender (<i>n</i> , %)	Female	383 (61.5%)
	Male	240 (38.5%)
Ethnicity ^a (<i>n</i> , %)	Caucasian/White	503 (80.7%)
	African American	55 (8.8%)
	Latino/Hispanic	48 (7.7%)
	Asian	32 (5.1%)
	Native American/Alaskan	20 (3.2%)
	Other	11 (1.7%)
Religion (<i>n</i> , %)	Christian	302 (48.5%)
	Non-Religious	131 (21.0%)
	Catholic	123 (19.7%)
	Jewish	16 (2.6%)
	Buddhist	11 (1.8%)
	Islam	8 (1.3%)
	Other	40 (6.4%)
Education (<i>n</i> , %)	Did not complete High School	18 (2.9%)
	Completed High School or Equivalent	135 (21.7%)
	Some College or Tertiary	255 (40.9%)
	Bachelor's Degree	151 (24.2%)
	Postgraduate Degree	64 (10.3%)
Relationship Status (<i>n</i> , %)	Single (never married)	202 (32.5%)
	Married/Domestic Partnership	294 (47.2%)
	Divorced or Separated	98 (14.3%)
	Widowed	29 (4.7%)
Employment Status	Full-Time Employment	193 (31.0%)
	Part-Time Employment	64 (10.3%)
	Casual Employment	11 (1.8%)
	Homemaker	74 (11.9%)
	Student	23 (3.7%)
	Retired	168 (27.0%)
	Unemployed	90 (14.4%)

^a Respondents could choose multiple categories.

2.3.2 Measures

Present-moment attention. Present-moment attention was measured by the Acting with Awareness subscale of the Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). This 8-item subscale assesses attention to moment-to-moment activities. Items (e.g., “When I do things, my mind wanders off and I’m easily distracted”) are rated on 5-point scales (1 = *never or very rarely true*, 5 = *very often or always true*), reverse scored, and averaged, with higher scores indicating greater present-moment attention. The scale has demonstrated good internal consistency (Cronbach’s alphas .86–.90) and good construct validity with evidence of predictive and incremental validity in student, community, meditating, and non-meditating samples (Baer et al., 2006, 2008; Bohlmeijer et al., 2011; Christopher, Neuser, Michael, & Baitmangalkar, 2012; Taylor & Millier, 2016; Williams, Dalgleish, Karl, & Kuyken, 2014). In the present study, the internal consistency was .95.

Nonjudgment. Nonjudgment was measured by the Nonjudging of Experience subscale of the FFMQ (Baer et al., 2006). This 8-item subscale assesses a nonevaluative orientation toward thoughts and emotions (e.g., “I tell myself I shouldn’t be feeling the way I am feeling”, reverse scored). Items are rated on 5-point scales (1 = *never or very rarely true*, 5 = *very often or always true*), reverse scored, and averaged, with higher scores indicating greater nonjudgment. The scale has demonstrated good internal consistency ($\alpha = .86-.93$) and good construct validity with predictive and incremental validity evident in student, community, meditating, and non-meditating samples (Baer et al., 2006, 2008; Bohlmeijer et al., 2011; Christopher et al., 2012; Taylor & Millier, 2016; Williams et al., 2014). In the present study, the internal consistency was .95).⁵

Interoception. Interoception was measured by the Noticing and Emotional Awareness subscales of the Multidimensional Assessment of Interoceptive Awareness

(MAIA; Mehling et al., 2012). These two dimensions of the MAIA were determined to most closely represent Farb et al.'s (2014) conceptualisation of interoception as perceptual body awareness, as distinct from evaluative and self-regulatory processes. The 4-item Noticing subscale (e.g., "When I am tense I notice where the tension is located in my body") and 5-item Emotional Awareness subscale (e.g., "I notice how my body changes when I am angry") assess awareness of internal bodily sensations in the context of emotional experience and more generally. In the present study, items were rated on 5-point scales (1 = *never*, 5 = *always*), with scores averaged for each of the subscales to produce two scores ranging from 1 to 5 (responses to items on the original MAIA are made on 6-point scales). These two subscales were found to be highly correlated ($r = .77$) and so were summed to create a composite, with higher scores indicating greater interoception. The MAIA has demonstrated good construct validity through correlations with indices related to body awareness and ability to distinguish between individuals with varying levels of experience in mind-body modalities (e.g., meditation, yoga, tai chi, and somatic therapy; Mehling et al., 2012). The MAIA has also demonstrated adequate internal consistencies and good convergent and discriminant validity (Bornemann, Herbert, Mehling, & Singer, 2015; Mehling et al., 2012, 2016). In the present study, the internal consistencies for the Noticing and Emotional Awareness subscales were .83 and .90, respectively.

Acceptance. Acceptance was measured by the Brief Experiential Avoidance Questionnaire (BEAQ; Gámez et al., 2014). This 15-item scale assesses willingness to remain in contact with aversive emotions, thoughts, memories, and physical sensations. Items (e.g., "I'm quick to leave any situation that makes me feel uneasy") are rated on 6-point scales (1 =

⁵ The FFMQ also includes measures of Observing, Describing, and Nonreactivity. However, in our view, the combination of the Acting with Awareness and Nonjudging of Experience subscales with the other measures described in the method provided the best conceptual fit with the components specified in Farb et al.'s (2014) model.

strongly disagree, 6 = *strongly agree*). Most of the content of the BEAQ reflects experiential avoidance (non-acceptance) and when reverse scored reflects psychological acceptance. After a review of measures used in previous research, the BEAQ was chosen as the most conceptually similar and psychometrically sound measure of psychological acceptance (Wolgast, 2014). For the current study, items (except item 6) were reverse scored and summed to produce a total score ranging from 15 to 90, with higher scores indicating greater acceptance. Gámez et al. (2014) reported good internal consistency ($\alpha = .80-.89$) for the BEAQ across multiple diverse samples (i.e., students, psychiatric outpatients, and community adults), good construct validity through associations with related constructs, and both convergent and discriminant associations with a variety of measures. The internal consistency in the present sample was .88.

Nonattachment. Nonattachment was measured using the 7-Item Nonattachment Scale (NAS-7; Sahdra et al., 2015), an abridged form of the original 30-item NAS (Sahdra et al., 2010). This scale assesses engagement with personal experiences without becoming fixated and trying to hold on to or change them in some way. Items (e.g., “I can enjoy pleasant experiences without needing them to last forever”) are rated on 6-point scales (1 = *disagree strongly*, 6 = *agree strongly*) and scores averaged, with higher scores indicating greater nonattachment. The NAS-7 has demonstrated good internal reliability ($\alpha = .83$), good construct validity, including discriminant and incremental validity in relation to measures of mindfulness, and predictive validity in relation to life satisfaction and life effectiveness (Elphinstone et al., 2015; Sahdra et al., 2016, 2015). In the present sample, the internal consistency was .86.

Decentering. Decentering was measured using the Decentering subscale of the Experiences Questionnaire (EQ; Fresco et al., 2007). This 11-item scale assesses the ability to observe thoughts and feelings as temporary, objective events. Items (e.g., “I can observe

unpleasant feelings without being drawn into them”) are rated on 5-point scales (1 = *never*, 5 = *all the time*) and summed to produce a total score ranging from 11 to 55, with higher scores indicating greater decentering. Fresco et al. (2007) reported good internal consistency ($\alpha = .81-.90$) and construct validity in both university and multi-national clinical samples. Convergent and discriminant validity have been demonstrated through correlations with measures of depressive symptoms, rumination, experiential avoidance, and emotion regulation. The internal consistency in the present sample was .91.

Flexible goal adjustment. Flexible goal adjustment was measured by the Goal Adjustment Scales (GAS; Wrosch et al., 2003). This 10-item instrument assesses capacities for goal disengagement (i.e., withdrawal of effort and commitment; 4 items) and goal reengagement (i.e., goal identification, commitment, and pursuit; 6 items). Respondents are asked to report how they typically react when they must stop pursuing an important goal in their life. Response items (e.g., “It’s easy for me to reduce my effort toward the goal”, “I think about other new goals to pursue”) are rated on 5-point scales (1 = *strongly disagree*, 5 = *strongly agree*). Responses are averaged to obtain two separate scores for goal disengagement and goal reengagement capacities. Following Bonanno, Pat-Horenczyk, and Noll’s (2011) method for deriving a measure of coping flexibility, we calculated a Flexible Goal Adjustment index by standardising the two subscale scores and then (a) summing them, (b) calculating the absolute discrepancy between them, and finally (c) subtracting the summed score from the discrepancy score. Here, higher scores indicated greater goal adjustment flexibility (i.e., the capacity to flexibly use both goal disengagement and reengagement strategies in response to changing circumstances). The GAS have demonstrated acceptable internal consistencies ($\alpha = .76-.89$), predictive validity, and convergence with adaptive well-being outcomes (Wrosch, 2011; Wrosch et al., 2013, 2003).

In the present sample, the internal consistencies for the Goal Disengagement and Goal Reengagement subscales were .70 and .95, respectively).

Affect balance. Affect balance was measured by the Scale of Positive and Negative Experience (SPANE; Diener et al., 2010). This 12-item scale assesses a broad range of recent positive and negative experiences and feelings. Items (e.g., “Pleasant”, “Unpleasant”, “Happy”, “Sad”) are rated on 5-point scales (1 = *very rarely or never*, 5 = *very often or always*) based on the amount of time each was experienced during the past four weeks. The SPANE produces separate summed scores for both positive (SPANE-P) and negative (SPANE-N) feelings. In the present study, following Diener et al. (2010), an index of affect balance was derived by subtracting the negative score from the positive score to create a balance score (SPANE-B) ranging from -24 to 24, with lower/higher scores indicating more negative/positive feelings overall. Diener et al. reported the SPANE to have good internal consistencies ($\alpha = .81-.89$) and good construct validity via associations with other scales of positive and negative affect and convergence with measures of emotion, well-being, happiness, and life satisfaction. The SPANE has also demonstrated consistent psychometric properties across a variety of cultures (Jovanović, 2015; Li, Bai, & Wang, 2013; Silva & Caetano, 2013; Sumi, 2014). The internal consistencies for the SPANE-P and SPANE-N in the present sample were .92 and .90, respectively.

Life satisfaction. The Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) was used to assess general life satisfaction. This scale comprises five statements regarding participant’s experiences in life (e.g., “So far, I have gotten the important things I want in life”). Responses are made on 7-point scales (1 = *strongly disagree*, 7 = *strongly agree*) and summed, with higher scores reflecting higher life satisfaction. The SWLS has demonstrated good internal consistency ($\alpha = .87$) and good convergent, discriminant, and predictive validity in a large number of samples across the

lifespan (Diener et al., 1985; Pavot & Diener, 1993, 2008; Pavot, Diener, Colvin, & Sandvik, 1991). In the present sample, the internal consistency was .92.

Psychological flourishing. Psychological flourishing was measured by the Flourishing Scale (FS; Diener et al., 2010). This 8-item scale assesses experiences of self-perceived success and well-being in key areas of human functioning such as relationships, competence, purpose, and optimism. Items (e.g., “I lead a purposeful and meaningful life”, “My social relationships are supportive and rewarding”) are rated on 7-point scales (1 = *strongly disagree*, 7 = *strongly agree*) and summed, with higher scores indicating greater psychological flourishing. Diener et al. (2010) reported the scale to have good internal consistency ($\alpha = .87$) and good construct validity via strong associations with other measures of psychological well-being and high convergence with similar scales. The internal consistency in the present study was .92.

Well-being composite. The well-being measures of affect balance, life satisfaction, and psychological flourishing were found to be highly correlated ($r_s > .72$, see Table 2.2). Following Pavot (2018), a composite well-being variable was created by first standardising, then summing the measures.

Covariates. Gender (0 = male, 1 = female), education (coded 0 = high school or lower, 1 = some tertiary), and health status were controlled for due to empirically established associations with mindfulness components (e.g., Baer et al., 2008; Feliu-Soler et al., 2016), goal adjustment capacities (Wrosch et al., 2013, 2003), and/or well-being (Diener, Pressman, Hunter, & Delgado-Chase, 2017). Health status was assessed via the 10-item ‘Physical Functioning’ subscale of the RAND 36-Item Health Survey 1.0 (Hays, Sherbourne, & Mazel, 1993). On average, participants reported a mostly favourable health status ($M = 72.48$, $SD = 28.21$; Range 0–100, with 100 representing optimum physical functioning).

2.3.3 Procedure

Following approval by the Institutional Research Ethics Committee, an advertisement was posted via TurkPrime's (Litman et al., 2017) research management platform. 'Mindfulness' was not mentioned within the study information provided to participants. Interested individuals were provided with a link to an external and secure online survey platform (i.e., Qualtrics). Study information was presented electronically to participants, who were notified that completion of the questionnaire indicated consent to participate and that no personally identifying information was requested. TurkPrime received \$3 USD per participant and participants were compensated according to the amount that they agreed to within the platform through which they entered the survey (e.g., via reward points, gift cards, cash, or donation to their preferred charity).

2.3.4 Statistical Analysis

To rule out possible concerns regarding common method bias (see Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), a single exploratory factor analysis (EFA) of the 92 scale items making up the 13 mindfulness component, goal adjustment, and well-being variables was employed. Using this approach, a substantial amount of common method bias is indicated by emergence of either a single factor or one general factor accounting for most of the covariance (Podsakoff et al. 2003). There were three missing values across the entire set of variables and these were treated by listwise deletion. Results using principal axis factoring revealed 13 components with eigenvalues > 1.0 , accounting for 66.23% of the variance. The largest component accounted for 30.31%, suggesting that common method bias did not introduce substantial bias in our data.

Bivariate correlation coefficients were used to examine relationships between the study variables. To examine the proposed pathways within the mindfulness model based on Farb et al. (2014; see Figure 1.1), four parallel mediation analyses were initially conducted

using Model 4 in PROCESS (Hayes, 2018, 2019). Next, to test our hypotheses that the relationships between each of the six model components with flexible goal adjustment and well-being would become stronger with age, we ran four conditional process (i.e., moderated mediation) analyses using Model 15. Here, age was modelled as a moderator of the direct pathways between the key predictor (present-moment attention or nonjudgment) and outcome (flexible goal adjustment or well-being), and between each of the four mediators (interoception, acceptance, nonattachment, and decentering) and the outcome. For each analysis, present-moment attention and nonjudgment were included as covariates when not entered as the key predictor, in addition to gender, education, and health status (age was also controlled for in the parallel mediation analysis). The significance of the indirect effects was assessed using bias-corrected confidence intervals estimated from 5,000 bootstrap samples.

2.4 Results

2.4.1 Relationships Between Mindfulness Model Components, Outcome Variables, and Age

Table 2.2 presents the means, standard deviations, and bivariate correlation coefficients for age, the mindfulness model components (i.e., present-moment attention, nonjudgment, interoception, acceptance, nonattachment, and decentering), flexible goal adjustment, the well-being measures, and covariates. As can be seen, there were significant small to large positive correlations between each component of the mindfulness model and all of the outcome variables, except for interoception which was only weakly positively correlated with flexible goal adjustment and psychological flourishing. As predicted, there were significant small to medium positive correlations between most of the mindfulness model components and age. In contrast, age was found to be significantly negatively (albeit weakly) correlated with interoception.

Table 2.2

Pearson Correlations, Means, and Standard Deviations for the Mindfulness Model Components, Outcome Variables, and Study Covariates

Variable	Mindfulness Model Components						Outcome Variables							Covariates			
	PMA	NJ	IC	ACC	NA	DC	FGA	(GD)	(GR)	AB	SWL	PF	[WBC]	Age	Gender	Ed.	Health
PMA		.61***	-.11***	.43***	.47***	.49***	.21***	.02	.27***	.56***	.39***	.43***	.51***	.31***	-.12**	.02	.13***
NJ			-.25***	.50***	.50***	.50***	.25***	.10*	.21***	.57***	.41***	.44***	.52***	.35***	-.05	.12**	.07
IC				-.26***	.09 ^a	.11***	.08 ^a	-.14***	.30***	-.04	.01	.12***	.03	-.18***	.18***	-.03	-.06
ACC					.35***	.33***	.17***	.06	.13***	.41***	.35***	.36***	.41***	.23***	-.02	.15***	.11***
NA						.74***	.35***	.06	.49***	.65***	.51***	.64***	.66***	.31***	-.01	.05	.01
DC							.37***	.03	.54***	.71***	.59***	.69***	.72***	.22***	-.06	.07	.08 ^a
FGA								.52***	.57***	.36***	.31***	.31***	.36***	.13***	.01	.11**	.07
(GD)									-.15***	.04	.03	-.07	.00	.15***	.00	.01	-.04
(GR)										.46***	.38***	.52***	.50***	.02	.04	.08 ^a	.13***
AB											.73***	.77***	.91***	.23***	-.04	.13**	.11***
SWL												.76***	.91***	.15***	-.02	.13**	.12***
PF													.92***	.16***	.03	.09 ^a	.12***
[WBC]														.20***	-.01	.00	.13***
Age															-.14***	.03	-.26***
Gender																-.07	-.11**
Ed.																	.14**
Mean	3.72	3.62	7.17 ^a	54.03	4.57	38.60	-1.15	2.85	3.57	6.11	20.23	40.96	0.00	48.78			72.48
(SD)	(0.89)	(1.02)	(1.86)	(13.11)	(0.95)	(7.74)	(1.74)	(0.83)	(0.91)	(9.30)	(8.12)	(9.94)	(2.74)	(16.74)			(28.21)

Notes. PMA = Present-moment attention. NJ = Nonjudgment. IC = Interoception. ACC = Acceptance. NA = Nonattachment. DC = Decentering. FGA = Flexible goal adjustment. GD = Goal disengagement. GR = Goal reengagement. AB = Affect balance. SWL = Satisfaction with life. PF = Psychological flourishing. WBC = Well-being composite. Ed. = Education. SD = Standard deviation. ^a Mean based on a 5-point response scale and therefore not directly comparable with other studies where 6-point response scales have been used.

* $p < .05$. ** $p < .01$. *** $p < .001$.

2.4.2 Age as a Moderator of the Associations Between Mindfulness Model Components and Key Outcomes

Figures 2.1 and 2.2 summarise the unstandardised path coefficients from the mediation models with flexible goal adjustment and well-being as the respective outcomes. Tables 2.3 and 2.4 present the unstandardised coefficients, standard errors, and p -values for the conditional process models.

Focusing first on the proposed mechanisms linking mindfulness components to flexible goal adjustment, the unconditional mediation models revealed significant positive indirect effects from present-moment attention through nonattachment, $B = 0.07$, 95% CI [0.01, 0.14], and decentering, $B = 0.11$, 95% CI [0.04, 0.20]; and similarly, from nonjudgment through nonattachment, $B = 0.08$, 95% CI [0.02, 0.15], and decentering, $B = 0.11$, 95% CI [0.04, 0.19].

Results for the conditional process analyses with flexible goal adjustment as the outcome showed a significant interaction between decentering and age in the models with both present-moment attention, $\Delta R^2 = .01$, $F(1, 607) = 5.44$, $p = .02$, and nonjudgment, $\Delta R^2 = .01$, $F(1, 607) = 5.06$, $p = .02$, as the respective key predictors. In each model, according to the Johnson-Neyman regions of significance, decentering was significantly positively associated with flexible goal adjustment for individuals aged older than 40. Significant indices of moderation were found for the conditional effects of age on the indirect effects of present-moment attention on flexible goal adjustment through decentering, $B = 0.005$, 95% CI [0.001, 0.009], and nonjudgment on flexible goal adjustment through decentering, $B = 0.004$, 95% CI [0.0002, 0.009]. Following Hayes (2018), these conditional indirect effects were examined by conditioning them at the 16th, 50th, and 84th percentiles of the continuous age distribution, equating to ages 28 (younger adults), 51 (middle-aged adults), and 67 (older adults). For present-moment attention, significant positive effects were observed for both

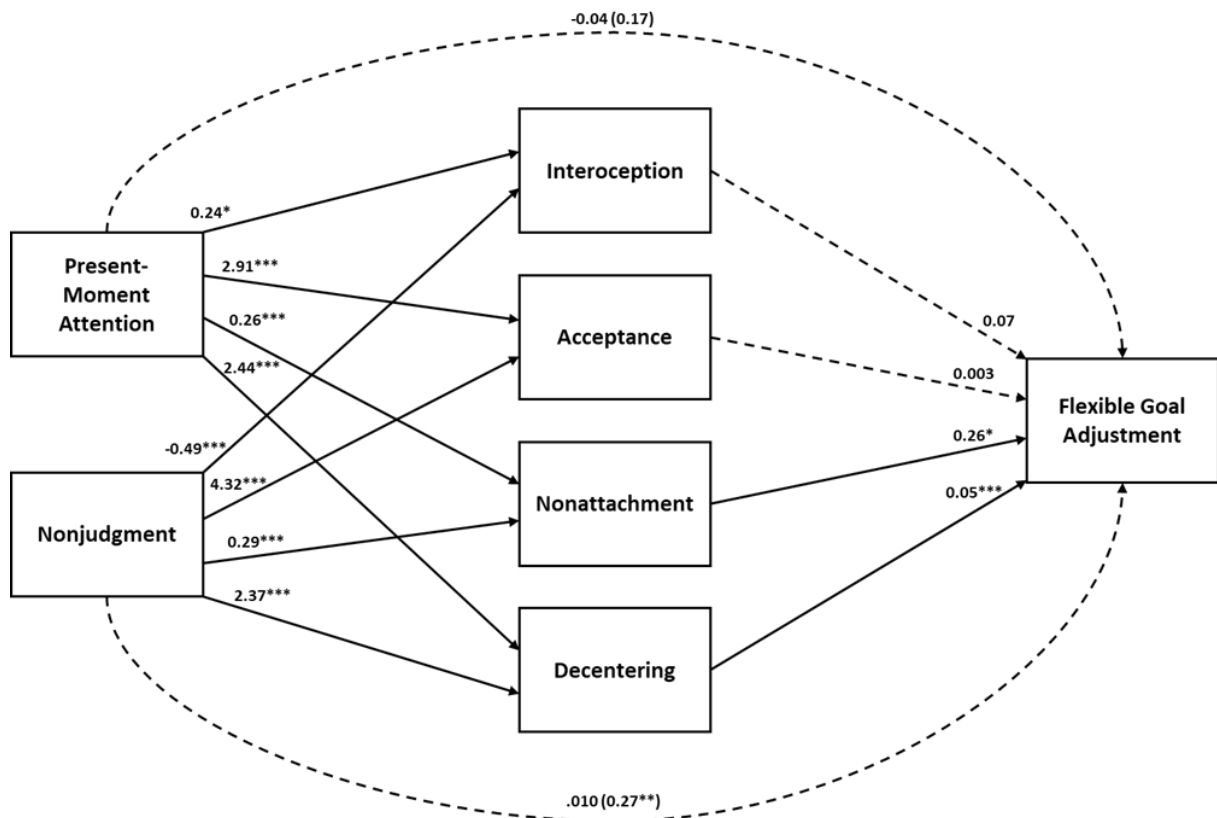


Figure 2.1. Unstandardised path coefficients for the mediation models with flexible goal adjustment as the outcome. The numbers in parentheses are the regression coefficients for the total effects of present-moment attention and nonjudgment on flexible goal adjustment unadjusted for mediation. Present-moment attention and nonjudgment were included as covariates when not entered as the key predictor, along with age, gender, education, and health status. Significant pathways are indicated by a solid line.

* $p < .05$. ** $p < .01$. *** $p < .001$.

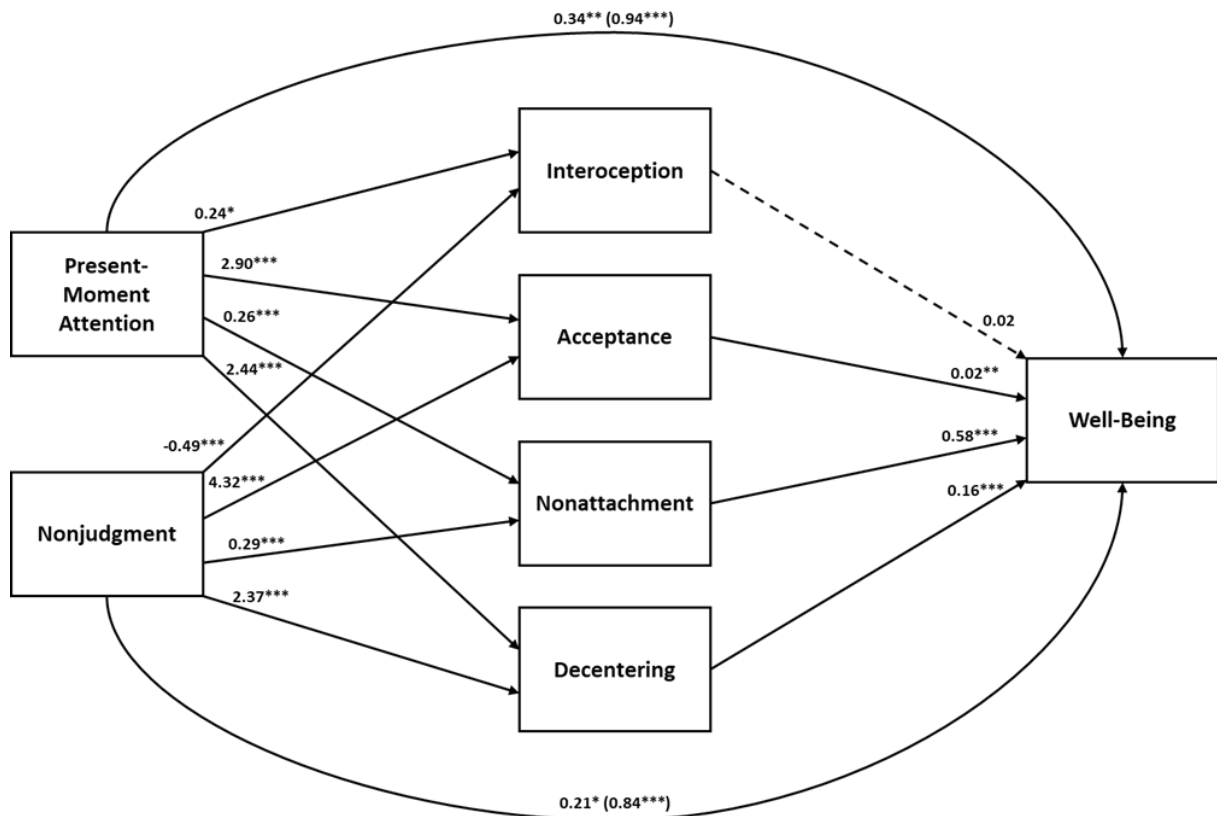


Figure 2.2. Unstandardised path coefficients for the mediation models with well-being as the outcome. The numbers in parentheses are the regression coefficients for the total effects of present-moment attention and nonjudgment on well-being unadjusted for mediation. Present-moment attention and nonjudgment were included as covariates when not entered as the key predictor, along with age, gender, education, and health status. Significant pathways are indicated by a solid line.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2.3

Unstandardised Regression Coefficients for the Conditional Process Models with Flexible Goal Adjustment as the Outcome

Antecedent	Outcome					
	Flexible Goal Adjustment _{PMA}			Flexible Goal Adjustment _{NJ}		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Present-moment attention	-0.10	0.27	.71	-0.04	0.10	.65
Nonjudgment	0.14	0.09	.14	0.05	0.25	.84
Interoception	0.06	0.12	.63	0.05	0.13	.70
Acceptance	0.003	0.02	.89	0.003	0.02	.86
Nonattachment	0.49	0.32	.13	0.50	0.32	.12
Decentering	-0.05	0.04	.22	-0.05	0.04	.24
Age	-0.06	0.03	.05*	-0.06	0.03	.04*
Present-moment attention x Age	0.001	0.005	.83	--	--	--
Nonjudgment x Age	--	--	--	0.002	0.01	.72
Interoception x Age	< 0.001	0.002	.94	< 0.001	0.002	.88
Acceptance x Age	< 0.001	< 0.001	.91	< 0.001	< 0.001	.96
Nonattachment x Age	-0.004	0.006	.50	-0.004	0.006	.49
Decentering x Age	0.002	0.001	.01*	0.002	0.001	.02*
Constant	-2.38	1.49	.11	-2.36	1.49	.11
	$R^2 = .17$			$R^2 = .17$		
	$F(12, 610) = 10.56, p < .001$			$F(12, 610) = 10.57, p < .001$		

Notes. PMA = Present-moment attention. NJ = Nonjudgment. *SE* = Standard error. Subscripts denote PMA or NJ as the primary predictor in the model (with the alternative variable included as a covariate). Gender, education, and health status were modelled as covariates in each analysis. Results in **bold** indicate significant interactions.

* $p < .05$.

Table 2.4

Unstandardised Regression Coefficients for the Conditional Process Models with Well-Being as the Outcome

Antecedent	Outcome					
	Well-Being _{PMA}			Well-Being _{NJ}		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Present-moment attention	-0.29	0.29	.33	0.34	0.11	.002**
Nonjudgment	0.26	0.10	.01*	-0.27	0.27	.32
Interoception	0.04	0.14	.79	-0.09	0.14	.53
Acceptance	0.05	0.02	.03*	0.05	0.02	.02*
Nonattachment	0.78	0.36	.03*	0.75	0.35	.03*
Decentering	0.16	0.04	< .001***	0.16	0.04	< .001***
Age	-0.02	0.03	.51	-0.06	0.03	.61
Present-moment attention x Age	0.01	0.01	.03*	--	--	--
Nonjudgment x Age	--	--	--	0.01	0.01	.04*
Interoception x Age	0.001	0.003	.62	0.002	0.003	.40
Acceptance x Age	-0.001	< 0.001	.24	-0.001	< 0.001	.22
Nonattachment x Age	-0.004	0.01	.57	-0.003	0.01	.63
Decentering x Age	< -0.001	0.001	.95	-0.0001	0.001	.87
Constant	-11.36	1.64	< .001***	-11.53	1.63	< .001***
	$R^2 = .60$			$R^2 = .60$		
	$F(12, 610) = 75.20, p < .001$			$F(12, 610) = 75.02, p < .001$		

Notes. PMA = Present-moment attention. NJ = Nonjudgment. *SE* = Standard error. Subscripts denote PMA or NJ as the primary predictor in the model (with the alternative variable included as a covariate). Gender, education, and health status were modelled as covariates in each analysis. Results in **bold** indicate significant interactions.

* $p < .05$. ** $p < .01$. *** $p < .001$.

middle-aged, $B = 0.12$, 95% CI [0.05, 0.20], and older adults, $B = 0.19$, 95% CI [0.09, 0.31], but not for younger adults, $B = 0.02$, 95% CI [-0.10, 0.13]. Likewise, for nonjudgment, significant positive effects were also observed for both middle-aged, $B = 0.12$, 95% CI [0.05, 0.20], and older adults, $B = 0.19$, 95% CI [0.09, 0.30], but not younger adults, $B = 0.02$, 95% CI [-0.09, 0.13].

For the mediation analyses with well-being as the outcome, there were significant positive indirect effects from present-moment attention through acceptance, $B = 0.06$, 95% CI [0.02, 0.11], nonattachment, $B = 0.15$, 95% CI [0.08, 0.24], and decentering, $B = 0.39$, 95% CI [0.23, 0.54]; and likewise, from nonjudgment through acceptance, $B = 0.09$, 95% CI [0.03, 0.15], nonattachment, $B = 0.17$, 95% CI [0.09, 0.27], and decentering, $B = 0.38$, 95% CI [0.25, 0.51].

Results of the conditional process analyses revealed that age moderated the direct effects between present-moment attention and well-being, $\Delta R^2 = .004$, $F(1, 607) = 5.76$, $p = .02$, and between nonjudgment and well-being, $\Delta R^2 = .003$, $F(1, 607) = 4.64$, $p = .03$. Here, the Johnson-Neyman regions of significance indicated significant positive relationships between present-moment attention and well-being for individuals older than 39, and between nonjudgment and well-being for individuals aged above 45 years. Accordingly, with present-moment attention as the key predictor, significant positive effects were observed for both middle-aged, $B = 0.39$, 95% CI [0.18, 0.61], and older adults, $B = 0.62$, 95% CI [0.31, 0.93], but not for younger adults, $B = 0.07$, 95% CI [-0.23, 0.37]. Similarly, for nonjudgment, significant positive effects were also observed for both middle-aged; $B = 0.27$, 95% CI [0.06, 0.47], and older adults, $B = 0.46$, 95% CI [0.15, 0.76], but not for younger adults, $B = -0.005$, 95% CI [-0.28, 0.27]. No other associations were conditional on age.

2.5 Discussion

The present study extends existing literature regarding mechanisms of mindfulness and further contextualises the role of mindfulness for well-being by considering its significance within a lifespan developmental framework. In the section that follows, we discuss our findings related to the role of age in moderating associations of mindfulness components with well-being in the context of Farb et al.'s (2014) process model.

2.5.1 Associations Between Mindfulness Model Components, Well-Being Outcomes, and Age

Our findings provide partial evidence for the mechanisms proposed by Farb et al. (2014) with the additional inclusion of nonattachment in our adapted model (see Figure 1.1). Among predictors of the well-being composite, acceptance, nonattachment, and decentering were all found to be mechanisms through which present-moment attention and nonjudgment exerted positive effects. Similar patterns of findings to those observed for well-being emerged in the analyses that included flexible goal adjustment as the outcome variable, although acceptance did not emerge as a significant mediator in these models. Overall, the results suggest that the propensity to attend to the present moment and to adopt a nonjudgmental orientation to experiences facilitates mindfulness-related attitudinal capacities which, in turn, gives rise to both the ability to flexibly adapt to changing circumstances and a perception of well-being (including a positive profile of affect, satisfaction with life, and a sense of flourishing). Contrary to Farb et al.'s model, interoception was not found to be an active mechanism in the relationships between present-moment attention and either outcome. It may be that including more broad attributes of interoception or using an alternative measure of body awareness (e.g., the Scale of Body Connection; Price, Thompson, & Cheng, 2017) may reveal a different pattern of results.

The primary aim of the present study was to examine whether the significance of the mechanisms in Farb et al.'s (2014) mindfulness model for adaptive outcomes reflecting psychological flexibility and well-being varied as a function of age. As expected, present-moment attention, nonjudgment, acceptance, nonattachment, and decentering were all found to be positively associated with age, suggesting that these are qualities or capacities that may naturally develop with time and life experience. These findings are consistent with preliminary research demonstrating similar associations across the lifespan for dispositional mindfulness (e.g., Lehto et al., 2015), acceptance (Shallcross, Ford, Floerke, & Mauss, 2013), nonattachment (Feliu-Soler et al., 2016), and decentering (Soler et al., 2014).

Moderation analyses revealed that the direct links between present-moment attention and well-being, and between nonjudgment and well-being, became stronger with age and were significant for adults older than approximately 40 years of age. These findings are somewhat consistent with SST (Carstensen, 2006) which posits that with age, comes increased awareness that our future time remaining is increasingly limited and the desire to savour the present moment intensifies, so as to maximise meaning and satisfaction from life. While SST suggests that this changing perspective of time is particularly relevant in older adulthood, our findings point to a possible turning point in midlife where the capacity for present-moment attention and nonjudgment takes on greater significance for well-being than is the case in emerging adulthood. Recent research has shown that middle adulthood represents a nadir in overall happiness levels, perhaps due to a clustering of stressors in midlife related to social, professional, and financial responsibilities (Cheng, Powdthavee, & Oswald, 2017). Lachman, Teshale, and Agrigoroaei (2015) characterise middle adulthood as a crucial time linking earlier and later periods of life that requires individuals to navigate processes of both growth and decline across multiple domains (e.g., age-related losses in physical health and cognition; gains in emotional maturity and social status). Our findings

provide preliminary evidence to suggest that during this developmental period, well-being becomes more strongly linked with appreciation for and engagement with the here-and-now (as opposed to rumination about the past or worry about the future), as well as the ability to adopt a non-evaluative stance to events and experiences (i.e., moving away from overt judgment of experiences as necessarily ‘good or bad’). Perhaps such capacities are a natural side effect of accumulated experience in managing complex problems and accruing wisdom through life (Blanchard-Fields, 2007), while also reflecting the increasing emphasis on affective regulation that comes with age (Carstensen, 2006).

Our findings further showed that the positive relationship between decentering and flexible goal adjustment became stronger with age and was also evident only for adults around 40 years of age and above. These findings make conceptual sense given that middle adulthood is a transitional stage between (a) earlier periods of life typically characterised by tenacious goal pursuit, and (b) later life when previously valued goals often become unattainable and accommodations must be made. Specifically, the transitional nature and demands of middle adulthood may increase the salience of unrealised personal goals, so that the adaptive ability to let go of unviable pursuits and reengage with alternative goals becomes particularly pertinent. For example, middle-aged men and women with an unfulfilled wish to have children, and who reported disengaging from the goal of having children and reengaging with alternative goals, experienced both lower negative affect and higher positive affect (Kraaij, Garnefski, & Schroevers, 2009). Theoretically, decentering may be a capacity that develops over time due to experiencing and understanding life’s changeability across multiple domains (e.g., social relationships, professional identities, and physical health; Bernstein et al., 2015). In the context of middle and older adulthood, perhaps the ability to decenter and adopt a broader and more objective perspective serves a self-regulatory function that buffers against the negative effects of acknowledging and relinquishing unattainable

goals, and facilitates openness and reorientation toward alternative goals (Bernstein et al., 2015; Brandtstädter, 2009; Wrosch et al., 2013).

2.5.2 Limitations and Future Directions

Our results must be interpreted in light of several limitations. First, participants were recruited via an online research management platform and may not be representative of the general population, particularly as lower levels of internet usage are associated with advancing age (Pruchno, 2019). However, our sizeable sample was drawn from a very large and relatively research-naïve pool, with arguably greater representability than student or other online samples commonly used in this type of psychological research (Prime Research Solutions, 2019). A second limitation is that the study relied solely on self-report measures which, although well-used and validated, may be subject to recall and social-desirability biases (e.g., overestimation of prosocial qualities; Grossman, 2019). Third, the cross-sectional design means that age and cohort effects cannot be separated and that causal sequences among the variables cannot be directly inferred. Indeed, recent research has demonstrated mutual, reciprocally enhancing relationships between daily mindfulness and positive emotions via positive upward spirals (Du, An, Ding, Zhang, & Xu, 2019). Thus, we cannot rule out the possibility that emotional well-being is a predictor of mindfulness-related attitudinal qualities. Future research may benefit from using alternative assessment strategies such as ecological momentary assessment to examine mindfulness in daily life contexts (Blanke & Brose, 2017). Designs of this type allow examination of within-person processes and lead-lag analyses (e.g., Donald, Atkins, Parker, Christie, & Ryan, 2016), which could help to untangle dynamic temporal associations between well-being and characteristics of mindfulness.

2.5.3 Conclusion

Our findings indicate that across the second half of life, the tendency to focus on the present-moment and to adopt a nonjudgmental orientation may become especially important for well-being. Furthermore, the ability to appreciate the transitory nature of personal experiences may become particularly important for flexible employment of both goal disengagement and reengagement strategies with advancing age. From a theoretical perspective, our findings suggest the value of considering different aspects of mindfulness within a lifespan developmental perspective. For example, future research could examine potential mechanisms within the relationships between age and mindful qualities, including older adults' motivational preferences (e.g., future-time perspective; Carstensen, 2006), stress exposure, and capacity for flexible adaptation to age-related challenges. In terms of practical implications, our results suggest that mindfulness-based interventions (e.g., Mindfulness-Based Stress Reduction; Kabat-Zinn, 1982, 1990) that are designed to facilitate qualities such as present-moment attention and nonjudgment could be particularly efficacious for enhancing well-being in middle-aged and older adults. Moreover, future mindfulness-based intervention studies should incorporate samples with a broad age-range so that treatment effects can be evaluated across different developmental contexts.

Prologue to CHAPTER 3

The results of the first study in the present thesis (viz., Mahlo & Windsor, 2020b) demonstrated positive associations between age and mindful characteristics, including present-moment attention, nonjudgment, and acceptance. Moreover, the relationships of both present-moment attention and nonjudgment with a well-being composite (comprising affect balance, life satisfaction, and psychological flourishing) were found to be stronger with increasing age, and to be particularly important from midlife through to older adulthood. The findings suggest that mindful qualities may naturally develop with time and life experience, and that attending to the present-moment and adopting a nonjudgmental orientation may have particular utility for well-being across the second half of life (Mahlo & Windsor, 2020b).

The next study in this thesis (viz., Mahlo & Windsor, in press) extends these findings by moving from the conceptualisation of mindfulness as representing dispositional or trait characteristics to a perspective where mindful qualities are viewed as dynamic states that can fluctuate from moment to moment. Specifically, experience-sampling methodology involving intensive, repeated, real-time assessment using participants' own smartphones was employed to examine the relationships between state-level mindfulness (via the Multidimensional State Mindfulness Questionnaire [MSMQ]; Blanke & Brose, 2017) and affective experience in response to daily hassles and uplifts in the daily lives of middle-aged and older adults. Furthermore, the potential role of both age and future time perspective in predicting these dynamic relationships was examined. The study provides the first examination of the MSMQ in the context of later adulthood and contributes a more fine-grained understanding of the importance of mindfulness for well-being in midlife and beyond.

CHAPTER**3****STATE MINDFULNESS AND AFFECTIVE WELL-BEING IN
THE DAILY LIVES OF MIDDLE-AGED AND OLDER
ADULTS**

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LM contributed 75% and TDW contributed 25% to the research design, data collection and analysis, and writing and editing of the manuscript, respectively.

3.1 Abstract

Objectives: Contemporary conceptualisations of mindfulness refer to paying attention to the present-moment with an open and nonjudgmental attitude. Empirical research is increasingly focusing on mindfulness as a dynamic and multifaceted state that can fluctuate across situations and time. The present study aimed to extend existing knowledge by using experience-sampling methodology to examine state-level mindfulness, pleasant/unpleasant event occurrence, and affective well-being in the everyday lives of middle-aged and older adults. **Method:** A community-based sample of 157 participants aged 53 to 86 ($M = 69.36$, $SD = 5.80$) was recruited in May–June 2020. Participants completed assessments of multidimensional state mindfulness, hassle and uplift occurrence, and positive and negative affect on their smartphones, four times a day over ten consecutive days. (Total observations: 4761; $M = 30.32$, $SD = 8.78$). **Results:** Multilevel models indicated that the state mindfulness-facets *present-moment attention* and *nonjudgmental acceptance* were predictive of greater affective well-being in older adulthood. Furthermore, nonjudgmental acceptance appeared to buffer affective reactivity to daily hassles, and importantly, this effect was stronger at older ages. Mindful states did not appear to provide any further boost to uplift-related mood. **Discussion:** The findings suggest that occasions characterised by relatively high present-moment attention and nonjudgmental acceptance may contribute to enhanced emotional well-being in later adulthood. Furthermore, adopting a nonevaluative and accepting orientation toward momentary experiences may be a psychological strategy that has particular utility for mitigating emotional reactivity to daily stressors with increasing age. Future research should investigate multidimensional state mindfulness and affective well-being for middle-aged and older adults participating in mindfulness-based interventions.

Keywords: state mindfulness; mindfulness facets; age; well-being; experience sampling

3.2 Introduction

Contemporary notions of mindfulness refer to paying attention to the present moment in a purposeful, receptive, and nonjudgmental way (Kabat-Zinn, 1994). Empirical research has demonstrated positive relationships between dispositional mindfulness and psychological health in the general population, including adaptive cognitive processes (e.g., reduced rumination and pain catastrophising), enhanced emotional processing and regulation, and reduced psychopathology (e.g., depressive symptoms; Tomlinson et al., 2018). Now, research attention is increasingly turning toward a more fine-grained investigation of mindfulness as an experiential and multifaceted state (rather than a stable and enduring trait) that can fluctuate from moment to moment. This is typically achieved through experience-sampling methodology which involves intensive, repeated, real-time assessment of peoples' experiences within their natural environments (Blanke & Brose, 2017; Brown & Ryan, 2003; Mehl & Conner, 2012). Previous research has highlighted how mindfulness could be particularly efficacious for supporting affective well-being in later life (e.g., Mahlo & Windsor, 2020a, 2020b). However, almost no studies have investigated state-level mindfulness in samples of older adults. The present study aimed to examine multidimensional state mindfulness and everyday affective experience using experience-sampling methodology with a community-based sample of people in late midlife to older adulthood.

3.2.1 State Mindfulness

Examination of intrapersonal moment-to-moment processes can lead to insights about flexible responsiveness across situations and time as well as identification of potentially meaningful patterns of behaviour (Nofle & Fleeson, 2015). Such investigations can answer questions about situational contingencies at the state level (e.g., involving affective experience and/or behaviour), and further, contribute to a deeper understanding of

developmental processes across the lifespan and consequences for well-being (e.g., see Mroczek & Almeida, 2004). Moreover, due to the nature of the information being assessed (i.e., generalised averages vs. more immediate experience), trait- and state-level reports are often divergent and demonstrate differential predictive value (Blanke et al., 2018; Schwarz, 2012). Of particular relevance, while trait- and state-level mindfulness may be structurally similar in terms of the underlying dimensions, they may also be considered as conceptually and statistically independent (Blanke & Brose, 2017; Brown & Ryan, 2003).

So far, a small amount of research suggests that state mindfulness in the context of everyday life is linked with lower levels of stress and negative affect and higher levels of positive affect (Brown & Ryan, 2003; Blanke et al., 2018; Snippe et al., 2015). State mindfulness has also been linked with more adaptive coping (Donald et al., 2016; Weinstein et al., 2009), reduced rumination and greater life satisfaction (Felsman et al., 2017), and reduced emotional exhaustion, increased job satisfaction, and better sleep quality in workers (Hülshager et al., 2013, 2014). In the majority of these studies, state mindfulness is operationalised as unidimensional and most often captures present-focused attention and awareness, either via the state Mindful Attention Awareness Scale (state-MAAS; Brown & Ryan, 2003) or with single-item measures (e.g., Donald et al., 2016; Felsman et al., 2017). Other researchers have approached state mindfulness as multidimensional using selected items from existing trait measures and have demonstrated differential relationships between facets such as present-moment attention, nonjudgmental acceptance, and nonreactivity with the outcomes of emotional granularity (Van der Gucht et al., 2019), anger and aggression (Eisenlohr-Moul, Peters, Pond, et al., 2016), and borderline personality characteristics (Eisenlohr-Moul, Peters, Chamberlain, et al., 2016).

In response to the emerging interest in assessing facet-level state mindfulness, and lack of an existing psychometrically sound measure for examining daily experiences within

meditation-naïve populations, Blanke and Brose (2017) recently developed the Multidimensional State Mindfulness Questionnaire (MSMQ). While other measures of state mindfulness are designed for use in the specific context of mindfulness training (i.e., the Daily Mindful Responding Scale [DMRS; Lacaille et al., 2015] and Toronto Mindfulness Scale [TMS; Lau et al., 2006]) or are comparatively lengthy and focus only on mindfulness of mind and body (i.e., the State Mindfulness Scale [SMS; Tanay & Bernstein, 2013]), the MSMQ is a relatively brief measure for use with the general population that was developed through multilevel confirmatory factor analysis and corroboration with existing trait-level measures (Blanke & Brose, 2017).

Recent research using the MSMQ and experience-sampling methodology in the daily lives of university students has demonstrated differential beneficial links between present-moment attention and positive affect, and between nonjudgmental acceptance and negative affect, and further, a specific buffering effect of nonjudgmental acceptance on affective reactivity to daily hassles (Blanke et al., 2018). These findings extend previous research by contributing a more fine-grained understanding of relationships between different dimensions of mindfulness and emotional well-being at the level of daily experience (Blanke et al., 2018). One aim of the present study was to investigate the predictive value, and potential buffering effect, of different state mindfulness facets for affective well-being within a community-based sample spanning late midlife to older adulthood.

3.2.2 Mindfulness and Adaptive Ageing

In general, despite normative losses in physical functioning and cognition, older adults tend to report lower levels of negative affect and similar or higher levels of positive affect relative to younger adults (Charles & Carstensen, 2014), at least prior to very late life (see Gerstorf et al., 2010). Contemporary lifespan developmental theories of ageing and emotion contribute to our understanding of this so-called ‘paradox of ageing’ and suggest

that, in the context of normative developmental changes, different facets of mindfulness may be particularly efficacious for supporting affective well-being in later life. Specifically, as outlined by Mahlo and Windsor (2020b), attending to the present-moment and adopting a nonjudgmental and accepting orientation to experiences may represent psychological coping resources that capitalise on age-related regulatory strengths and buffer the adverse effects of exposure to common ageing-related losses (e.g., declines in health, see Baltes & Smith, 2003).

Socioemotional Selectivity Theory (SST; Carstensen et al., 2003, 1999) posits that with older age comes the realisation that one's future time to live is increasingly limited. Consequently, individuals tend to deprioritise future-oriented goals (e.g., knowledge and information acquisition) and instead seek to maximise their present-moment experience through satisfying emotional experiences and meaningful pursuits, thus promoting greater emotional well-being. In their recent study, Blanke et al. (2018) demonstrated that higher within-person levels of present-moment attention in daily life (i.e., occasions when an individual's present-moment attention was higher than their own personal average) corresponded with higher levels of positive affect above and beyond other mindfulness facets (i.e., nonjudgmental acceptance and acting with awareness).⁶ Consistent with SST (Carstensen et al., 2003, 1999), this beneficial coupling of present-moment focusing and affective well-being may well become stronger with age, as individuals experience an increased motivation to pursue goals that maximise the quality of their current emotional experiences.

⁶ According to Blanke and Brose (2017, p. 741), while “present-moment attention is related to acting with awareness, the latter mainly refers to [one's] own actions, whereas present-moment attention covers attention to the present moment beyond [one's] own activities”.

A potential mechanism linking present-moment attention with positive affect could involve increased appreciation for uplifts (i.e., positive or pleasant events in daily life; Kanner et al., 1981). Specifically, a tendency to be in the ‘here-and-now’ may increase the salience of uplifting experiences (e.g., a pleasant exchange with a friend, time spent in nature, etc.), potentially increasing positive affect. This is in line with Fredrickson's (2004, 2013) *broaden-and-build theory* which posits a reciprocal relationship between states of broadened present-moment awareness and positive emotions, ultimately contributing to personal resource gain and enhanced well-being over time. In particular, Fredrickson and colleagues (Garland et al., 2015; Garland & Fredrickson, 2019) suggest that mindfulness (as a state, trait, and practice) contributes to emotional well-being by promoting both positive appraisals and savouring in the context of stressful and/or pleasant experiences. Relatedly, savouring (i.e., mindful appreciation of positive experiences) is suggested to be a particularly pertinent means for deriving meaning in later adulthood (Bryant & Smith, 2015). Overall, attending to the present moment could provide a potential ‘boosting’ effect of the relationship between uplifting experiences and positive affectivity, particularly in the context of increasing age.

On the other hand, adopting a nonjudgmental and accepting attitude towards experiences may promote feelings of equanimity or reduced affective reactivity to both pleasant and unpleasant events. Providing indirect support for this proposition, Shao et al., (2016) found that older adults (aged 60–68 years) who underwent 8 weeks of attention- and compassion-based meditation training demonstrated relatively more neutral responding when viewing both negative and positive pictures, compared with those who underwent relaxation training. That is, negative pictures were rated as more positive, and positive pictures as less positive, and these ratings were accompanied by lower perceived arousal (i.e., greater feelings of calm). These findings are consistent with the notion that mindfulness, and nonjudgmental acceptance in particular, can promote a sense of affective stability or

equanimity across a range of contexts, whether they be negatively, neutrally, or positively valenced (Desbordes et al., 2015). Thus, higher levels of nonjudgmental acceptance could temper the relationship between potentially uplifting experiences and positive affect, where levels of positive affect are maintained rather than boosted. These concurrent propositions regarding the effects of state mindfulness on the coupling between uplifts and positive affect were investigated in the present study.

Expanding on SST, the model of *Strength and Vulnerability Integration* (SAVI; Charles, 2010) outlines how older adults regulate their emotional experience by selectively avoiding exposure to potentially negative experiences (see also Blanchard-Fields, 2007). However, when older adults encounter unavoidable and sustained stressors (e.g., chronic illness or caregiving demands), they tend to experience elevated negative affect and prolonged physiological arousal due to age-related reductions in biological regulation capacity (Wrzus et al., 2013). In the context of this vulnerability to unavoidable stressors in later life, the adoption of a nonjudgmental and accepting attitude toward experiences could potentially buffer the adverse effects of prolonged stress on emotional well-being (Creswell & Lindsay, 2014; Feldman et al., 2016). In particular, nonjudgmental acceptance may be an especially effective psychological resource for managing potentially aversive experiences that requires relatively modest physiological and cognitive resources, and importantly for older adults, could contribute to faster physiological recovery (i.e., return to baseline levels) from stressor-related adverse effects (Desbordes et al., 2015; Mahlo & Windsor, 2020b). To our knowledge, no research has investigated the relationship between states of nonjudgmental acceptance and affective well-being with an older adult sample.

3.2.3 Mindfulness and Adaptive Ageing: Empirical Evidence

A small amount of research has investigated naturally occurring (vs. intentionally cultivated through intervention) links between mindfulness and psychological functioning in

the context of older adulthood (for a review of mindfulness-based intervention studies with older adults, see Geiger et al., 2016). So far, research shows that dispositional mindfulness is positively correlated with age (Lehto et al., 2015; Smoski et al., 2015) and that older adults are relatively more mindful when compared with younger adults (Fountain-Zaragoza et al., 2018; Mackenzie et al., 2018; Mahoney et al., 2015). Furthermore, trait mindfulness in older adulthood is associated with better mental health and emotional well-being (de Frias & Whyne, 2015; Fiocco & Mallya, 2015; Imel & Dautovich, 2018; Elliot et al., 2019; Raes et al., 2015; Shook et al., 2017), and positive expectations regarding ageing (Fiocco & Meisner, 2020).

Most recently, in a validation study of a commonly used trait mindfulness measure (i.e., the Five Facet Mindfulness Questionnaire - Short Form [FFMQ-SF]; Baer et al., 2006; Bohlmeijer et al., 2011) with a sample of community-dwelling older adults (i.e., aged 60–89 years), Brady et al. (2019) went beyond the global assessment of mindfulness and demonstrated that while most facets were independently associated with both positive and negative affect, the facet observe (assessing awareness of internal and external experiences) was not significantly associated with negative affect, and the facet nonjudgment (i.e., of one's thoughts and feelings) was not significantly related to positive affect. These findings mirror prior studies with relatively younger samples (Baer et al., 2008; Brady et al., 2019) and highlight that present-moment awareness appears more relevant for positive affectivity, while nonjudgmental acceptance seems to have particular utility in the context of stress and negative experiences (Blanke et al., 2018; Creswell & Lindsay, 2014). Another recent study by Fiocco and Meisner (2020) found that older adults (aged 55–79 years) with higher levels of nonjudgmental acceptance reported more positive expectations about ageing, an important factor underlying health, well-being, and longevity in older adulthood (Kotter-Gröhn,

Kleinspehn-Ammerlahn, Gerstorf, & Smith, 2009; Sargent-Cox, Anstey, & Luszcz, 2012; Siebert, Wahl, Degen, & Schröder, 2018)

In previous cross-sectional research (viz., Mahlo & Windsor, 2020b), we demonstrated positive associations between age and mindful characteristics, including present-moment attention, nonjudgment, and acceptance. Moreover, the relationships of both present-moment attention and nonjudgment with a well-being composite (comprising affect balance, life satisfaction, and psychological flourishing) were found to be stronger from midlife through to older adulthood. The findings suggest that mindful qualities may naturally develop with time and life experience, and that attending to the present-moment and adopting a nonjudgmental orientation may have particular utility for well-being (including balanced affect) across the second half of life (Mahlo & Windsor, 2020b). Furthermore, the results highlight how the predictive value of different mindfulness facets likely depends on the outcomes being investigated (Blanke et al., 2018).

While experience-sampling has been well-used to investigate the affective experiences of older adults in daily life (e.g., Carstensen et al., 2011), not much research has employed similar methodology to examine state-level mindfulness in older populations. To our knowledge, Moore et al. (2016) conducted the only such study with 67 older adults (aged 65–79) who participated in a mindfulness-based intervention trial. This study required participants to complete a paper-and-pencil assessment together with a ten-day online experience-sampling phase comprising the same measures, both before and after participation in an 8-week mindfulness-based treatment program (or health education control group). The study utilised four items from an existing trait measure of mindfulness (i.e., the Cognitive Affective Mindfulness Scale-Revised [CAMS-R]; Feldman et al., 2007) and demonstrated significantly greater improvements in mindfulness, depression, and anxiety for participants of the mindfulness intervention (compared to the active control group) when using data

collected online via experience-sampling, but not by paper-and-pencil. Moreover, when analysing data from the paper-and-pencil tests, there was no evidence of the beneficial effects for mindfulness and depression. Moore et al., concluded that experience-sampling appears to outperform traditional pencil-and-paper assessment in terms of precision and sensitivity to change in key outcomes; and that the benefits of its use may outweigh any increased procedural burden for researchers and participants.

More recently, in twin studies, Blanke et al., (2020) used experience-sampling to investigate state-mindfulness in the daily lives of 70 university students (average age 26 years) and also 179 middle-aged adults (average age 51 years) from Germany, respectively. The findings from both samples consistently showed that present-moment attention and nonjudgmental acceptance (via items from the MSMQ) moderated associations of both rumination and reflection with affective well-being. Of note, these studies utilised data from two separate experience-sampling studies and did not examine age effects. Thus, to date, no research has utilised the MSMQ to investigate links between facet-level mindfulness and affective well-being in community-dwelling adults across the second half of the lifespan; hence, setting the scene for the current study.

3.2.4 The Present Study

The overarching aims of the present study were to: (1) examine associations of state-level mindfulness facets with everyday affective experience in a community-based sample of middle-aged to older adults (i.e., aged 50 and above); (2) extend previous research (Blanke et al., 2018) by examining affective responses to daily uplifts in addition to daily hassles; and (3) examine the potential roles as moderators of both age and future-time perspective on the relationships between mindfulness facets and within-person (WP) couplings of daily hassles/uplifts and affect. These aims were achieved using an intensive experience-sampling design where participants were asked a series of brief questions relating to mindfulness (via

the MSMQ), positive and negative affect, and daily hassle and uplift occurrence, four times a day for ten consecutive days. Thus, participants completed up to forty in situ assessments. In addition, participants completed a psychosocial questionnaire comprising demographic questions and a trait measure of future time perspective prior to the experience-sampling phase.

We considered whether higher-than-usual mindfulness is associated with affective reactivity to daily events (i.e., hassles and uplifts) and whether these effects vary as a function of age. First, it was expected that mindfulness characteristics would be associated with higher positive affect and lower negative affect at each time point. Second, it was expected that daily hassle occurrence at each assessment point would be associated with higher and lower levels of negative and positive affect, respectively; and that uplift occurrence would be associated with increased positive affect. Third, it was expected that higher levels of nonjudgmental acceptance would buffer the association of daily hassle occurrence with affective well-being. We further predicted that the coupling between uplifts and positive affect would be either (a) boosted by higher levels of present-moment attention (evidenced by larger increases in uplift-related positive affect) *or* (b) tempered by higher levels of nonjudgmental acceptance (evidenced by smaller increases in uplift-related positive affect). Finally, considering the lifespan developmental perspectives outlined above and the view that mindfulness characteristics may become especially important for maintaining well-being with increasing age, it was predicted that both age and future time perspective (as individual differences) would also act as moderators. Here, it was expected that the beneficial effects of both present-moment attention and nonjudgmental acceptance on daily hassle/uplift-affect coupling would become stronger with increasing age; and that positive associations of present-moment attending with uplift-related positive affect would be stronger among those with a more limited future time perspective.

3.3 Method

3.3.1 Participants

A community-based sample of 163 participants was recruited through distribution of the study advertisement in May–June 2020 via (a) an email database of older adults who had previously registered an interest in research participation with our research lab; and (b) the South Australian Office for Ageing Well’s feedback network (via email) and digital publication (“Weekend Plus”). Eligibility criteria required participants to be: 1) aged 50 years or older; 2) fluent in English; and 3) to own and be able to operate a smartphone with both text messaging capability and internet connection. Of the 163 people who successfully completed the online eligibility questions and registered their interest in participating, five did not proceed to complete the baseline survey. Data for one participant was excluded from analyses due to self-reported mild cognitive impairment/dementia at baseline.⁷ The final sample consisted of 157 participants aged between 53 and 86 years ($M = 69.36$, $SD = 5.80$, 66.9% female). Adequacy of the sample for statistical power is supported by it being more than double the size of similar studies conducted previously that have reported statistically reliable associations of state mindfulness with affect at the within-person level (e.g., Blanke & Brose, 2017; Blanke et al., 2018). Sample characteristics are provided in Table 3.1.

3.3.2 Procedure

Following approval by the Institutional Ethics Committee, the opportunity to participate in a research study about ‘Well-Being in Daily Life’ was advertised. Mindfulness was not mentioned within any study materials. Interested individuals were provided with (a) the contact details of the primary researchers, and (b) a link to an online landing page via a

⁷ The baseline survey incorporated measures for another unrelated study, including an item about mild cognitive impairment or dementia embedded within the Physical Health Indicators Checklist (Borim, Neri, Francisco, & Barros, 2014). There were no further cognitive assessments and psychological symptomatology (i.e., anxiety, depression, etc.) were not assessed.

Table 3.1

Demographic Characteristics of 'Well-Being in Daily Life' Participants

Characteristics		<i>N</i> = 157
Age (Years)	Mean (<i>SD</i>)	69.36 (5.80)
Gender (<i>n</i> , %)	Female	105 (66.9%)
	Male	52 (33.1%)
Ethnicity ^a (<i>n</i> , %)	Caucasian/White	155 (98.7%)
	Asian	2 (1.3%)
Education (<i>n</i> , %)	Did not complete High School	7 (4.5%)
	Completed High School or Equivalent	20 (12.7%)
	Some College or Tertiary	52 (33.1%)
	Bachelor's Degree	44 (28.0%)
	Postgraduate Degree	34 (21.7%)
Employment Status (<i>n</i> , %)	Full-Time Employment	2 (1.3%)
	Part-Time Employment	13 (8.3%)
	Casual Employment	7 (4.5%)
	Homemaker	2 (1.3%)
	Student	2 (1.3%)
	Retired	130 (82.8%)
	Unemployed	1 (0.6%)
Relationship Status (<i>n</i> , %)	Single (never married)	6 (3.8%)
	Married/Domestic Partnership	105 (66.9%)
	Separated	3 (1.9%)
	Divorced	22 (14.0%)
	Widowed	20 (12.7%)
	Other ^b	1 (0.6%)
Meditation ^c (<i>n</i> , %)	Yes	37 (23.6%)
	No	120 (76.4%)

^a Respondents could choose multiple categories. ^b "Carer for older dear friend." ^c Respondents were asked if they regularly engage in formal meditation practice (i.e., at least once a week over the past month).

secure survey platform (i.e., Qualtrics) where they were presented with an introduction and information page and invited to answer eligibility questions (i.e., regarding age, English fluency, and smartphone ownership). Eligible participants were asked to indicate their

informed consent and to provide their contact details (i.e., name, birthdate, email address, phone number, and postcode). Following the registration process, participants received an automated email with the study instructions, a link to the online baseline survey (via Qualtrics), and notification of their unique randomly generated study code. On completion of the online baseline survey, participants were immediately redirected to the registration page for the mobile phase of the study (hosted by SurveySignal; Hofmann & Patel, 2015). Here, participants were asked to re-enter their contact details and unique study code, select their time-zone, and verify their smartphone via a text-message link.

Beginning the next day and for ten consecutive days, participants received four daily text-message prompts containing survey links (via Qualtrics). The text-messages were distributed semi-randomly within four equal segments of the day between 9am and 8pm, with the constraint that they were at least 60 minutes apart and with the survey links expiring after 30 minutes. (Participants also received a text-message at 8:30pm each evening with a survey link for an evening diary unrelated to the present study). Following Hofmann and Patel (2015), a response-based compensation procedure was employed: upon completion of the study, participants received \$10 AUD as base compensation for their time, with another \$25 AUD on completion of at least 60% of the mobile surveys, and a further \$15 AUD for 80% completion; totalling a possible compensation of \$50 AUD per participant. Due to intermittent issues with text-message delivery, participants received an average of 48 text-message prompts (range 10–50); the total average response rate was 79.5% ($M = 38.02$, $SD = 10.60$, range 1–49).⁸ For the four daytime prompts, participants completed an average of 30.32 surveys ($SD = 8.78$, range 1–40), resulting in a total of 4761 observations.

⁸ Response-based calculations include the evening diaries unrelated to the present study.

3.3.3 Measures

Table 3.2 displays the 13 questions presented to participants via the experience-sampling methodology. All responses were on a 7-point scale (0 = *does not apply at all*, 6 = *applies strongly*), except for the questions about hassles and uplifts, which required a yes/no response.

Table 3.2

Experience-Sampling Variables and Questions

Variable	Experience-sampling questions ^a
(Stem)	<i>Please recall the period since the last measurement / you woke up: How did you behave, what did you think and feel? That is what the following questions are about...</i>
Present-moment attention (MSMQ)	I focused my attention on the present moment. I opened myself up to what was happening. I concentrated on what I was doing at that moment.
Acting with awareness (MSMQ)	I did things/tasks automatically without being aware of what I'm doing. (R) I did things without paying attention. (R) I sometimes did not stay focused on what was happening in the present. (R)
Nonjudgmental acceptance (MSMQ)	I thought some of my thoughts/feelings were slightly off. (R) Things went through my mind that I should not really be engaging myself with. (R) I thought I could have acted more appropriately at a certain time. (R)
(Stem)	<i>How have you primarily felt since the last measurement / waking up: Please rate how well the following emotion adjectives describe your feelings during this time period.</i>
Negative affect	Nervous / Downhearted / Distressed
Positive affect	Happy / Relaxed / Content
(Stem)	<i>Since the last measurement / waking up...</i>
Hassles	Did something unpleasant happen?
Uplifts	Did something pleasant happen?

Note. MSMQ = Multidimensional State Mindfulness Questionnaire (Blanke & Brose, 2017). R = Reverse coded.

^a All responses were on a 7-point scale (0 = *does not apply at all*, 6 = *applies strongly*), except for the questions about hassles and uplifts which required a yes/no response.

State mindfulness. State-level mindfulness was measured using the MSMQ (Blanke & Brose, 2017). This 9-item scale assesses three facets of mindfulness: *present-moment attention, acting with awareness, and nonjudgmental acceptance* (see Table 3.2). After reverse scoring negatively worded items, responses were averaged for each of the facets to produce three scores ranging from 0 to 6, with higher scores indicating greater mindfulness. Blanke and Brose (2017) reported acceptable psychometrics for the MSMQ. On average, participants endorsed a high level of mindfulness across all measurement occasions (present-moment attention: $M = 4.54$, $SD = 0.83$; acting with awareness: $M = 4.68$, $SD = 0.83$; nonjudgmental acceptance: $M = 5.28$, $SD = 0.86$). The WP reliabilities of change (R_C based on Cranford et al., 2006) for the present-moment attention, acting with awareness, and nonjudgmental acceptance facets were .65, .61, and .71, respectively.

State affect. Following Blanke et al. (2018), state positive and negative affect were assessed by asking participants to rate how well six different emotion adjectives (PA: happy, relaxed, and content; NA: nervous, downhearted, and distressed) described their feelings during the time since the last assessment/waking up. Responses were averaged to produce two scores ranging from 0 to 6, with higher scores reflecting higher positive and negative affect, respectively. On average, participants reported medium levels of positive affect ($M = 4.43$, $SD = 1.06$) and lower levels of negative affect ($M = 0.59$, $SD = 0.75$). The WP reliabilities of change (R_C) for positive and negative affect were .79 and .68, respectively.

Hassle and uplift occurrence. Daily hassles and uplifts were measured by, respectively, asking participants if something pleasant/unpleasant had happened since the last assessment/waking up (coded 0 = no occurrence, 1 = occurrence). On average, participants reported 2.84 hassles ($SD = 3.39$, range 0–21) and 15.22 uplifts ($SD = 9.49$, range 0–37) across the 10-day experience-sampling phase of the study. The average proportion of

completed mobile surveys with hassles and/or uplifts endorsed was 9.33% and 50.49%, respectively.

Future time perspective. Future time perspective was measured at baseline using the Future Time Perspective Scale (FTP; Carstensen & Lang, 1996). This 10-item scale assesses the extent to which individuals perceive a more open-ended or limited future time perspective (e.g., “Many opportunities await me in the future”; “I have the sense time is running out”). Responses are made on a 7-point Likert-type scale (1 = *very untrue*, 7 = *very true*). Items 8 through 10 are reverse scored and responses are averaged to produce a total score ranging from 1 to 7, with higher scores indicating a more open-ended time perspective. ($\alpha = .89$).

Covariates. Analyses controlled for time-related effects, including linear and quadratic terms for occasions (coded 0–39), days (coded 0–9), time-of-day (0 = signals 1–2, 1 = signals 3–4), and weekend (0 = weekday, 1 = weekend). We also controlled for gender (0 = male, 1 = female), education (coded 0 = no tertiary degree, 1 = tertiary degree), and health status due to previously reported associations with mindfulness (e.g., Baer et al., 2008; Mahlo & Windsor, 2020b) and/or affective well-being (Diener et al., 2017). Health status was assessed via the 10-item ‘Physical Functioning’ subscale of the RAND 36-Item Health Survey 1.0 (Hays, Sherbourne, & Mazel, 1993; Range 0–100, with 100 representing optimum physical functioning).

3.3.4 Analytic Strategy

Multilevel models with restricted maximum likelihood estimation were run using IBM SPSS 25.0 to predict state positive and negative affect. This provided the advantages of a flexible method of modelling hierarchies within the data and readily accommodating missing data under missing-at-random assumptions (Schafer & Graham, 2002). First, unconditional models (with repeated assessments at Level 1 nested within days at Level 2 nested within individuals at Level 3) were estimated for both positive and negative affect:

results showed substantial variance attributable to between-person (BP) differences at Level 3 (PA: 65.9%, NA: 53.0%), between-day differences at Level 2 (PA: 11.6%, NA: 16.0%), and WP differences across occasions at Level 1 (PA: 22.6%, NA: 31.0%).

We first modelled time-related effects and covariates along with the three state mindfulness predictors (Model 1). Prior to analysis, time-varying predictors representing the mindfulness facets and hassle/uplift occurrence were each decomposed into two separate variables to estimate the effects of BP (person-specific means across assessments, grand-mean centered) and WP (occasion-specific deviations from the person-mean) variance separately (Hoffman & Stawski, 2009). The BP hassle/uplift variables were calculated as the proportion of hassle/uplift occurrence across response occasions. Time-invariant continuous predictors (age, health, future time perspective) were centered on the sample mean.

Random slopes for the predictors capturing WP mindfulness components were estimated at Level 3 as likelihood ratio tests indicated that allowing the slopes to vary across participants improved model fit (Singer & Willett, 2003; present-moment attention [PA: $\chi^2(2) = 92.40, p < .001$; NA: $\chi^2(2) = 112.28, p < .001$], acting with awareness [PA: $\chi^2(2) = 78.68, p < .001$; NA: $\chi^2(2) = 144.31, p < .001$], nonjudgmental acceptance [PA: $\chi^2(2) = 68.01, p < .001$; NA: $\chi^2(2) = 273.00, p < .001$]). Associated intercept-slope and slope-slope covariances were also estimated, with an unstructured variance-covariance matrix specified. The proportion of variance accounted for was estimated using pseudo- R^2 , representing the proportional change in the variance components (compared to the unconditional models; Singer & Willett, 2003). Each mindfulness facet was sequentially removed one at a time and pseudo- R^2 was compared to determine the variance of affect explained by each facet.

Next, the buffering/boosting effects of state mindfulness on affective response to daily hassles and uplifts were examined (Model 2). Here, hassles, uplifts, and their respective interactions with each of the mindfulness facets were modelled as predictors, as was affective

state at the previous measurement occasion, to control for any change in affect that occurred due to hassles/uplifts (following Blanke et al. 2018). We then included both age and future time perspective as additional moderators, along with all related three-way (e.g., age x present-moment attention x hassles) and lower-order (e.g., age x present-moment attention, age x hassles, present-moment attention x hassles) interactions, to examine moderating effects on relationships between state mindfulness and affective reactivity.

Finally, we trimmed the models by progressively excluding non-significant interactions (beginning with higher order terms) to arrive at the most parsimonious model (Model 3). Given our relatively large sample within the context of experience-sampling research and our large number of observations contributing to statistical power (e.g., Hox, 2010), as well as a high number of statistical comparisons, we employed a more stringent alpha criterion of .01 a priori, in order to balance the likelihood of type 1 and type 2 errors (Anderson, 2020; Hox, 2010). The final model for each outcome comprised all main effects with the remaining interaction terms significant at $p < .01$. Significant interactions were graphically illustrated by calculating predicted affect scores for hypothetical individuals based on ± 1 standard deviations of the moderator(s) (representing relatively high and low levels) and plotting for hassle/uplift occurrence.

The following equation specifies the complete model fitted for positive/negative affect (Y) at the individual i , day j , and assessment k level, adjusted for covariates (i.e., gender, education, and health status) and time-related effects (i.e., occasions [linear & quadratic change], day, time-of-day, and weekends):

$$\begin{aligned}
 Y_{ijk} = & \gamma_{00} + \gamma_{01}MFL-BP_i + \gamma_{02}EVENT-BP_i + \gamma_{03}AGE_i + \gamma_{04}FTP_i + \gamma_{10}AFFECT-1_{ijk} + \\
 & \gamma_{11}MFL-WP_{ijk} + \gamma_{12}EVENT-WP_{ijk} + \gamma_{13}MFL-WP_{ijk}EVENT-WP_{ijk} + \\
 & \gamma_{14}Age_iMFL-WP_{ijk} + \gamma_{15}Age_iEVENT-WP_{ijk} + \gamma_{16}FTP_iMFL-WP_{ijk} + \\
 & \gamma_{17}FTP_iEVENT-WP_{ijk} + u_{0i} + u_{1i}MFL-WP_{ijk} + r_{ijk}
 \end{aligned}$$

comprising variables of between-person (BP) and within-person (WP) mindfulness facets (MFL) and hassles/uplifts (EVENT); age and future time perspective (FTP); affect at the previous measurement occasion (AFFECT-1); associated interactions; and variance components representing individual-level random effects around the intercept (u_{0i}), random slopes for the mindfulness facets (u_{1i}), and time-specific residuals (r_{ijk}).

In line with the literature review and arguments outlined above, we have interpreted the results that follow from the perspective that state mindfulness has predictive value for affective well-being. However, as our experience-sampling data are correlational, the possibility of reverse causality cannot be ruled out (see study limitations for further discussion).

3.4 Results

3.4.1 Associations of Between-Person Mindfulness Facets with Positive/Negative Affect

Descriptive statistics and bivariate correlations for the BP study variables and covariates are provided in Table 3.3. Substantial shared variance among the mindfulness facets resulted in less consistent patterns of BP associations between the individual facets and affect in the adjusted analyses than were evident in the bivariate correlations. Specifically, as can be seen in Table 3.4 (Model 1), both BP present-moment attention and nonjudgmental acceptance (but not acting with awareness) were significantly positively associated with positive affect. Table 3.5 (Model 1) shows that only BP nonjudgmental acceptance was significantly negatively associated with negative affect. These BP associations indicate that participants who, on average reported greater use of specific mindfulness facets across assessments, reported higher positive affect or lower negative affect respectively, relative to those who reported lower use of the mindfulness strategies averaged across assessments.

Table 3.3

Pearson Correlations, Means, and Standard Deviations for the 'Well-Being in Daily Life' Between-Person Variables

Variable	Age	Gender	Ed	Health	FTP	PMA	AA	NJA	Ha%	Up%	PA	NA
Age		-.11	.05	-.26*	-.22*	.07	-.05	-.04	-.09	.10	.05	-.03
Gender			.02	-.001	-.02	-.01	-.05	-.02	.11	.08	-.14	.05
Ed				.15	-.04	.07	.03	-.08	-.06	.11	-.03	-.08
Health					.22*	.11	.08	.10	-.16	.08	.25*	-.20
FTP						.37**	.31**	.38**	-.21*	.24*	.47**	-.36**
PMA							.55**	.48**	-.26*	.19	.63**	-.46**
AA								.66**	-.27*	.05	.47**	-.61**
NJA									-.30**	-.02	.60**	-.83**
Ha%										.10	-.42**	.40**
Up%											.18	-.05
PA												-.69**
Mean	69.36			80.06	4.07	4.54	4.68	5.28	0.09	0.50	4.43	0.59
(SD)	(5.80)			(20.31)	(1.23)	(0.83)	(0.83)	(0.86)	(0.11)	(0.29)	(1.06)	(0.75)
Range	53–86			0–100	1–7	0–6	0–6	0–6			0–6	0–6

Notes. Ed = Education. FTP = Future time perspective. PMA = Present-moment attention. AA = Acting with awareness. NJA = Nonjudgmental

acceptance. Ha% = Proportion of hassle occurrence across response occasions. Up% = Proportion of uplift occurrence across response

occasions. PA = Positive affect. NA = Negative affect. *SD* = Standard deviation.

* $p < .01$. ** $p < .001$.

Table 3.4

Multilevel Models Examining Positive Affect as a Function of State Mindfulness Facets, Hassles, Uplifts, Age, and Future Time Perspective

	Positive Affect								
	Model 1			Model 2			Model 3		
	Est.	SE	99% CI	Est.	SE	99% CI	Est.	SE	99% CI
Fixed effects									
Intercept	4.53**	0.12	4.22, 4.83	4.08**	0.14	3.72, 4.44	4.09**	0.14	3.73, 4.45
Covariates									
Occasion	0.04	0.02	-0.01, 0.08	0.00	0.02	-0.05, 0.05	0.00	0.02	-0.04, 0.05
Occasion ²	0.00	0.00	0.00, 0.00	0.00	0.00	0.00, 0.00	0.00	0.00	0.00, 0.00
Day	-0.14	0.07	-0.31, 0.03	-0.05	0.07	-0.23, 0.13	-0.06	0.07	-0.24, 0.12
Time of day	0.02	0.04	-0.07, 0.11	0.02	0.04	-0.08, 0.12	0.02	0.04	-0.09, 0.12
Weekend	0.09*	0.03	0.02, 0.16	0.07*	0.02	0.01, 0.13	0.07*	0.02	0.01, 0.13
Gender	-0.26	0.12	-0.56, 0.05	-0.20	0.11	-0.47, 0.08	-0.16	0.10	-0.44, 0.11
Education	0.03	0.11	-0.26, 0.33	0.01	0.10	-0.26, 0.28	0.04	0.10	-0.23, 0.31
Health	0.01*	0.003	0.001, 0.01	0.01	0.00	-0.001, 0.01	0.01	0.00	0.00, 0.01
Affect-1				0.12**	0.01	0.09, 0.14	0.12**	0.01	0.09, 0.14
Main predictors (BP)									
Present-moment attention (PMA)	0.58**	0.08	0.36, 0.80	0.47**	0.08	0.27, 0.68	0.43**	0.08	0.22, 0.63
Acting with awareness (AA)	-0.07	0.10	-0.33, 0.18	-0.07	0.09	-0.30, 0.16	-0.06	0.09	-0.29, 0.17
Nonjudgmental acceptance (NJA)	0.50**	0.09	0.26, 0.73	0.44**	0.08	0.22, 0.65	0.40**	0.08	0.18, 0.61
Hassles %				-1.14	0.50	-2.46, 0.17	-0.98	0.50	-2.29, 0.33
Uplifts %				0.16	0.19	-0.34, 0.65	0.03	0.19	-0.48, 0.54
Age							0.01	0.01	-0.01, 0.04
Future time perspective (FTP)							0.11	0.05	-0.02, 0.24
Main predictors (WP)									
PMA	0.19**	0.02	0.14, 0.23	0.23**	0.02	0.16, 0.29	0.22**	0.02	0.15, 0.28
AA	0.03	0.02	-0.01, 0.07	0.01	0.02	-0.04, 0.06	0.03	0.02	-0.01, 0.07
NJA	0.28**	0.02	0.23, 0.34	0.20**	0.03	0.12, 0.27	0.21**	0.02	0.15, 0.27

Hassle			-0.52**	0.04	-0.62, -0.42	-0.52**	0.04	-0.62, -0.42
Uplift			0.24**	0.02	0.18, 0.29	0.24**	0.02	0.18, 0.30
PMA x Hassle			-0.02	0.05	-0.14, 0.11			
AA x Hassle			0.03	0.04	-0.07, 0.14			
NJA x Hassle			0.13*	0.04	0.03, 0.22	0.14**	0.04	0.05, 0.23
PMA x Uplift			-0.12**	0.03	-0.20, -0.04	-0.10*	0.03	-0.18, -0.03
AA x Uplift			0.04	0.03	-0.02, 0.11			
NJA x Uplift			0.01	0.03	-0.07, 0.09			
Age x NJA						-0.01	0.004	-0.02, 0.005
Age x Hassle						0.004	0.01	-0.01, 0.02
Age x NJA x Hassle						0.02*	0.01	0.01, 0.04
Random effects								
Intercept (L3)	0.48**	0.06	0.36**	0.05		0.35**	0.05	
PMA slope	0.02*	0.005	0.02*	0.01		0.02*	0.01	
AA slope	0.01*	0.004	0.01*	0.004		0.01*	0.004	
NJA slope	0.03**	0.01	0.03*	0.01		0.03*	0.01	
Cov. (Intercept-PMA)	-0.02	0.01	-0.01	0.01		-0.02	0.01	
Cov. (Intercept-AA)	0.01	0.01	0.01	0.01		0.01	0.01	
Cov. (Intercept-NJA)	-0.04	0.02	-0.02	0.01		-0.02	0.01	
Cov. (PMA-AA)	0.00	0.00	-0.00	0.00		-0.003	0.003	
Cov. (PMA-NJA)	0.00	0.00	-0.00	0.01		0.001	0.01	
Cov. (AA-NJA)	0.00	0.00	0.01	0.00		0.01	0.004	
Intercept (L2)	0.11**	0.01	0.04**	0.01		0.04**	0.01	
Residual (L1)	0.29**	0.01	0.28**	0.01		0.28**	0.01	
Level 3 Pseudo- R^2		.56		.68			.68	
Level 2 Pseudo- R^2		.42		.79			.79	
Level 1 Pseudo- R^2		.22		.24			.24	

Notes. $N = 157$. $M = 30.32$ measurement occasions per person. Est. = Unstandardised estimate. SE = Standard error. CI = Confidence interval. Affect-1 = Positive affect at prior measurement occasion. BP = Between-person. WP = Within-person. PMA = Present-moment attention. AA = Acting with awareness. NJA = Nonjudgmental acceptance. Hassles % = Proportion of hassle occurrence across response occasions. Uplifts % = Proportion of uplift occurrence across response occasions. FTP = Future time perspective. L3 = Level 3 (Individual). L2 = Level 2 (Day). L1 = Level 1 (Occasion). Cov. = Covariance.

* $p < .01$. ** $p < .001$.

Table 3.5

Multilevel Models Examining Negative Affect as a Function of State Mindfulness Facets, Hassles, Uplifts, Age, and Future Time Perspective

	Negative Affect								
	Model 1			Model 2			Model 3		
	Est.	SE	99% CI	Est.	SE	99% CI	Est.	SE	99% CI
Fixed effects									
Intercept	0.74**	0.07	0.56, 0.92	0.64**	0.08	0.42, 0.85	0.62**	0.08	0.41, 0.84
Covariates									
Occasion	0.00	0.02	-0.04, 0.04	-0.02	0.02	-0.06, 0.02	-0.02	0.02	-0.06, 0.02
Occasion ²	0.00	0.00	-0.00, 0.00	0.00	0.00	0.00, 0.00	0.00	0.00	0.00, 0.00
Day	-0.02	0.06	-0.18, 0.13	0.04	0.06	-0.12, 0.20	0.04	0.06	-0.12, 0.20
Time of day	-0.04	0.03	-0.12, 0.04	-0.01	0.03	-0.09, 0.08	0.00	0.03	-0.09, 0.09
Weekend	-0.02	0.02	-0.08, 0.03	-0.01	0.02	-0.07, 0.04	-0.01	0.02	-0.07, 0.04
Gender	-0.02	0.06	-0.19, 0.14	-0.02	0.06	-0.18, 0.13	-0.04	0.06	-0.20, 0.12
Education	-0.04	0.06	-0.20, 0.12	-0.01	0.06	-0.17, 0.14	-0.01	0.06	-0.17, 0.14
Health	0.00	0.00	-0.01, 0.00	0.00	0.00	-0.01, 0.00	0.00	0.00	-0.01, 0.00
Affect-1				0.12**	0.01	0.09, 0.16	0.13**	0.01	0.10, 0.16
Main predictors (BP)									
Present-moment attention (PMA)	-0.01	0.05	-0.13, 0.11	0.01	0.05	-0.11, 0.13	0.03	0.05	-0.09, 0.15
Acting with awareness (AA)	-0.08	0.05	-0.22, 0.06	-0.08	0.05	-0.21, 0.06	-0.08	0.05	-0.22, 0.05
Nonjudgmental acceptance (NJA)	-0.62**	0.05	-0.75, -0.50	-0.52**	0.05	-0.65, -0.40	-0.52**	0.05	-0.65, -0.39
Hassles %				0.11	0.29	-0.65, 0.87	0.00	0.29	-0.77, 0.76
Uplifts %				-0.02	0.11	-0.32, 0.27	0.02	0.12	-0.28, 0.32
Age							-0.01	0.01	-0.03, 0.00
Future time perspective (FTP)							-0.03	0.03	-0.11, 0.05
Main predictors (WP)									
PMA	-0.01	0.02	-0.06, 0.03	0.01	0.02	-0.04, 0.07	0.00	0.02	-0.05, 0.05
AA	-0.05*	0.01	-0.08, -0.01	-0.02	0.02	-0.06, 0.03	-0.04*	0.01	-0.07, -0.01
NJA	-0.35**	0.03	-0.41, -0.28	-0.28**	0.03	-0.35, -0.20	-0.24*	0.03	-0.31, -0.17
Hassle				0.63**	0.03	0.54, 0.72	0.61**	0.03	0.52, 0.70
Uplift				-0.12**	0.02	-0.17, -0.06	-0.11**	0.02	-0.16, -0.06

PMA x Hassle			0.03	0.04	-0.08, 0.14			
AA x Hassle			-0.08	0.04	-0.17, 0.02			
NJA x Hassle			-0.15**	0.03	-0.24, -0.06	-0.18**	0.03	-0.27, -0.10
PMA x Uplift			-0.01	0.03	-0.08, 0.06	0.10	0.02	-0.06, 0.07
AA x Uplift			-0.03	0.02	-0.09, 0.02			
NJA x Uplift			0.08*	0.03	0.003, 0.15			
Age x NJA						0.01	0.004	-0.004, 0.02
Age x Hassle						-0.01	0.01	-0.02, 0.01
FTP x PMA						-0.04*	0.01	-0.08, -0.01
FTP x Hassle						-0.09*	0.03	-0.16, -0.01
FTP x Uplift						0.02	0.02	-0.02, 0.06
Age x NJA x Hassle						-0.02**	0.01	-0.04, -0.01
FTP x PMA x Uplift						0.05*	0.02	0.004, 0.10
Random effects								
Intercept (L3)	0.15**	0.02		0.12**	0.01		0.12**	0.02
PMA slope	0.01*	0.004		0.01	0.00		0.01	0.00
AA slope	0.01*	0.003		0.00	0.00		0.01	0.00
NJA slope	0.06**	0.01		0.04**	0.01		0.05**	0.01
Cov. (Intercept-PMA)	-0.01	0.01		-0.01	0.01		-0.01	0.01
Cov. (Intercept-AA)	0.01	0.01		-0.01	0.00		-0.01	0.00
Cov. (Intercept-NJA)	-0.04**	0.01		-0.03*	0.01		-0.02*	0.01
Cov. (PMA-AA)	-0.01	0.01		0.00	0.00		0.00	0.00
Cov. (PMA-NJA)	0.01	0.00		0.00	0.00		0.00	0.00
Cov. (AA-NJA)	-0.00	0.00		0.00	0.00		0.00	0.00
Intercept (L2)	0.07**	0.01		0.03**	0.01		0.03**	0.01
Residual (L1)	0.24**	0.01		0.21**	0.01		0.22**	0.01
Level 3 Pseudo- R^2		.71			.77			.77
Level 2 Pseudo- R^2		.56			.81			.81
Level 1 Pseudo- R^2		.23			.32			.29

Notes. $N = 157$. $M = 30.32$ measurement occasions per person. Est. = Unstandardised estimate. SE = Standard error. CI = Confidence interval. Affect-1 = Negative affect at prior measurement occasion. BP = Between-person. WP = Within-person. PMA = Present-moment attention. AA = Acting with awareness. NJA = Nonjudgmental acceptance. Hassles % = Proportion of hassle occurrence across response occasions. Uplifts % = Proportion of uplift occurrence across response occasions. FTP = Future time perspective. L3 = Level 3 (Individual). L2 = Level 2 (Day). L1 = Level 1 (Occasion). Cov. = Covariance.

* $p < .01$. ** $p < .001$.

3.4.2 The Predictive Value of State Mindfulness for Affect in Midlife and Older

Adulthood – Main Effects

Turning to our key research focus on WP effects, and as shown in Table 3.4 (Model 1), higher levels of WP present-moment attention and nonjudgmental acceptance (but not acting with awareness) were found to be significant predictors of increased positive affect. This indicates that participants' positive affect tended to be higher on occasions when their reported use of present-moment attention and nonjudgmental acceptance was higher than average, and lower on occasions when their use of the mindfulness strategies was lower than average. Further, the model with all three mindfulness predictors explained 22% of the WP variance. Removal of each mindfulness facet from the model one at a time (see *Analytic Strategy*) revealed that WP present-moment attention, acting with awareness, and nonjudgmental acceptance accounted for 6%, 3%, and 8% of the Level 1 variance, respectively.

Table 3.5 (Model 1) shows that higher levels of WP acting with awareness and nonjudgmental acceptance were found to be significant predictors of lower negative affect. Here, the full model with the mindfulness predictors explained 23% of the WP variance. Removal of each mindfulness facet from the model one at a time indicated that the unique contributions of WP present-moment attention, acting with awareness, and nonjudgmental acceptance were 0%, 0%, and 13% of the Level 1 variance, respectively. Together, the results indicate that of the three state-level mindfulness facets, nonjudgmental acceptance may be the most reliable predictor of both increased positive affect and reduced negative affect in later adulthood.

3.4.3 State Mindfulness as a Potential Buffer/Booster for Middle-Aged and Older Adults' Affective Reactivity to Daily Hassles and Uplifts

It was expected that at each measurement occasion, hassle occurrence would be associated with lower positive affect and higher negative affect, respectively; and that uplift occurrence would be associated with higher positive affect. As can be seen in Tables 3.4 and 3.5 (Model 2, WP Hassles and Uplifts), hassle occurrence was found to be a significant predictor of both positive and negative affect in the expected directions. Furthermore, uplift occurrence was also found to significantly predict both higher momentary positive affect and lower momentary negative affect.

It was further predicted that the associations of hassles with both positive and negative affect would be weaker on occasions when participants reported higher levels of nonjudgmental acceptance. As shown in Model 2 (Tables 3.4 and 3.5, respectively), significant interactions were found between WP nonjudgmental acceptance and hassles for both positive and negative affect. Here, on occasions when participants reported experiencing a hassle, they were less likely to show either a decrease in positive affect (Figure 3.1a) or an increase in negative affect (Figure 3.1b) if they also reported higher-than-usual nonjudgmental acceptance on that occasion. Thus, as predicted, nonjudgmental acceptance appeared to buffer affective reactivity to hassles. (Note that the slopes in Figure 3.1 show predicted values at the sample mean for age. See also the three-way [age x nonjudgmental acceptance x hassle] interaction results reported below).

Regarding uplifts, it was predicted that their coupling with positive affect would be either (a) boosted by higher-than-usual levels of present-moment attention, or (b) tempered by higher-than-usual levels of nonjudgmental acceptance. As shown in Table 3.4 (Model 2) with positive affect as the outcome, a significant interaction emerged between WP present-moment attention and uplifts. Figure 3.2 illustrates the nature of this interaction. On

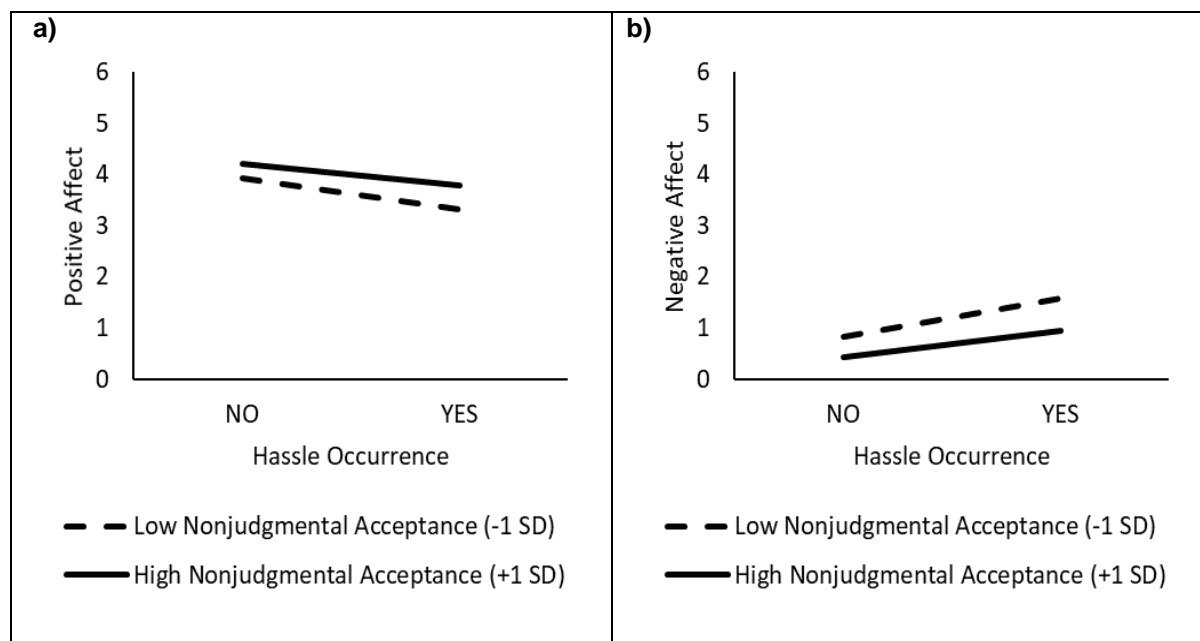


Figure 3.1. Nonjudgmental acceptance as a moderator of associations between hassle occurrence and (a) positive affect and (b) negative affect. *SD* = Standard deviation.

occasions when participants reported relatively higher present-moment attention, levels of positive affect on average remained relatively high and stable, irrespective of whether an uplift was reported. However, on occasions when present-moment attention was low, positive affect tended to be higher in the context of a concurrent uplift. Thus, somewhat contrary to predictions, higher-than-usual present-moment attention appeared to reflect moments of general positivity and provided a context for positive affect in the absence of an uplift, but no further boost to positive mood when an uplift did occur.

While there was no evidence of a significant interaction between nonjudgmental acceptance and uplifts in relation to positive affect, a complementary pattern to the present-moment attention x uplift interaction reported above was observed for negative affect (see Table 3.5, Model 2; and Figure 3.3). That is, on occasions when participants reported relatively higher nonjudgmental acceptance, levels of negative affect on average remained relatively low and stable, irrespective of whether an uplift occurred. However, on occasions

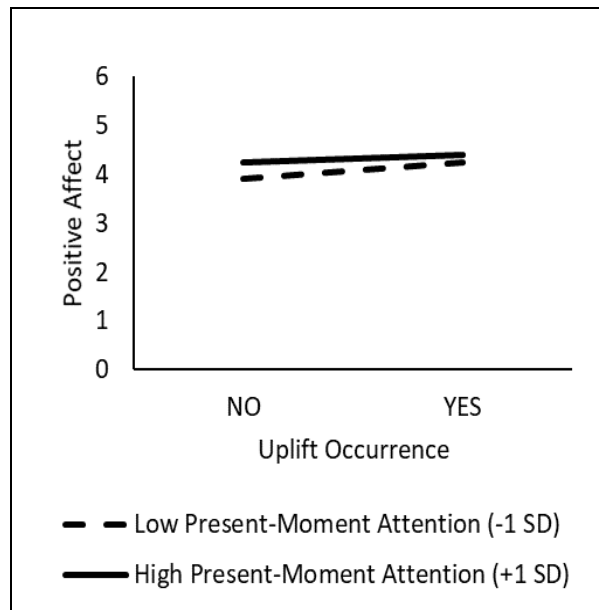


Figure 3.2. Present-moment attention as a moderator of associations between uplift occurrence and positive affect. *SD* = Standard deviation.

when nonjudgmental acceptance was low, negative affect tended to be lower when a concurrent uplift was reported. Thus, for negative affect, higher-than-usual nonjudgmental acceptance appeared to be linked with low negativity in general but was not associated with further reductions in negative mood when an uplift occurred.

3.4.4 Age and Future Time Perspective as Moderators of Relationships Between State Mindfulness and Affective Reactivity

Our final predictions were that the moderating role of mindfulness for affective reactivity described above would become stronger with age; and that positive relations between present-moment attention and uplift-related (positive) affect would be stronger among those with a more limited future time perspective. Of central interest in the present study, three-way interactions indicated that the extent to which WP nonjudgmental acceptance moderated associations of WP hassle occurrence with affect varied as a function of age (see Tables 3.4 and 3.5, Model 3). Figure 3.4 provides an illustration of these subtle

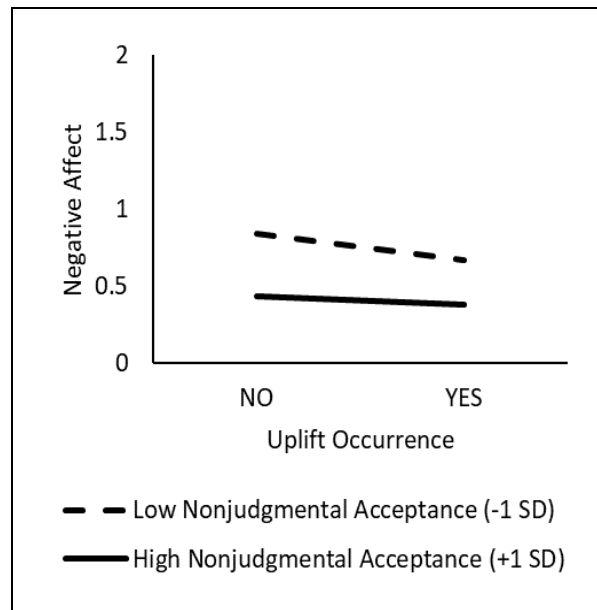


Figure 3.3. Nonjudgmental acceptance as a moderator of associations between uplift occurrence and negative affect. *SD* = Standard deviation.

relationships. Here, in line with predictions, the moderating effect of higher-than-usual nonjudgmental acceptance in the context of hassle occurrence was greater for participants who were relatively older (i.e., one standard deviation above the sample mean age), compared with those who were younger. That is, relative to younger participants, older participants who experienced a hassle and higher-than-usual nonjudgmental acceptance in tandem on a given occasion, reported both smaller reductions in positive affect (see Figure 3.4 a & b) and smaller increases in negative affect (Figure 3.4 c & d). Thus, we found evidence that the moderating effect of nonjudgmental acceptance on the association of hassles with affect across the whole sample (see Figure 3.1), was somewhat more evident at older ages (Figure 3.4 b & d) and less evident at younger ages (Figure 3.4 a & c).

As can be seen in Table 3.5 (Model 3; see also Figure 3.5) another significant three-way interaction emerged between future time perspective, present-moment attention, and uplift-related negative affect (but not positive affect). Here, among participants with a

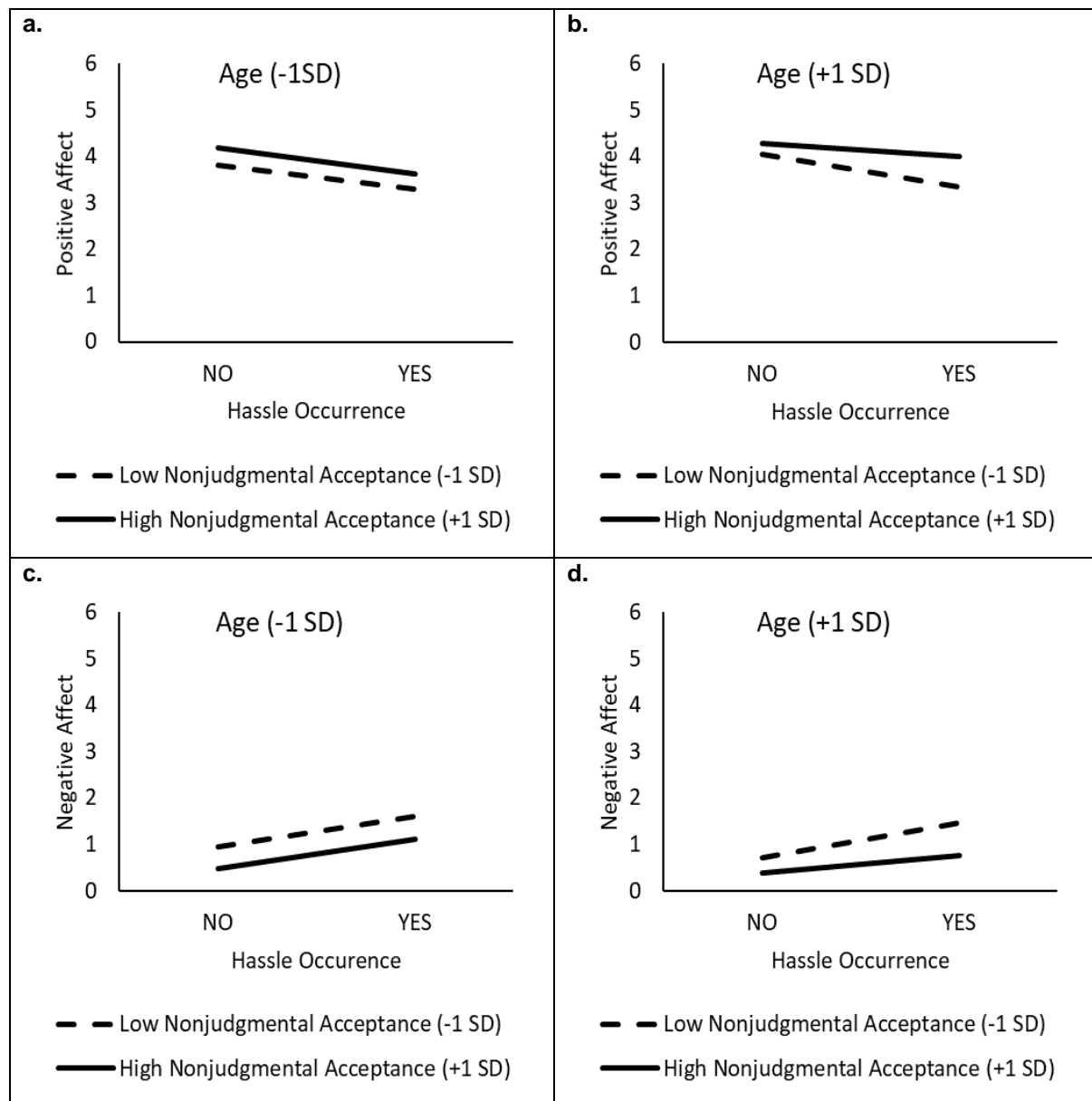


Figure 3.4. Age as a moderator of associations between nonjudgmental acceptance, hassle occurrence, and positive affect (a & b) and negative affect (c & d). *SD* = Standard deviation.

relatively more open-ended sense of future time, negative affect tended to remain low and stable irrespective of uplift occurrence, if present-moment attention was also relatively higher on those occasions. In contrast, participants with a more limited future time perspective appeared to experience some benefits to affective well-being (i.e., slightly lower negative affect) on occasions when both present-moment attending was higher-than-usual and an uplift

occurred; although this effect was small and driven by relatively higher negative affect in the absence of an uplift for those with lower future time perspective and higher momentary present-moment attention.

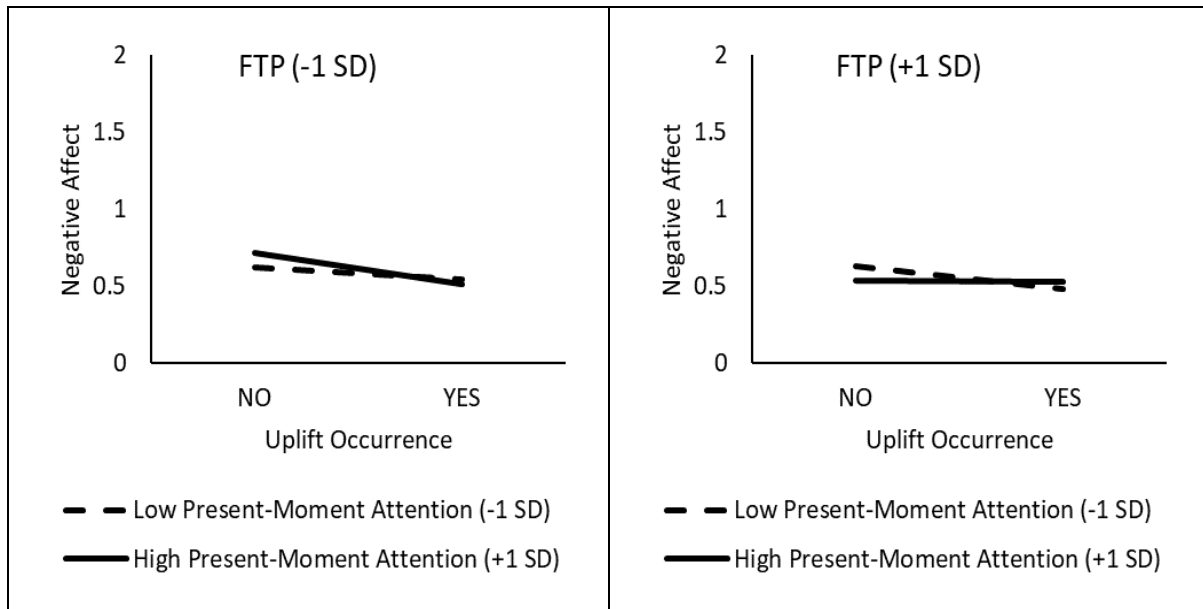


Figure 3.5. Future time perspective (FTP) as a moderator of associations between present-moment attention, uplift occurrence, and negative affect. *SD* = Standard deviation.

3.5 Discussion

To our knowledge, the present study is the first to use micro-longitudinal methods to examine links between state-level mindfulness facets and affective well-being in the everyday lives of late middle-aged to older adults. Below, we discuss our findings regarding (1) the predictive value of state mindfulness for momentary positive and negative affect, (2) state mindfulness as a potential buffer/booster for affective response to daily hassles and uplifts, and (3) the role of age and future time perspective in moderating relationships between state mindfulness and affective reactivity. In sum, the state mindfulness-facets present-moment attention and nonjudgmental acceptance were predictive of greater affective

well-being for adults in later midlife and older adulthood. Furthermore, nonjudgmental acceptance appeared to moderate affective reactivity to daily hassles, and importantly, this effect was stronger at older ages. However, mindful states did not appear to provide any further boost to uplift-related mood.

3.5.1 Relationships Between State Mindfulness Facets and Affective Well-Being Among Middle-Aged and Older Adults

Regarding relationships between the different mindfulness facets and affective well-being, our results indicated that higher states of both present-moment attention and nonjudgmental acceptance (but not acting with awareness) were uniquely predictive of higher-than-usual momentary positive affect. Likewise, between-person associations showed that greater use of present-moment attention and nonjudgmental acceptance on average was also associated with higher average positive affect. Consistent with Blanke et al. (2018), higher states of nonjudgmental acceptance emerged as the strongest predictor of lower-than-usual negative affect. Similarly, only higher use of nonjudgmental acceptance on average was found to be associated with negative affect. Overall, of the three state mindfulness facets, nonjudgmental acceptance appeared to be the most robust predictor for both positive and negative affect in the current sample (although present-moment attention was also a relatively strong predictor of positive affect).

As expected, and consistent with Blanke et al. (2018), nonjudgmental acceptance was found to moderate affective reactivity to hassles. That is, when a hassle was reported, participants were less likely to experience a decrease/increase in positive/negative affect when they also reported a relatively higher level of nonjudgmental acceptance. Of central interest in the present study, this moderating effect was found to be enhanced for older participants within the current sample. Here, relatively older participants (compared to young-old participants) experienced less affective reactivity (i.e., less reduced positive affect

and less increased negative affect) on occasions when adopting higher-than-usual nonjudgmental acceptance in the context of a hassle. In other words, the moderating effect of nonjudgmental acceptance on the association of hassles with affect was somewhat more evident at older ages and less evident at younger ages. This finding extends prior research with younger populations at both the dispositional (e.g., Ciesla, Reilly, Dickson, Emanuel, & Updegraff, 2012; Feldman et al., 2016) and state level (Blanke et al., 2018), and highlights how adopting a non-evaluative and accepting orientation toward momentary experiences may be a particularly efficacious strategy for older adults' emotional well-being (Mahlo & Windsor, 2020b). It may be that in the context of global events such as the COVID-19 pandemic (during which our data were collected), older adults' capacity to view potentially uncontrollable and ever-changing events with greater equanimity represents an effective coping strategy that can reduce threat-perception and rumination and facilitate well-being (Blanke et al., 2020; Polizzi, Lynn, & Perry, 2020). More generally, momentary nonjudgmental acceptance may be a readily accessible psychological resource that can effectively buffer the adverse effects of unavoidable stress exposure for older adults' emotional well-being (Charles, 2010; Wrzus et al., 2013). Importantly, lower stress reactivity in daily life is predictive of better health and well-being and longevity (Charles, Piazza, Mogle, Sliwinski, & Almeida, 2013; Mroczek et al., 2015; Piazza, Charles, Sliwinski, Mogle, & Almeida, 2013; Sin, Graham-Engeland, Ong, & Almeida, 2015).

The present study also provided the first known examination of associations between state mindfulness facets, uplifts, and affect among later middle-aged and older adults. Our findings pointed to occasions of relatively high present-moment attending being linked with higher positive affect irrespective of uplift occurrence. In contrast, occasions of comparatively low present-moment attention were characterised by slightly lower positive affect in the absence of an uplift. This finding indicates that present-moment attention could

potentially facilitate positive emotions regardless of whether overtly pleasant events occur. However, on occasions when an uplift is experienced, greater attending to the present-moment might not promote any further uplift-related boost to mood. A complementary pattern was observed for negative affect where occasions of relatively high nonjudgmental acceptance were associated with low and stable negative affect irrespective of uplifts; whereas occasions of comparatively low nonjudgmental acceptance were characterised by slightly higher negative affect in the absence of uplifts. Hence, greater nonjudgmental acceptance appeared to be associated with an overall protective effect for negative mood, but no additional uplift-related benefit.

Taken together, these findings point to the possibility that mindful states provide general mood enhancing effects in later adulthood, but do not amplify benefits to mood associated with pleasant experiences. Offering some indirect support for this notion, prior research has demonstrated that trait mindfulness is associated with attenuated neural reactivity to high arousal pleasant stimuli (Brown, Goodman, & Inzlicht, 2013). Furthermore, in an analysis of six experience-sampling and daily diary studies, Grosse Rueschkamp, Kuppens, Riediger, Blanke, and Brose (2020) found that people with relatively higher levels of well-being profited less from positive events compared to those who reported lower levels of well-being. The authors concluded that positive events may serve as potential mood brighteners in the particular context of lower well-being. Perhaps the same is true for mindfulness where greater affective responsiveness to uplifts is more likely during occasions characterised by relatively low present-moment attending (for positive affect) and nonjudgmental acceptance (for negative affect). One possible explanation for the observed link between mindfulness (i.e., present-moment attention and nonjudgmental acceptance) and more positive mood irrespective of reported uplifts could be that both trait and state mindfulness are associated with a broader savouring of life in general (and hence more stable

and enhanced mood) as opposed to cognitions and behaviours that serve to amplify momentary positive mood in the context of pleasant occurrences (Garland et al., 2015; Grosse Rueschkamp et al., 2020).

We also found evidence of a moderating role of future time perspective in associations between present-moment attention, uplifts, and negative affect. For individuals with a more open-ended future time perspective, occasions of higher-than-usual present-moment attention were linked with relatively low and stable negative affect, irrespective of uplift occurrence. However, when individuals who perceived time remaining as more limited reported relatively high present-moment attention, negative affect appeared to be somewhat higher in the absence of an uplift. A potential explanation for this (subtle) finding is that having a more expansive future time perspective reflects a more optimistic disposition in general (Windsor, Fiori, & Crisp, 2012), and for such individuals, higher-than-usual present-moment attending intensifies appreciation for life and its possibilities, resulting in slightly less negative mood regardless of whether overtly pleasant events are occurring.

3.5.2 Limitations and Future Directions

Our results should be considered with several limitations in mind. First, the experience-sampling study design required participants to be smartphone owners; thus, our Australian sample of people in late midlife to older adulthood may not be representative of older adults in the general population, particularly as smartphone users are more likely to be young-old adults with higher educational attainment and affluence (Pew Research Center, 2017). While our sample average age was 69 years, participants were mostly female, Caucasian, and recruited online. Furthermore, due to the broad age span (53–86 years), some participants may have been experiencing comparatively different life contexts and associated developmental demands (e.g., related to health, family, and/or employment), particularly within the context of COVID-19. Here, although daily life was disrupted at the time of the

study, compared to other parts of the world, Australia had experienced less dire consequences as a result of the pandemic (i.e., lower infection rates and associated fatalities; Australian Government Department of Health, 2020). Notably, the present sample tended to report higher average levels of mindfulness (difference: 0.7–1 units) and positive affect (difference: 1.2 units), and lower levels of negative affect (difference: 0.8 units), than Blanke et al.'s (2018) sample of university students (aged 20–30 years). On average, unpleasant experiences (hassles) were only reported on 9% of response occasions, while uplifting experiences were reported on 50% of occasions. Thus, despite COVID-19, these findings were consistent with previous research showing beneficial associations between age and mindfulness, affective well-being, stressor exposure, and positive event occurrence (Carstensen et al., 2011; Mahlo & Windsor, 2020b; Mroczek & Almeida, 2004; Sin, Graham-Engeland, & Almeida, 2015; Sin, Ong, Stawski, & Almeida, 2017). In particular, our participants' reports of fewer hassles compared with uplifts (on average) is consistent with literature outlining age-related response biases such that with increasing age, negative experiences are actively avoided (as in SAVI) and positive experiences may be more salient for maintaining emotional well-being (as in SST; Charles & Carstensen, 2014).

Our use of experience-sampling methodology and intensive repeated assessments within older individuals' everyday lives provided high ecological validity, minimised retrospective biases, and is a major strength of the present study (Mehl & Conner, 2012). Furthermore, the high number of measurement occasions contributed to a nuanced understanding of the relationships between state mindfulness, daily events, and affective experience, while controlling for time-related trends (e.g., across occasions, days, and weekends). Nevertheless, a second limitation is that the nature of the data is correlational meaning we cannot directly determine the temporal development of mindfulness and affect. Previous research has demonstrated how increased mindfulness appears to precede improved

affect during mindfulness-based treatment, rather than mindfulness being a product of improved mood (Snippe et al., 2015). In contrast, mutual enhancement of both mindfulness and positive affect in ‘upward spirals’ has been demonstrated within the context of a single-group mindful walking intervention (Gotink et al., 2016). Most likely, there is a reciprocal relationship between mindfulness and well-being that can be examined further via experimental time-lagged study designs (e.g., Donald et al., 2016; Van der Gucht et al., 2019) to enable more robust conclusions regarding dynamic temporal sequencing.

Third, we used a relatively new measure of state mindfulness- comprising three facets- that might not represent the full range of mindfulness dimensions (Blanke & Brose, 2017). Certainly, additional components that could be integral to mindfulness have been identified, including non-avoidance, decentering, and insight (e.g., Bergomi, Tschacher, & Kupper, 2013a, 2013b; Soler et al., 2014). Defining and conceptualising the complex construct of mindfulness (as a trait, state, and target for intervention) is an open and evolving area of enquiry (Grossman, 2019).

Finally, consistent with existing knowledge of ageing (Carstensen et al., 2011; Charles & Carstensen, 2014), our sample of older adults reported relatively high affective well-being, low affective variability, and low stressor occurrence, contributing to small effects. However, our relatively large sample in the context of micro-longitudinal studies provided enough power to detect reliable (if subtle) age-related patterns in the buffering effects of nonjudgmental acceptance for stress-affect coupling. Nevertheless, future research should determine whether the findings are replicable for older individuals who may be experiencing more frequent stress exposure and/or higher levels of negative affect (e.g., related to chronic illness or caregiving demands). Moreover, in the present study, hassle/uplift occurrence was assessed via a single dichotomous item. Thus, future research could extend the present findings by considering different types of pleasant/unpleasant

events, particularly as older adults may exhibit differential responding according to event domain (e.g., interpersonal vs. more general; Luong & Arredondo, 2019). Future studies might also use experience-sampling methodology to investigate relationships between older adults' state mindfulness and hassle/uplift-affect coupling (a) across multiple phases, to determine longer-term trajectories (Almeida, Piazza, Stawski, & Klein, 2011); and (b) in response to mindfulness-based training, to ascertain practice-related effects.

So far, a nascent body of research has demonstrated that mindfulness-based interventions are both acceptable and feasible for older adults and can potentially offer well-being benefits (Geiger et al., 2016; Mahlo & Windsor, 2020a). Preliminary evidence also suggests that mindfulness-based techniques can improve depressive symptomatology and subjective well-being in the specific context of informal caregiving in older adulthood (Cheng et al., 2020). However, specific improvements in mindful attributes and skills are often not evident, either due to not being assessed or non-significant findings (see Cheng et al., 2020; Geiger et al., 2016). One consideration is that age-related increases in mindfulness may preclude potential gains in this domain due to ceiling effects (Geiger et al., 2016). Thus, an interesting question for future research involves the extent to which mindful traits and states can be further cultivated for older individuals who may have naturally become more mindful with ageing (Mahlo & Windsor, 2020a, 2020b).

3.5.3 Conclusions

The present study contributes new knowledge regarding intra-individual variability in mindful states and affective well-being across the second half of the lifespan. The findings suggest that occasions characterised by relatively high present-moment attention and nonjudgmental acceptance may contribute to greater emotional well-being in later midlife and older adulthood. Furthermore, adopting a nonevaluative and accepting orientation toward momentary experiences is a psychological strategy that appears to have potential utility for

mitigating emotional reactivity to daily stressors at older ages. Mindful states did not, however, appear to provide any additional uplift-related brightening of mood. Overall, our findings suggest that mindfulness in everyday life represents the use of attentional and cognitive strategies that may align well with ageing-related strengths and capacities, and could become increasingly important for down-regulating momentary negative mood states in later adulthood. Future research should examine associations of multidimensional state mindfulness, daily events, and affective well-being for older adults deliberately undertaking mindfulness-based practices.

Prologue to CHAPTER 4

The results of the previous studies in this thesis revealed that (a) certain mindful characteristics (e.g., attending to the present-moment and adopting a nonjudgmental orientation toward experiences) may become especially important for adaptation and well-being across the second half of life (Mahlo & Windsor, 2020b); and (b) moments characterised by higher-than-usual nonjudgmental acceptance appear to provide a buffer against detrimental affective responding to hassles in daily life, and that this effect becomes stronger at older ages (Mahlo & Windsor, in press). These findings suggest that interventions designed to facilitate mindfulness skills could be particularly efficacious for enhancing well-being for older adults.

Building on these findings, the final study of the thesis (viz., Mahlo & Windsor, 2020a) investigated the feasibility, acceptability, and preliminary efficacy of an app-based mindfulness-meditation program among community-based older adults. In the first known study of its kind, older participants (aged 63 to 81 years) participated in a 30-day app-based mindfulness-meditation program for 10-minutes daily on their smartphones and completed repeated measures of mindfulness, emotional well-being, and life satisfaction across the study interval. Furthermore, the effects of both participants' attitudes toward smartphones and their level of engagement with the program (i.e., frequency and duration of app-use) on mindfulness and well-being were examined. Older users' evaluations of meditation in general and the app-based program in particular were also obtained.

A few months after completion of this study, the COVID-19 pandemic of 2020 caused unprecedented societal restrictions on mobility across the entire globe, with unique impacts for older adults due to perceptions of heightened physical vulnerability to the virus. With much of the world practising physical distancing and encouraged to remain homebound as

much as possible, this timely study investigating digitally delivered mindfulness for older adults increased significantly in both relevance and importance.

CHAPTER**4****FEASIBILITY, ACCEPTABILITY, AND PRELIMINARY
EFFICACY OF AN APP-BASED MINDFULNESS-
MEDITATION PROGRAM AMONG OLDER ADULTS**

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Author Contributions

LM contributed 75% and TDW contributed 25% to the research design, data collection and analysis, and writing and editing of the manuscript, respectively.

4.1 Abstract

Background and Objectives: Few studies have focused on the utility of mindfulness-meditation for well-being in older adults. The present study investigated the feasibility, acceptability, and preliminary efficacy of an app-based mindfulness-meditation program among older adults. **Research Design and Methods:** A community-based sample of 46 participants aged between 63 and 81 ($M = 70.85$, $SD = 4.70$) engaged with a 30-day app-based mindfulness-meditation program for 10-minutes daily on their smartphones. Each meditation session comprised focusing on the breath, mentally scanning the body, monitoring the mind's activity, and cultivating a nonjudgmental orientation toward experiences. Participants completed questionnaires at baseline, day 10, and day 30. **Results:** On average, participants completed 25 sessions and almost 4-hours of application use across the 30-days. Results of linear mixed effects models showed significant improvements in positive affect, negative affect, and life satisfaction across the study interval, but no meaningful change in total mindfulness or perceived stress. Furthermore, relative to high levels of smartphone efficacy, low smartphone efficacy was associated with higher perceived stress and negative affect, and less life satisfaction at baseline; and steeper improvements on these outcomes across the study interval. On average, older adults rated the app-based mindfulness-meditation training as interesting, enjoyable, valuable, and useful. **Discussion and Implications:** The findings provide preliminary support for the feasibility and acceptability of an app-based mindfulness-meditation program with community-dwelling older adults and demonstrate potential benefits for well-being. Results suggest the value of further research investigating the efficacy of digital mindfulness-meditation interventions for older adults via larger randomised-controlled trials.

Keywords: digital interventions; attitudes toward smartphones; well-being

4.2 Background and Objectives

While empirical research investigating the effects of meditation across the lifespan is gaining interest, relatively few studies have focused on the utility of mindfulness-meditation in older adulthood (Geiger et al., 2016). Furthermore, existing studies with older adults have mainly focused on outcomes related to psychopathology as opposed to well-being (Geiger et al., 2016). The present study assessed the feasibility, acceptability, and preliminary efficacy of an app-based mindfulness-meditation training program for well-being among community-dwelling older adults.

4.2.1 Mindfulness-Meditation and Adaptive Ageing

Contemporary conceptualisations of mindfulness refer to a natural human quality of awareness and ability to pay attention to the present moment in an intentional and nonjudgmental way (Kabat-Zinn, 1990). Mindfulness-meditation is a formal practice which serves to cultivate and facilitate this attentive and aware state of mind. Meditation involves focusing on a chosen object of attention (e.g., the breath) while maintaining an open, accepting, and observant attitude toward whatever thoughts and feelings arise.

Mindfulness-meditation may offer unique potential for supporting affective well-being in later life. As outlined by Mahlo and Windsor (2020b), mindfulness-meditation may require relatively modest physiological and cognitive resources, and at the same time capitalises on age-related regulatory strengths. In summary, the fundamental principle in meditation of focusing attention on immediate experience is consistent with the normative tendency of older adults to be more present-moment oriented (see *Socioemotional Selectivity Theory*; Carstensen, 2006). As older adults may be vulnerable to heightened physiological arousal and decreased well-being in response to unavoidable stressors (see *Strength and Vulnerability Integration*; Charles, 2010), the capacity to adopt a nonjudgmental and non-evaluative attitude toward *any* experience may provide an effective strategy for managing

prolonged and potentially aversive experiences (e.g., chronic illness). Older adults appear to preference low-arousal positive states that provide a sense of calm and relaxation over high-arousal states such as excitement and exhilaration (Scheibe et al., 2013). Therefore, the practice of mindfulness-meditation may be inherently appealing to older adults given that it is commonly reported to invoke experiences of calm and contentment (e.g., Lomas et al., 2016).

Mindfulness-meditation appears to be an acceptable form of training in older adulthood (Geiger et al., 2016). Moreover, there is promising evidence for the beneficial effects of mindfulness-based practices on older adults' psychological functioning including reduced symptoms of anxiety, depression, stress, and insomnia, and increased pain acceptance (for reviews, see Fountain-Zaragoza & Prakash, 2017; Geiger et al., 2016; Hazlett-Stevens et al., 2019; Klimecki et al., 2019). So far, these conclusions are considered preliminary due to the relatively small body of literature and methodological limitations, including inconsistent protocols and high attrition within small samples (Geiger et al., 2016; Klimecki et al., 2019). Also, to date, few studies have focused on outcomes directly assessing older adults' emotional well-being following meditation training (as opposed to psychopathology: Geiger et al., 2016; Klimecki et al., 2019). Furthermore, in most studies with older adults to date, meditation is one aspect of a more comprehensive intervention (e.g., Mindfulness-Based Stress Reduction [MBSR]; Kabat-Zinn, 1990) that incorporates additional elements such as psychoeducation and social support (though for an exception, see Teixeira, 2010). Thus, it is difficult to ascertain the effects of meditation per se, as distinct from the influence of non-meditation specific factors (Geiger et al., 2016).

4.2.2 App-Based Mindfulness-Meditation Training

The increasingly widespread use of electronic devices (e.g., smartphones) together with the advance of application technology (i.e., "apps") has provided a new and unprecedented platform for the delivery of meditation training. Advantages of digitally

delivered mindfulness-based practice include enhanced dissemination within the general community and flexible access for participants at a time and place of their choosing.

Research is now showing that digital mindfulness-based interventions (i.e., delivered via smartphone applications and web-based platforms) can produce meaningful improvements in relation to attention, stress, depression, and anxiety (Mrazek et al., 2019). Uptake of digital technology continues to increase among older adults. In the United States, 42% of older adults own a smartphone (Pew Research Center, 2017), and rates of smartphone use are higher in Australia (the setting of the present study) where 88% of adults aged 18–75 and 78% of 65–75 year olds report ownership (Deloitte, 2017).

In an evaluation of available mindfulness-based apps, *Headspace* (www.headspace.com) was rated as the most high-quality and easy-to-use with high scores on engagement, functionality, visual aesthetics, information quality, and user satisfaction (Mani et al., 2015). The Headspace training program is used by millions of people worldwide and consists of audio-guided meditation sessions together with short animated videos illustrating the key concepts of mindfulness and meditation. With a relatively small time commitment of 10 minutes per day, the Headspace training is designed to be easily integrated within users' daily routines.

A growing number of randomised controlled trials have demonstrated that the Headspace meditation program can produce significant improvements in various aspects of psychosocial well-being and behaviour (e.g., Bennike et al., 2017; Champion et al., 2018; Economides et al., 2018; Flett et al., 2019). However, we are aware of just two studies using Headspace that have included participants aged 65 and over. Rosen et al., (2018) reported improved quality of life for a sample of breast cancer patients (aged 25–70+) following 4–8 weeks of use; and Kubo et al. (2018) demonstrated reduced distress and greater quality of life for a sample of cancer patients and their caregivers (aged 38–78) after 8 weeks of use.

Research focusing on use of the Headspace training-program with non-clinical community-dwelling older adults is needed.

4.2.3 The Present Study

The overarching aim of this study was to investigate the preliminary efficacy and acceptability of app-based mindfulness-meditation training with community-dwelling older adults, via a single-group 30-day pilot intervention. It was hypothesised that older adults who participated in the Headspace meditation program would demonstrate increased levels of mindfulness, emotional well-being (including lower perceived stress and negative affect, and higher positive affect), and life satisfaction over a 30-day period. We also explored whether individual differences such as participants' attitudes toward smartphones and/or frequency and duration of application use (an index of study compliance and 'dose' of meditation undertaken) predicted rates of change across the study interval. Moreover, in addition to assessing within-person changes in the outcome measures described above, the acceptability and usability of the brief daily intervention among community-dwelling older adults was ascertained by examining participants' responses to the program. In particular, we examined objective usage data indicating frequency and duration of meditation sessions; responses on a standardised measure of intrinsic motivation for meditation at study completion; and evaluations of the Headspace program via questions used in previous studies (see Mistler et al, 2017).

4.3 Research Design and Methods

4.3.1 Participants

A community-based sample of 52 participants was recruited via distribution of the study advertisement to an email database of older adults who had previously registered an interest in research participation with our research lab, and through an eBulletin circulated to members of the University of the Third Age (Canberra). Eligibility criteria required

participants to be (a) aged 60 and over, (b) English fluent, and (c) smartphone owners. Exclusion criteria were previous engagement with mindfulness and/or meditation for more than 20 minutes in the past 6 months, and prior use of the Headspace application. Participants were also screened for cognitive impairment following enrolment into the study (see below). Three participants withdrew from the study prior to commencing the Headspace program due to a change in life circumstances (2) or non-response (1). Another three participants' application use data was unavailable due to Headspace code activation issues (2) or a decision to meditate without the app (1). The final sample consisted of 46 participants aged between 63 and 81 ($M = 70.85$, $SD = 4.70$, 89.1% female). Demographic characteristics are provided in Table 4.1.

4.3.2 Procedure

Following approval by the Institutional Ethics Committee, an invitation to participate in research involving 'Mindfulness-Meditation in Older Adulthood' was circulated to prospective participants. Interested individuals were provided with the contact details of the researchers, and a link to an online landing page via a secure survey platform (Qualtrics) where they were presented with study information, answered eligibility questions, and provided informed consent. Eligible participants were contacted by telephone and completed the Memory Impairment Screen (MIS-T; Lipton et al., 2003). No participants scored below the recommended cut-off for potential dementia. Participants next received an email invitation to complete an online baseline psychosocial questionnaire (via Qualtrics), followed by another email with written instructions for downloading and accessing the Headspace meditation application (via a unique participation code) and for contacting Headspace technical support. Here, participants were encouraged to complete their first meditation within 24 hours and to aim for 10 minutes of meditation daily. While the application includes an option for users to enable daily reminder notifications, participants did not receive any

Table 4.1

Demographic Characteristics of 'Mindfulness-Meditation in Older Adulthood' Participants

Characteristics		<i>N</i> = 46
Age (Years)	Mean (<i>SD</i>)	70.85 (4.70)
Gender (<i>n</i> , %)	Female	41 (89.1%)
	Male	5 (10.9%)
Ethnicity ^a (<i>n</i> , %)	Caucasian/White	46 (100.0%)
	Indian	1 (2.2%)
Education (<i>n</i> , %)	Did not complete High School	2 (4.3%)
	Completed High School or Equivalent	3 (6.5%)
	Some College or Tertiary	20 (43.5%)
	Bachelor's Degree	17 (37.0%)
	Postgraduate Degree	4 (8.7%)
Relationship Status (<i>n</i> , %)	Single (never married)	1 (2.2%)
	Married/Domestic Partnership	25 (54.3%)
	Divorced	15 (32.6%)
	Widowed	5 (10.9%)
Employment Status (<i>n</i> , %)	Full-Time Employment	2 (4.3%)
	Part-Time Employment	4 (8.7%)
	Casual Employment	6 (13.0%)
	Student	1 (2.2%)
	Retired	33 (71.7%)

^a Respondents could choose multiple categories.

instruction regarding this. There was no training provided and no further phone contact with participants, except for occasional enquiries regarding difficulties with the study code activation process. The Headspace program begins with 10 introductory sessions ("Basics") which are 'unlocked' progressively and is followed by two further programs of 10-sessions each ("Basics 2 and 3"). This series is complemented with access to a range of additional meditations and instructional videos. Each meditation session comprises focusing on the breath, body scanning, monitoring the mind's activity, and cultivating a nonjudgmental orientation. Participants received email invitations to complete online follow-up

questionnaires on days 10 and 30 of their participation. On study completion, participants were given a further 2-month subscription to the Headspace application (valued at approximately \$38 AUD) as compensation.

4.3.3 Measures

Mindfulness. Mindfulness was measured using the Five-Facet Mindfulness Questionnaire – Short Form (FFMQ-SF; Baer et al., 2006; Bohlmeijer et al., 2011). This 24-item scale assesses five facets of mindfulness: Observing, Describing, Acting with Awareness, Nonjudgment, and Nonreactivity. Items are rated on 5-point scales (1 = *never or very rarely true*, 5 = *very often or always true*) and summed to obtain a unidimensional mindfulness score and five separate facet-scores. Higher scores indicate greater mindfulness. In the present study (at baseline), internal consistency was .86 for unidimensional mindfulness, and .74–.92 for the five facets.

Perceived Stress. Perceived stress was measured by the 10-item Perceived Stress Scale (PSS-10; Cohen & Williamson, 1988), which assesses the extent to which individuals appraise situations in their life as stressful. Due to our repeated assessment protocol, the PSS-10 was adapted from assessing “the last month” to “the last week”. Items assess how unpredictable, uncontrollable, and overloaded respondents perceived their life to be. Responses are rated on 5-point scales (0 = *never*, 4 = *very often*) and summed. Higher scores indicate greater perceived stress. ($\alpha = .93$).

Positive and negative affect. Affective experience was measured by the Scale of Positive and Negative Experience (SPANE; Diener et al., 2010). This 12-item scale assesses a broad range of positive and negative feelings. In the present study, the time-frame for the SPANE was adapted from “the past four weeks” to “the past week”. Items (e.g., “Happy”, “Sad”) are rated on 5-point scales (1 = *very rarely or never*, 5 = *very often or always*) based on the amount of time each was experienced during the past week. Separate summed scores

are produced for both positive (SPANE-P) and negative (SPANE-N) feelings, with higher scores indicating more positive/negative feelings. ($\alpha = .94$ and $.87$ for the SPANE-P and SPANE-N, respectively).

Life satisfaction. The Satisfaction with Life Scale (SWLS; Diener et al., 1985) includes five statements regarding participants' experiences in life. Responses are made on 7-point scales (1 = *strongly disagree*, 7 = *strongly agree*) and summed. Higher scores reflect higher life satisfaction. ($\alpha = .86$).

Attitudes toward smartphones. Attitudes toward smartphones were measured by an adapted version of the Attitudes Toward Computer Use Questionnaire (ATCQ; Jay & Willis, 1992). Following Lee et al. (2019), the Comfort (5-items), Efficacy (5-items), and Interest (4-items) subscales were re-worded for use in the current study (i.e., the word 'computer' was replaced by 'smartphone'). We also adapted the scale to be more culturally relevant (i.e., the word "dumb" was replaced with "incapable"). Items were rated on 5-point scales (1 = *disagree strongly*, 5 = *strongly agree*) and summed to produce three separate scores. Higher scores reflect more positive attitudes ($\alpha = .91$, $.83$, and $.67$ for the Comfort, Efficacy, and Interest subscales, respectively).

Intrinsic motivation. The Interest/Enjoyment and Value/Usefulness subscales of the Intrinsic Motivation Inventory (IMI; Ryan, 1982) were used to measure participants' subjective experience of the mindfulness-meditation training. These two 7-item subscales assessed participants' intrinsic motivation for engaging with mindfulness-meditation, and its perceived value and usefulness, respectively. Items were rated on 7-point scales (1 = *not at all true*, 7 = *very true*) and scores averaged for each of the subscales. Higher scores indicate greater interest/enjoyment and value/usefulness. Internal consistencies for the Interest/Enjoyment and Value/Usefulness subscales (at study completion) were $.95$ and $.99$, respectively.

Perceived difficulty. Perceived difficulty of mindfulness-meditation was assessed via a single item (i.e., “I found mindfulness-meditation difficult to complete”) rated on a 7-point scale (1 = *not at all true*, 7 = *very true*).

Acceptability and usability of the Headspace application/program. An adapted 20-item scale based on previous work evaluating the Headspace application (i.e., Mistler et al., 2017) was used to assess participants’ perceptions of app acceptability and usability. Items were rated on 5-point scales (1 = *strongly disagree*, 5 = *strongly agree*). The option to provide further information was also included via an open question (i.e., “Is there anything else you would like to tell us about your experience with mindfulness-meditation or the Headspace app/program?”).

Frequency and duration of application use. Objective data regarding participants’ application use was collected via the Headspace interface. This included unique study code activation dates; session dates and times, pack (e.g., “Basics”), name (e.g., “Session 1”), and duration (minutes); and the platform used (i.e., IOS, Android, or desktop). In the present study, we focused on the number of sessions and total minutes completed by participants over the 30-day study interval and whether participants followed the “Basics” program or engaged with extra/alternative content (coded 0 = Basics, 1 = extra/alternative content).

Covariates. Age, gender (0 = male, 1 = female), education (coded 0 = no tertiary degree, 1 = tertiary degree), and health status were controlled for due to empirically established associations with mindfulness (e.g., Baer et al., 2008; Mahlo & Windsor, 2020b) and/or well-being (Diener et al., 2017). Health status was assessed via the 10-item ‘Physical Functioning’ subscale of the RAND 36-Item Health Survey 1.0 (Hays et al., 1993; $M = 81.96$, $SD = 17.30$, with 100 representing optimum physical functioning).

4.3.4 Analytic Strategy

To assess changes in study outcomes, multilevel models with maximum likelihood estimation were used. This method provides the advantage of readily accommodating attrition and missing data under missing-at-random assumptions (Schafer & Graham, 2002). In the present sample, there were two missing values across the entire set of variables.

First, unconditional models (with repeated assessments at Level 1 nested within individuals at Level 2) were estimated to examine the within-person (Level 1) and between-person (Level 2) variance for each of the mindfulness and well-being outcomes. Results showed significant between-person (Range: 64.92–76.21%) and within-person (Range: 22.91–35.08%) variance for each of the mindfulness and well-being outcomes. We then fitted linear growth models using day-in-study (defined as days elapsed since baseline [day 0] at each assessment) as our index of time. Thus, the regression coefficient for day-in-study represents the sample average change in the dependent variable corresponding with a one-unit (one day) change over time. The random slope for day-in-study was tested for each outcome; where models did not achieve convergence or the likelihood ratio test did not indicate improved model fit, only the fixed effect for day-in-study was estimated (Singer & Willett, 2003).

We next included the covariates, attitudes toward smart phones, and Headspace engagement as predictors of the intercept and slope (i.e., interactions with day-in-study). After fitting the initial full models, we trimmed the predictors by progressively excluding non-significant predictors (beginning with higher order terms) to arrive at the most parsimonious model. The final model for each outcome comprised all remaining predictors and interaction terms significant at $p < .05$.

The proportion of variance accounted for in each model was estimated using pseudo- R^2 , representing the association between estimated predicted values and actual values (Singer

& Willett, 2003). Significant interactions were graphically illustrated by calculating trajectories for hypothetical individuals based on ± 1 standard deviations of the moderator (representing relatively high and low levels) and plotting across the study interval (i.e., Day 0-31). Due to variation in the timing of participants' final assessments, the sample mean of 30.80 days since first assessment was used. To further ensure significant interactions were not being driven by outliers, individual trajectories for separate groups based on a median split were generated and inspected (results available upon request). Prior to analysis, continuous predictor variables were grand-mean centered and outcome measures were standardised by transforming them to T-scores based on baseline means and standard deviations. Thus, allowing the interpretation of results according to metrics that are meaningful in effect size terms.

4.4 Results

Descriptive statistics and bivariate correlations for the key study variables are provided in Tables 4.2 and 4.3, respectively.

4.4.1 Headspace Application Use

Over the 30-day study period, participants completed an average of 24.57 Headspace sessions ($SD = 12.25$, Range = 2–61) and 234 minutes of application use ($SD = 165.76$, Range = 6–811), with 40 (87%) of the 46 study participants completing 10 or more sessions. (Five participants provided self-report frequency and duration data for the first week of their study participation due to Headspace code activation difficulties). Number of sessions and minutes completed was highly correlated, $r = .84$, $p < .001$. Twenty (43.5%) participants followed the Headspace “Basics” training program, while 26 (56.5%) participants engaged with extra/alternative Headspace content (e.g., themed meditations on ‘stress’ or ‘sleep’) either alongside ($n = 23$) or instead of following the “Basics” program ($n = 3$). Sample attrition was 2%, as all participants who initially engaged with the Headspace program

Table 4.2

Means (M) and Standard Deviations (SD) for the Key Study Variables at Baseline, Day 10, and Day 30

Variable	Range	Day 0	Day 10 ^a	Day 30 ^b
		<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
ATS–C	5–25	21.04 (3.81)	--	--
ATS–E	5–25	21.70 (2.86)	--	--
ATS–I	4–20	16.30 (2.12)	--	--
Mindfulness	24–120	83.15 (10.56)	82.15 (10.24)	84.41 (10.62)
ActAware	5–25	17.02 (3.58)	16.41 (2.88)	16.96 (3.18)
Nonjudgment	5–25	16.70 (4.43)	16.63 (4.71)	16.76 (4.25)
Nonreactivity	5–25	15.37 (3.57)	15.85 (3.03)	16.07 (2.71)
Observe	4–20	15.96 (2.60)	15.61 (2.51)	16.22 (2.77)
Describe	5–25	18.11 (2.91)	17.65 (2.99)	18.28 (3.14)
Perceived stress	0–40	14.43 (7.68)	14.33 (5.32)	13.54 (5.51)
Positive affect	6–30	21.91 (4.72)	22.89 (4.20)	23.43 (4.26)
Negative affect	6–30	12.57 (4.40)	11.48 (3.81)	10.96 (3.65)
Life satisfaction	5–35	23.80 (6.25)	24.59 (6.22)	25.17 (5.69)
Intrinsic Motivation				
Interest/Enjoyment	1–7	--	5.15 (1.36)	5.17 (1.43)
Value/Usefulness	1–7	--	5.39 (1.50)	5.47 (1.69)
Perceived Difficulty	1–7	--	2.67 (1.97)	2.61 (1.69)

Notes. $N = 46$. ATS–C = Attitudes toward smartphones–Comfort. ATS–E = Attitudes toward smartphones–Efficacy. ATS–I = Attitudes toward smartphones–Interest. ActAware = Acting with awareness.

^a $M_{Day10} = 9.72$ ($SD = 1.89$). ^b $M_{Day30} = 30.88$ ($SD = 3.66$).

Table 4.3

Pearson Correlations for the 'Mindfulness-Meditation in Older Adulthood' Study Variables at Baseline

Variable	Gender	Ed	Health	ATS-C	ATS-E	ATS-I	MFL	AA	NJ	NR	Obsv	Desc	PS	PA	NA	LS
Age	.004	-.10	-.06	-.39**	-.20	-.22	.05	.02	-.11	.01	.27	.08	-.06	.14	.09	.04
Gender		.04	.06	-.09	.14	.02	.17	-.10	-.04	.16	.40**	.23	-.08	.26	-.13	.35*
Ed			.04	-.08	.08	.01	-.02	-.06	.02	-.08	-.02	.07	-.21	.20	-.24	.40**
Health				.04	-.08	-.22	.04	.04	-.08	.08	.01	.11	-.09	.002	.003	.09
ATS-C					.55***	.59***	.33*	.19	.40*	.24	-.09	.14	-.24	.10	-.25	-.01
ATS-E						.56***	.25	.17	.27	.23	.06	-.03	-.27	.23	-.37*	.28
ATS-I							.08	-.11	.14	.11	.06	.01	-.10	.02	-.15	.06
MFL								.68***	.72***	.76***	.25	.55***	-.66***	.53***	-.59***	.23
AA									.57***	.24	-.23	.27	-.49**	.36*	-.43**	.02
NJ										.40**	-.23	.09	-.57***	.50**	-.50***	.20
NR											.39**	.29	-.48**	.27	-.45**	.19
Obsv												.19	.02	.08	-.04	.19
Desc													-.35*	.31*	-.25	.09
PS														-.78***	.88***	-.49**
PA															-.74***	.64***
NA																-.51***

Notes. Ed = Education. ATS-C = Attitudes toward smartphones-Comfort. ATS-E = Attitudes toward smartphones-Efficacy. ATS-I = Attitudes toward smartphones-Interest. MFL = Mindfulness (Total). AA = Acting with awareness. NJ = Nonjudgment. NR = Nonreactivity. Obsv = Observe. Desc = Describe. PS = Perceived stress. PA = Positive affect. NA = Negative affect. LS = Life satisfaction.

* $p < .05$. ** $p < .01$. *** $p < .001$.

provided data at day 10 and day 30, except for one person who elected to meditate without the app and did not complete the final assessment.

4.4.2 Mindfulness and Well-Being Outcomes Over the Study Interval

It was hypothesised that older adults who participated in the Headspace meditation program would demonstrate increased mindfulness and well-being over the 30-day study period. Table 4.4 presents the results of multilevel models for the respective outcomes. As predicted, on average, positive affect and life satisfaction increased by 0.32 *SD* and 0.22 *SD*, respectively; and negative affect decreased by 0.37 *SD* across the study interval. Contrary to predictions, there was no evidence of statistically reliable change for total mindfulness ($p = .107$) or perceived stress ($p = .161$). Supplementary results for facet-level mindfulness are provided below (see Section 4.4.4).

4.4.3 Attitudes toward Smartphones and Headspace Engagement as Predictors of Change in Mindfulness and Well-Being Outcomes

We next examined the role of individual difference predictors in accounting for levels and rates of change in mindfulness and well-being outcomes over the study interval. Here, predictors included attitudes toward smartphones, Headspace engagement (i.e., number of sessions and content), and covariates. Table 4.5 presents the results of the final models with significant predictors (after excluding non-significant predictors).

For the mindfulness model, one significant interaction emerged between smartphone interest and day-in-study (see Figure 4.1A). Here, only low smartphone interest was associated with an increase in mindfulness across the study interval (0.33 *SD*). That is, relative to older adults who reported more interest in smartphones, older adults with less interest in smartphones exhibited a steeper increase in mindfulness over the study interval.

Next, significant interactions emerged between smartphone efficacy and day-in-study for the outcomes of perceived stress, negative affect, and satisfaction with life. For both

Table 4.4

Multilevel Models (with Unstandardised Estimates and Standard Errors) for the Mindfulness and Well-Being Outcomes

	Mindfulness	Perceived stress	Positive affect	Negative affect	Life satisfaction
<i>Fixed effects</i>					
Intercept	49.56 (1.42) ^{***}	50.15 (1.14) ^{***}	50.48 (1.33) ^{***}	49.44 (1.27) ^{***}	50.17 (1.38) ^{***}
Day-in-study	0.04 (0.03)	-0.04 (0.03)	0.10 (0.03) ^{**}	-0.11 (0.03) ^{**}	0.07 (0.03) [*]
<i>Random effects</i>					
Level 2	76.57 (17.76) ^{***}	43.29 (10.81) ^{***}	66.75 (15.54) ^{***}	56.18 (13.67) ^{***}	72.05 (16.75) ^{***}
Level 1	22.47 (3.33) ^{***}	23.06 (3.42) ^{***}	20.35 (3.02) ^{***}	25.21 (3.74) ^{***}	21.80 (3.23) ^{***}
Pseudo- R^2 L2	< .001	< .001	< .001	< .001	0.17
Pseudo- R^2 L1	0.01	0.01	0.09	0.10	0.16

Notes. L2 = Level 2 (Between-person). L1 = Level 1 (Within-person). Random slopes were not estimated to enable convergence for all models.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4.5

Multilevel Models (with Unstandardised Estimates and Standard Errors) for the Mindfulness and Well-Being Outcomes as a Function of Day-in-Study, Attitudes Toward Smartphones, and Headspace Engagement

	Mindfulness	Perceived stress	Negative affect	Life satisfaction
<i>Fixed effects</i>				
Intercept	49.52 (1.35) ^{***}	50.17 (1.12) ^{***}	49.47 (1.22) ^{***}	46.91 (1.71) ^{***}
Day-in-study	0.04 (0.03)	-0.04 (0.03)	-0.11 (0.03) ^{**}	0.07 (0.03) [*]
Education	--	--	--	7.12 (2.50) ^{**}
ATS-C	1.10 (0.42) [*]	--	--	-0.57 (0.41)
ATS-E	--	-0.75 (0.40)	-1.21 (0.43) ^{**}	1.04 (0.55)
ATS-I	-0.67 (0.78)	--	--	--
HS Sessions	--	--	--	0.11 (0.11)
ATS-C x Day	--	--	--	0.02 (0.01) [*]
ATS-E x Day	--	0.02 (0.01) [*]	0.03 (0.01) [*]	-0.03 (0.01) [*]
ATS-I x Day	-0.03 (0.01) [*]	--	--	--
HS Sessions x Day	--	--	--	-0.004 (0.002) [*]
<i>Random effects</i>				
Level 2	68.81 (16.43) ^{***}	43.22 (10.85) ^{***}	52.31 (12.91) ^{***}	61.73 (15.14) ^{***}
Level 1	21.64 (3.23) ^{***}	22.23 (3.31) ^{***}	23.97 (3.57) ^{***}	19.92 (3.00) ^{***}
Pseudo- R^2 L2	< .001	< .001	0.05	< .001
Pseudo- R^2 L1	0.01	0.05	0.15	0.13

Notes. ATS-C = Attitudes toward smartphones-Comfort. ATS-E = Attitudes toward smartphones-Efficacy. ATS-I = Attitudes toward smartphones-Interest. HS = Headspace. L2 = Level 2 (Between-person). L1 = Level 1 (Within-person). Random slopes were not estimated to enable convergence for all models. Age, gender, and health status were non-significant predictors and not included in the final models.

* $p < .05$. ** $p < .01$. *** $p < .001$.

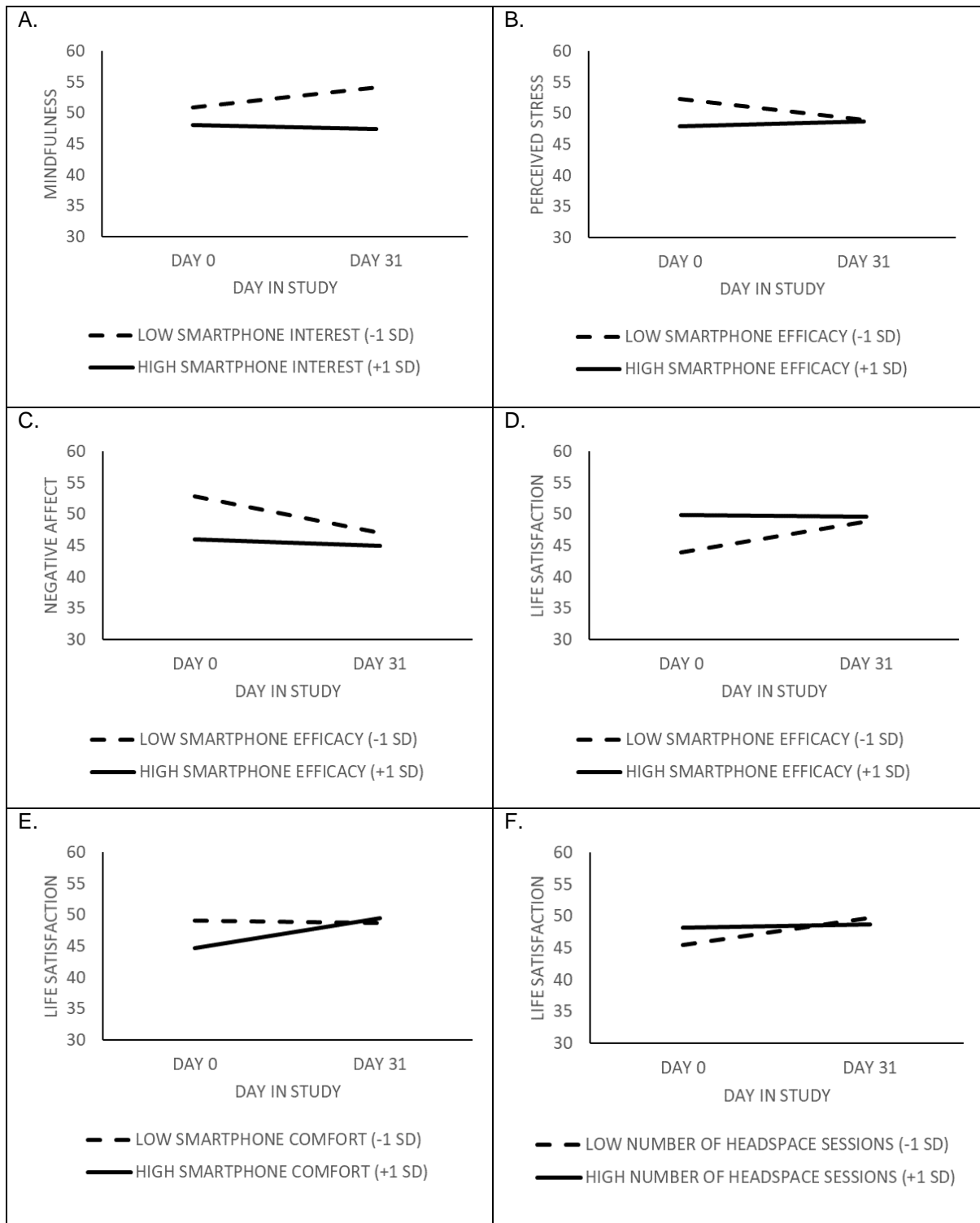


Figure 4.1. Associations of day-in-study and (a) mindfulness as a function of smartphone interest; (b) perceived stress, (c) negative affect, and (d) life satisfaction as a function of smartphone efficacy; (e) life satisfaction as a function of smartphone comfort; and (f) life satisfaction as a function of Headspace sessions. *SD* = Standard deviation.

perceived stress (Figure 4.1B) and negative affect (Figure 4.1C), the pattern indicates that, relative to high smartphone efficacy, low smartphone efficacy was associated with higher levels of perceived stress (difference: 4.33) and negative affect (difference: 6.91) at baseline, as well as significant decreases in both perceived stress (0.34 *SD*) and negative affect (0.59 *SD*) across the study interval. A complementary pattern was observed for satisfaction with life where, relative to high smartphone efficacy, low smartphone efficacy was associated with lower life satisfaction at baseline (difference: 5.94), and an increase in satisfaction with life across the study interval (0.49 *SD*; see Figure 4.1D).

For satisfaction with life, smartphone comfort and number of Headspace sessions each predicted rates of change. Here, high smartphone comfort was associated with lower life satisfaction at baseline (difference: 4.37) and a notable increase in life satisfaction across the study interval (0.48 *SD*). In contrast, life satisfaction remained relatively higher and stable among those reporting low smartphone comfort (see Figure 4.1E). The only evidence of Headspace engagement as a moderating influence in the final models indicated that completion of a low number of sessions was associated with lower life satisfaction at baseline (difference: 2.72), but also an increase in life satisfaction across the study interval (0.42 *SD*; Figure 4.1F).

4.4.4 Supplementary Analyses for Facet-Level Mindfulness

Unconditional models showed significant between-person (Range: 62.41–82.36%) and within-person (Range: 17.49–37.59%) variance for the each of the mindfulness-facet outcomes. Results of multilevel models showed no evidence of meaningful change for any of the mindfulness-facets over the 30-day study period ($ps = .107-.995$; see Table 4.6, Model 1). The role of individual difference predictors in accounting for levels and rates of change in facet-level mindfulness was also examined, with potential moderators including attitudes toward smartphones (i.e., comfort, efficacy, and interest), Headspace engagement (i.e.,

number of sessions and program content), and covariates (i.e., age, gender, education, and health). The only significant interactions to emerge in the final models (after exclusion of non-significant predictors) were for the model with nonjudgment as the outcome (see Table 4.6, Model 2). First, only higher educational attainment (i.e., having completed a tertiary degree) was associated with an increase in nonjudgment over the study interval (i.e., 0.23 *SD*). Second, high smartphone efficacy was associated with a decrease in nonjudgment over the study interval (i.e., 0.34 *SD*).

4.4.5 Intrinsic Motivation and Perceived Difficulty of Mindfulness-Meditation

Table 4.2 shows that, on average (at day 10 and 30), participants rated intrinsic motivation for mindfulness-meditation as midway between ‘somewhat’ and ‘very’ for both interest/enjoyment and value/usefulness; and perceived difficulty as between ‘not at all’ and ‘somewhat’.

4.4.6 Acceptability and Usability of the Headspace Application

As shown in Table 4.7, most participants indicated that they found the app easy to use, felt comfortable and confident using it, would use the app in the future, and would recommend the app to others. In addition, most participants endorsed being able to see the screen and that the app helped them to focus.

At final assessment, 31 (67.4%) participants responded to an open-ended question regarding their experience of mindfulness-meditation and/or the Headspace application. Most comments were positive and reflected themes of increased well-being (e.g., *“I actually feel happy and positive for the first time in many years”*); *“I found it very helpful at a difficult time with health issues”*); greater confidence with meditation (e.g., *“I am confident I could meditate without using the app... [and]... follow the mindfulness-meditation information I have learnt over the 30 sessions”*); and appreciation for the content (e.g., *“I liked the image of the blue sky and the clouds and have used that in day-to-day situations”*); here, the blue sky

Table 4.6

Multilevel Models (with Unstandardised Estimates and Standard Errors) for Facet-Level Mindfulness

	ActAware	Nonjudgment		Nonreactivity	Observe		Describe	
	Model 1 & 2	Model 1	Model 2	Model 1 & 2	Model 1	Model 2	Model 1	Model 2
<i>Fixed effects</i>								
Intercept	49.27 (1.36)***	49.85 (1.44)***	49.14 (1.91)***	50.40 (1.37)***	49.52 (1.41)***	38.25 (3.64)***	49.24 (1.47)***	52.57 (2.09)***
Day-in-study	0.01 (0.04)	0.01 (0.03)	0.04 (0.04)	0.06 (0.04)	0.03 (0.04)	0.03 (0.04)	0.03 (0.03)	0.03 (0.03)
Gender	--	--	--	--	--	12.64 (3.81)**a	--	--
Education	--	--	1.52 (2.85)	--	--	--	--	--
ATS-C	--	--	0.96 (0.43)*	--	--	--	--	--
ATS-E	--	--	0.004 (0.59)	--	--	--	--	--
ATS-I	--	--	--	--	--	--	--	--
Sessions	--	--	--	--	--	--	--	--
Content	--	--	--	--	--	--	--	-5.90 (2.72)*
Educ x Day	--	--	0.12 (0.05)*	--	--	--	--	--
ATS-E x Day	--	--	-0.02 (0.01)*	--	--	--	--	--
<i>Random effects</i>								
Level 2	71.82 (18.27)***	83.40 (18.87)***	78.53 (18.37)***	72.56 (18.70)***	67.33 (16.79)***	52.94 (13.93)***	81.83 (19.13)***	74.94 (17.88)***
Intercept-Slope Cov	-0.90 (0.46)	--	--	-1.01 (0.47)*	--	--	--	--
Slope	0.04 (0.02)*	--	--	0.03 (0.02)	--	--	--	--
Level 1	19.58 (4.05)***	18.04 (2.67)***	16.64 (2.49)***	20.32 (4.29)***	35.55 (5.27)***	35.55 (5.27)***	26.09 (3.87)***	26.09 (3.87)***
Pseudo R ² L2	< .001	< .001	0.06	< .001	< .001	0.21	< .001	0.08
Pseudo R ² L1	0.36	0.01	0.07	0.30	0.01	< .001	< .001	< .001

Notes. ATS-C = Attitudes toward smartphones-Comfort. ATS-E = Attitudes toward smartphones-Efficacy. ATS-I = Attitudes toward smartphones-Interest. Cov. = Covariance. L2 = Level 2 (Between-person). L1 = Level 1 (Within-person). ActAware = Act with Awareness. Model 1 represents the base model with the main effect for day-in-study. Model 2 represents the final model after exclusion of nonsignificant predictors. The models for ActAware and Nonreactivity include the random slope for day-in-study due to improved model fit. Random slopes were not estimated for the Nonjudgment, Observe, or Describe models to enable convergence. Age and health status were non-significant predictors and therefore not included in any of the final models. ^a Gender effects may be unreliable as there were only 5 males in the sample.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4.7

Participant Acceptability and Usability Ratings for the Headspace Application at Day 30

Statement	Strongly disagree <i>n</i> (%)	Disagree <i>n</i> (%)	Neutral <i>n</i> (%)	Agree <i>n</i> (%)	Strongly agree <i>n</i> (%)
I would use the app often.	4 (8.7)	2 (4.3)	13 (28.3)	14 (30.4)	13 (28.3)
It was too complicated.	34 (73.9)	9 (19.6)	3 (6.5)	0 (0.0)	0 (0.0)
It was easy to use.	0 (0.0)	1 (2.2)	3 (6.5)	10 (21.7)	32 (69.6)
I felt confident using it.	0 (0.0)	2 (4.3)	4 (8.7)	9 (19.6)	31 (67.4)
I felt comfortable using it.	0 (0.0)	0 (0.0)	3 (6.3)	12 (26.1)	31 (67.4)
It was easy to learn.	0 (0.0)	1 (2.2)	7 (15.2)	12 (26.1)	26 (56.5)
The info was easy to understand.	0 (0.0)	1 (2.2)	1 (2.2)	14 (30.4)	30 (65.2)
I could see the screen.	1 (2.2)	1 (2.2)	3 (6.5)	12 (26.1)	29 (63.0)
I had enough meditation time.	1 (2.2)	5 (10.9)	10 (21.7)	15 (32.6)	15 (32.6)
I did not have enough meditation time.	19 (41.3)	10 (21.7)	12 (26.1)	4 (8.7)	1 (2.2)
I did not like the voice.	30 (66.7)	6 (13.3)	6 (13.3)	0 (0.0)	3 (6.7)
I did like the voice.	3 (6.5)	2 (4.3)	9 (19.6)	8 (17.4)	24 (52.2)
The app helped me focus.	2 (4.3)	5 (10.9)	7 (15.2)	18 (39.1)	14 (30.4)
The app did not help me focus.	21 (45.7)	12 (26.1)	8 (17.4)	5 (10.9)	0 (0.0)
The app functions the way I want.	2 (4.3)	2 (4.3)	13 (28.3)	15 (32.6)	14 (30.4)
I would use the app in the future.	4 (8.7)	2 (4.3)	6 (13.0)	12 (26.1)	22 (47.8)
The app was fun to use.	2 (4.3)	3 (6.5)	18 (39.1)	16 (34.8)	7 (15.2)
I would recommend the app to others.	1 (2.2)	2 (4.3)	8 (17.4)	13 (28.3)	22 (47.8)
I was comfortable with the info collected on the app.	0 (0.0)	2 (4.4)	8 (17.8)	18 (40.0)	17 (37.8)
I was worried about the privacy of my info.	30 (65.2)	8 (17.4)	4 (8.7)	1 (2.2)	3 (6.5)

Note. *Ns* range from 45–46.

is used as a metaphor for the mind where clouds represent the passing nature of different thoughts, feelings, and experiences). Only a few participants made more neutral/critical comments related to meditation (e.g., “*I think meditation is a good thing – just not for me*”; “*It was a boring activity*”; “*The difficulty I had was regularly finding the time to complete the meditation*”) or the Headspace application (e.g., “*The exercises were too similar*”; “*I would probably not pay for the use of it but try and do it myself without guidance*”).

4.5 Discussion and Implications

To our knowledge, the present study is the first to examine the acceptability and usability of app-based mindfulness-meditation training with non-clinical community-dwelling older adults. In the section that follows, we discuss our preliminary findings regarding (a) efficacy of the Headspace program for older adults as indicated by changes in mindfulness and well-being outcomes over the study interval, and (b) acceptability and usability of the program as reflected by application usage (i.e., number of sessions), intrinsic motivation for meditation following the intervention, and participant evaluations.

4.5.1 Preliminary Efficacy of the Headspace Mindfulness-Meditation Program for Older Adults' Well-Being

Our findings provide somewhat mixed preliminary evidence for the efficacy of the Headspace meditation program with older adults. Over the 30-day pilot intervention, small effects on participants' well-being were observed, including increased levels of positive affect and life satisfaction and decreased levels of negative affect. Contrary to predictions, no statistically reliable effects were found for the total sample in relation to mindfulness or perceived stress levels. The results suggest potential benefits across some, but not all outcomes, arising from engagement with the program.

It is possible that, in general, the present sample of older participants may have scored sufficiently high in mindfulness so that there was limited scope for further improvement. In support of this, a comparison with Bohlmeijer et al.'s (2011) original validation sample for the FFMQ-SF with relatively younger clinical samples shows that, on average, our participants scored one-third to one standard deviation higher on each of the mindfulness facets at baseline. Furthermore, Brady et al.'s (2019) validation of the FFMQ-SF with community-dwelling older adults (aged 60–89) also demonstrated relatively higher average scores than the original validation study, particularly on the 'acting with awareness',

‘nonjudgment’, and ‘nonreactivity’ facets. Together, these results are consistent with research showing a positive relationship between age and dispositional mindfulness (Geiger et al., 2016; Mahlo & Windsor, 2020b). It is also possible that adopting mindful practices via Headspace or other such low-dose platforms may require longer periods of use to demonstrate reliable changes on measures designed to capture mindfulness components as relatively stable dispositional traits.

Overall, our results are in partial concordance with previous studies utilising the Headspace application with younger cohorts where well-being has been shown to increase over relatively brief periods (i.e., 10–30 days; Champion et al., 2018; Economides et al., 2018; Flett et al., 2019; Yang et al., 2018). Several studies have examined the impact of the Headspace program on dispositional mindfulness, with the findings demonstrating significant improvements via single components or alternative unidimensional measures of mindfulness (e.g., Bennike et al., 2017; Flett et al., 2019; Yang et al., 2018). Together, our results and the inconsistent operationalisation of mindfulness across previous studies highlight the unresolved question in the field of how to best conceptualise and operationalise the complex skills associated with mindfulness (Grossman, 2019).

The present study further examined whether participants’ attitudes toward smartphones or frequency of application use predicted rates of change in the outcomes across the study interval. First, we found evidence that older adults with relatively less interest in smartphones exhibited a greater increase in total mindfulness over the 30-day period. To the extent that smartphones act as conduits to broad information and contact with the external world, one possible explanation for this finding is that lower smartphone interest (among smartphone owners) reflects a more self-reflective, introspective orientation to life. This could potentially facilitate greater receptivity to meditation in a way that in turn contributes to a more mindful disposition.

Second, older adults who reported relatively lower levels of smartphone efficacy appeared to experience higher perceived stress and negative affect, and less life satisfaction at study commencement. They also exhibited greater improvements on each of these outcomes over the intervention period, relative to those who reported greater competence with smartphones. In this context, participation in an app-based mindfulness-meditation intervention could potentially facilitate boosts to well-being by providing a novel avenue for routine positively reinforcing activity, accompanied by a sense of mastery or competence through successful use of a (perhaps previously avoided) digital-platform (Hopko, Ryba, McIndoo, & File, 2016).

Third, evaluations of life satisfaction in the current sample also appeared to vary according to perceived comfort with smartphones. In contrast with smartphone efficacy, older adults who reported greater comfort with smartphones (relative to those with lower comfort) also displayed lower life satisfaction at study commencement and greater consequent improvements over the 30-day study interval. Although it is only possible to speculate, perhaps older adults who were more comfortable with smartphones tended to also be relatively more engaged with modern-day life and technological advances. In this context, although striving to “stay relevant” may provide opportunities for stimulation and challenge, at the same time it could lead to greater exposure to stressors (e.g., Stawski, Almeida, Lachman, Tun, & Rosnick, 2010), and in turn less positive evaluations of life. Whatever the underlying reason for the lower initial life satisfaction scores among those reporting greater comfort with smartphones, it was notable that life satisfaction scores increased among this group across the study interval.

Finally, completion of a relatively lower number of Headspace sessions was linked with both lower levels of life satisfaction at baseline and an increase in life satisfaction across the study interval. It is possible that individuals who used the Headspace application to a

lesser degree may have been experiencing particularly challenging life circumstances with less discretionary time available to engage with the application; yet these individuals demonstrated comparative benefits despite lower (but perhaps sufficient) adherence to the program.

4.5.2 Feasibility and Acceptability of App-Based Mindfulness-Meditation with Older Users

An additional primary aim of the present study was to directly ascertain older adults' views of the suitability of app-based mindfulness-meditation training. All participants who engaged with the program (except one) provided data at the final assessment. On average, participants meditated for 25 days of the 30-day program with most sessions being around 10 minutes in duration. Notably, average session completion in the present study was higher than that reported in some other 30-day Headspace intervention studies with younger cohorts (e.g., Bennike et al., 2017; Champion et al., 2018; Flett et al., 2019; Yang et al. 2018).

Although the collection of objective app-related frequency and duration data is a strength of the present study, we have no way of ascertaining the quality of participants' engagement during each session. However, both intrinsic motivation for mindfulness-meditation and evaluations of the Headspace application at study completion appeared to indicate genuine engagement with, and potential enjoyment of, the Headspace program and process.

Participants' responses to our open-ended question were generally very favourable, and on average, participants rated mindfulness-meditation as interesting, enjoyable, valuable, and useful. Most participants indicated that they found Headspace easy to use, perceived benefits from the program, and were interested in both using the application in the future and recommending it to others.

4.5.3 Limitations and Future Directions

Our results should be interpreted with several limitations in mind. First, a small

convenience sample of smartphone-owning older adults was recruited who may not be representative of older adults in the general population, particularly as smartphone users are more likely to be young-old adults with higher levels of educational attainment and affluence (Pew Research Center, 2017). Indeed, our sample was aged between 63 and 81 years and included mostly female, highly educated adults who were recruited online, suggesting a relatively high degree of digital access and literacy. Relatedly, while our adapted measure of attitudes toward smartphones assessed smartphone interest, efficacy, and comfort, we did not assess participants' levels of smartphone use or objective proficiency. We also did not assess potential sensory impairments, although all participants were able to satisfactorily complete a phone-based cognitive screen. Furthermore, while our participants were meditation naïve, they may have enrolled in the study due to a particular interest in the topic of mindfulness. Our data suggests that digitally delivered mindfulness-meditation may be acceptable and effective for older adults, but it is unknown whether these effects would generalise to a more representative sample, including older users and those with more limited digital access and skills. Importantly, access to the Headspace program and its potential benefits is limited to individuals who are smartphone owners or who at least have online connectivity, and therefore also by other determinants of digital inequality, including age, education, income, gender, and generational status (Fang et al., 2018; Mitzner et al., 2019). Consistent with the the Digital Competence Framework (Ferrari et al., 2013), the provision of opportunities for older adults to acquire technological access and competence and thus avenues for participation in online programs and interventions is an important ongoing consideration (Mitzner et al., 2019).

Second, the study relied on self-report measures which, although well-used and validated, may be subject to recall, social-desirability, and expectancy biases, particularly after participation in a 30-day program. Here, future research on mindfulness should consider

using more ecologically valid state-level measures (e.g., Blanke & Brose, 2017) and/or objective behavioural assessment (e.g., breath-counting; Levinson, Stoll, Kindy, Merry, & Davidson, 2014). A third limitation is the lack of a control group, although the primary aim of this pilot study was to provide an initial assessment of the feasibility and acceptability of the Headspace application for older adults as a means of informing future larger-scale studies. A strength of the study is that the intervention focused purely on mindfulness-meditation training without the non-meditation specific elements of didactic group-based learning often accompanying in-person learning (e.g., MBSR). However, future randomised-controlled trials with older adults using Headspace should incorporate active comparison groups with long-term follow-up to more reliably establish efficacy and sustainability.

4.5.4 Conclusion

Our findings provide preliminary support for the feasibility and acceptability of an app-based mindfulness-meditation program with community-based older adults and demonstrate potential benefits for well-being. In sum, the results suggest that the majority of older participants found the Headspace mindfulness-meditation program easy to use, enjoyable, and useful. Our preliminary data assessing outcomes also suggests that brief daily use of the application could enhance well-being. However, the fact that we did not observe corresponding reliable improvements in trait mindfulness, means that the mechanisms underlying improved well-being remain uncertain. It was further identified that older adults' perceptions of smartphone competency may play a role in the outcomes of app-based programs. Within the context of our rapidly ageing population and increasing digital uptake by older individuals, the results suggest the value of further research investigating the efficacy of digital mindfulness-meditation interventions for older adults via larger randomised-controlled trials.

CHAPTER

5

DISCUSSION

5.1 Summary of Research Findings and Original Contributions

This thesis was designed to make an original and novel contribution to existing knowledge on mindfulness, meditation, and well-being within a lifespan developmental perspective. The first cross-sectional study (Chapter 2; Mahlo & Windsor, 2020b) examined the role of age in predicting associations of characteristics of mindfulness and well-being within the context of a proposed model of mindfulness. The second study (Chapter 3; Mahlo & Windsor, in press) used experience-sampling methodology to examine state-level mindfulness and affective well-being in the daily lives of middle-aged and older adults. The third and final study (Chapter 4; Mahlo & Windsor, 2020a) examined the feasibility, acceptability, and preliminary efficacy of app-based mindfulness-meditation training for well-being with community-based older adults.

Overall, the findings provide partial empirical support for the proposed mechanisms of mindfulness in an adapted model based on Farb et al. (2014); and also show that mindful characteristics tend to be positively associated with age. Furthermore, certain characteristics—such as a propensity toward present-moment attending, adopting a nonjudgmental orientation toward experiences, and appreciation of the transitory nature of experiences and events—appeared to become especially important for flexible adaptation and well-being from midlife and beyond (Study 1). Moreover, everyday more transitory states of relatively high present-moment attention and nonjudgmental acceptance were also found to predict greater momentary emotional well-being in later midlife and older adulthood. In particular, occasions of high nonjudgmental acceptance appeared to mitigate affective reactivity to daily hassles and this effect was stronger at older ages (Study 2). The findings also provide evidence that app-based mindfulness-meditation training is feasible and acceptable for community-based older adults and can potentially facilitate benefits for well-being (Study 3). Together, these studies make an original and novel contribution to

knowledge by addressing gaps in the literature regarding mechanisms of mindfulness, the experience of state-mindfulness, and digitally delivered mindfulness; and by focusing on well-being (as opposed to psychopathology) within the context of development across the adult lifespan. In the sections that follow I outline the importance, findings, and novel contribution of each study, highlight the clinical implications of the findings, and discuss methodological limitations along with potential directions for future research.

5.1.1 Mindfulness Characteristics and Well-Being Across the Lifespan

As discussed in Chapter 1 (and Section 2.2.2), while it is well-established that mindfulness can be helpful in reducing stress and psychological symptomatology, empirical research investigating conceptual models of mindfulness that can shed light on the processes through which mindfulness affects well-being is recognised as a priority for the field (Alsubaie et al., 2017; Gu et al., 2015). Moreover, research considering the positive effects of mindfulness on psychological functioning from a lifespan perspective is needed. The first study of this thesis utilised a large community sample of individuals from across the adult lifespan to examine (a) an adapted mindfulness model based on Farb et al. (2014) and the potential links between mindfulness-related characteristics and adaptive outcomes reflecting well-being and psychological flexibility (see Figure 1.1); and (b) the extent to which the proposed relationships varied by age.

Associations between mindfulness characteristics, adaptation, and well-being.

First, among predictors of well-being, acceptance, nonattachment, and decentering were all found to be mechanisms through which present-moment attention and nonjudgment exerted positive effects. This is consistent with Farb et al.'s (2014) description of acceptance and decentering—as well as Sahdra and colleague's (2016, 2010) conceptualisation of nonattachment—as attitudinal capacities deriving from the propensity to adopt a nonjudgmental orientation to experiences, which in turn give rise to the perception of well-

being (including a positive profile of affect, satisfaction with life, and a sense of flourishing). However, the findings also indicated that acceptance, nonattachment, and decentering mediated associations of attention on the present-moment with well-being, despite these pathways not being overtly outlined in Farb et al.'s original model. These findings could indicate that present-moment awareness creates an experiential context that facilitates acceptance, nonattachment, and decentering. This notion is consistent with Brown and Ryan's (2004) description of how the qualities of openness and acceptance are embedded within the capacity to attend to the present-moment; and with Joseph, Murphy, and Patterson's (2016) view that regularly attending to present-moment experiencing promotes the development of mindfulness-related attitudinal qualities or outcomes. Furthermore, in line with Garland, Hanley, Goldin, and Gross (2017), higher levels of present-moment attending may allow the effective allocation of attentional resources to adaptive self-regulatory processes and skills that enhance well-being, including acceptance, nonattachment, and decentering.

Second, similar patterns of findings to those observed for well-being emerged for flexible goal adjustment as the outcome, although acceptance did not emerge as a significant mediator in these models. These findings suggest that both attending to the present moment and adopting a nonjudgmental orientation independently facilitate the tendency to relate to experiences and situations (including positive ones) without becoming fixated and attempting to hold onto them, as well as psychological objectivity and the ability to adaptively perceive experiences and events as transitory. This, in turn, appears to promote flexible adaptation and accommodation to changing circumstances—in particular, the ability to flexibly employ goal disengagement and goal reengagement strategies as needed. Here, the qualities of present-moment attention, nonjudgment, nonattachment, and decentering may well foster a broader perspective that supports the ability to let go of previously valued goals and to identify and engage with new goals. Notably, in this study and in contrast to expectations, psychological

acceptance (i.e., openness and receptivity to experiences) was not found to play a significant role in the context of flexible goal adjustment. It may be that flexible goal adjustment (as a measure of psychological flexibility) is not as closely conceptually tied to the outcome of emotion regulation in Farb et al.'s (2014) model of mindfulness, as is the measure of self-perceived well-being used in this study.

Contrary to Farb et al.'s (2014) model, interoception was not found to be an active mechanism in the relationships between present-moment attention and either outcome. One possible explanation for this unexpected finding is that the concept of interoception was not adequately captured by the scales that were selected for inclusion in the study. Here, the 'noticing' and 'emotional awareness' subscales from the MAIA (Mehling et al., 2012) were utilised based on Farb et al.'s conceptualisation of interoception as "an awareness of momentary sensations from inside the body" (p. 555), and as distinct from evaluative and self-regulatory processes. While body awareness is known to be an important mechanism in the relationship between mindfulness and mental health (Burzler et al., 2018; Cebolla et al., 2018), recent research has shown that present-moment attention and nonjudgment are more strongly linked with the dimensions of interoception reflecting reactions to bodily awareness (as measured by the MAIA; i.e., the 'not-distracting' and 'not-worrying' subscales), and demonstrate only trivial or non-significant associations with subscales reflecting actual awareness of bodily sensations and their connection with emotional states (i.e., 'noticing' and 'emotional awareness'; Bornemann et al., 2015; Hanley, Mehling, & Garland, 2017). It may be that including more broad attributes of interoception or using an alternative measure of body awareness (e.g., the Scale of Body Connection; Price & Thompson, 2007; Price et al., 2017) may reveal a different pattern of results. Furthermore, highlighting the complex nature of this construct, heightened interoceptive awareness without the context of targeted mind-body practices (e.g., meditation, yoga, etc.) may be linked with psychopathology rather than

well-being (Burzler et al., 2018; Mehling et al., 2012). For example, anxiety disorders are generally accompanied by increased attention to and worry about somatic symptoms (Domschke, Stevens, Pfleiderer, & Gerlach, 2010). Overall, the conceptualisation and operationalisation of interoception within psychological research is a relatively new endeavour and existing measures represent initial steps toward appropriate assessment (Farb & Mehling, 2016).

Associations between mindfulness characteristics, well-being outcomes, and age.

The primary aim of the first study in this thesis was to examine whether the significance of the mechanisms in Farb et al.'s (2014) mindfulness model for adaptive outcomes (i.e., flexible coping with change and perceptions of well-being) varied as a function of age. As outlined in Sections 2.4 and 2.5, most mindfulness-related characteristics (i.e., present-moment attention, nonjudgment, acceptance, nonattachment, and decentering) were positively related to age, suggesting that these qualities or capacities may naturally develop with time and life experience. This is consistent with preliminary research demonstrating similar associations across the lifespan for dispositional mindfulness (e.g., Crego, Yela, Gómez-Martínez, & Karim, 2019; Lehto et al., 2015; Smoski et al., 2015), acceptance (Shallcross et al., 2013); nonattachment (Feliu-Soler et al., 2016; Sahdra et al., 2016; Sahdra et al., 2010); and decentering (Soler et al., 2014).

Furthermore, there was evidence that the positive relationships between present-moment attention and well-being, nonjudgment and well-being, and decentering and flexible goal adjustment, became stronger with age and were significant for adults from approximately 40 years of age and above. These findings point to a possible turning point in midlife where (a) appreciation for and engagement with the here-and-now (as opposed to focusing on the past or future) and adoption of a non-evaluative stance to events and experiences take on greater significance for well-being, and (b) the ability to perceive and

appreciate the transient nature of personal experiences is more strongly linked to flexible employment of both goal disengagement and reengagement strategies than is the case in emerging adulthood. As discussed in Section 2.5, the findings are consistent with lifespan developmental theories on ageing and emotion. In particular, these specific mindfulness-related characteristics may reflect accumulated experience in flexibly managing complex problems and accruing wisdom through life (Blanchard-Fields, 2007), and the increasing emphasis on affective self-regulation that comes with age (Brandtstädter, 2009; Brandtstädter et al., 2010; Carstensen, 2006; Carstensen et al., 1999, 2003; Wrosch, 2010; Wrosch et al., 2013).

Alternatively, it may be that certain mindful attributes (as currently operationalised) reflect somewhat different characteristics at different ages across the lifespan, particularly in the context of cross-sectional age differences. For example, the notion of mindfulness should be considered in light of historical differences across generations—including the high incidence of stress and distraction (or “mindlessness”) now prevalent within contemporary society (Creswell, 2017; Kabat-Zinn, 1994), as well as the exponential increase in both public discourse on the ‘hot’ topic of mindfulness and uptake of mindfulness practices over the past few decades (Creswell, 2017). In this regard, cohort-sequential research designs will be needed to address how such historical factors may have impacted peoples’ experience and understanding of mindfulness across different developmental contexts.

Overall, the initial study of this thesis provides the first known empirical test of Farb et al.’s (2014) proposed mechanisms of mindfulness with the inclusion of nonattachment. In particular, the study extends existing research by examining a multiple-mediator model (as recommended by Alsubaie et al., 2017; and Gu et al., 2015) and providing evidence of positive links between mindfulness-related characteristics (i.e., present-moment attention, nonjudgment, acceptance, nonattachment, and decentering) and well-being outcomes,

including flexible adaptation to change. So far, to my knowledge, the study is one of only a few that examine links between mindfulness and flexible coping (Jones, Lehman, Noriega, & Dinnel, 2019) and the only study to consider goal adjustment processes specifically within the context of mindfulness across the lifespan. Of central importance, the study revealed that present-moment attention, nonjudgment, and decentering may represent qualities or strategies that are particularly useful for navigating the unique challenges experienced across the second half of life.

5.1.2 State Mindfulness and Well-Being in the Everyday Lives of Middle-Aged and Older Adults

As outlined in Chapters 1 and 3, research attention is increasingly turning toward conceptualisation of mindfulness as a dynamic, experiential state that can fluctuate across situations and short time frames. This research interest is reflected in an emerging body of literature focusing on the nuanced investigation of mindfulness via experience-sampling methodology; that is, intensive, repeated, real-time assessment of people's experiences within real world contexts (Mehl & Conner, 2012). Furthermore, such methods are consistent with increasing theoretical and empirical interest in intra-individual phenomena and their consequences within the field of psychology more generally (Nofhle & Fleeson, 2015).

According to a recent systematic review, utilising intensive longitudinal methods to examine state-level mindfulness appears to yield more consistent and reliable findings compared to the more generalised and retrospective measurement of trait-level mindfulness that is common throughout the literature (Enkema, McClain, Bird, Halvorson, & Larimer, 2020). Notably, of the 23 mindfulness-related experience-sampling studies reviewed by Enkema et al. (2020), only seven assessed state (vs. trait) mindfulness and each of these utilised different measures (e.g., based on the FFMQ, MAAS, or a single item). Furthermore, only one study (viz., Blanke et al., 2018) employed a validated multidimensional measure of

state-level mindfulness (i.e., the MSMQ). Overall, to my knowledge, just one study has examined state-level mindfulness in the context of older adulthood so far (i.e., Moore et al., 2016), and none have considered a multidimensional perspective of state mindfulness for older adults. Thus, the second study of this thesis is important as it extends Blanke et al.'s (2018) novel investigation of the predictive value of different facets of state mindfulness for everyday affective experience by (1) examining these associations with an older sample; (2) incorporating assessment of both pleasant and unpleasant events into the study design; and (3) investigating potential age-varying effects.

To summarise, the findings of Study 2 revealed that (a) the state mindfulness-facets present-moment attention and nonjudgmental acceptance (of the MSMQ) were predictive of greater affective well-being for adults in later midlife and older adulthood; (b) nonjudgmental acceptance appeared to buffer affective reactivity to daily hassles, and importantly, this effect was stronger at older ages; and (c) mindful states did not appear to provide any further boost to uplift-related mood.

Specifically, for adults aged between 53 and 86, greater use of both present-moment attention and nonjudgmental acceptance strategies on average (i.e., between-person) was associated with higher positive affect on average; while only higher use of nonjudgmental acceptance on average was associated with lower average negative affect. Similarly, higher (within-person) states of present-moment attention and nonjudgmental acceptance were predictive of higher-than-usual momentary positive affect; whereas higher states of nonjudgmental acceptance were most strongly predictive of lower-than-usual momentary negative affect. Furthermore, on occasions when daily hassles were reported, participants in this study were less likely to experience a decrease in positive affect and an increase in negative affect when they also reported a state of relatively high nonjudgmental acceptance.

A key finding in this study was that the apparent buffering effect of nonjudgmental acceptance on affective reactivity was stronger at older ages. That is, compared to young-old participants, relatively older participants demonstrated smaller reductions in positive affect and smaller increases in negative affect in conjunction with daily hassles, on occasions of relatively high nonjudgmental acceptance. As discussed in Section 3.5.1, this finding extends prior research with younger populations at both the dispositional (e.g., Ciesla et al., 2012; Feldman et al., 2016) and state level (Blanke et al., 2018). Moreover, the findings suggest that adopting a non-evaluative and accepting orientation toward momentary experiences may be a particularly efficacious strategy for mitigating the potentially adverse effects of stress exposure and optimising health and well-being in later life (Charles, 2010; Charles et al., 2013; Mroczek et al., 2015; Piazza, Charles, Sliwinski, et al., 2013; Sin, Graham-Engeland, Ong, & Almeida, 2015; Wrzus et al., 2013).

While mindful states appeared to provide general mood enhancing effects, there was no evidence of any further mindfulness-related benefits to middle-aged and older adults' mood in conjunction with pleasant experiences. Here (and in Section 3.5.1), I speculate that greater affective responsivity to uplifts might be more likely during occasions characterised by relatively low present-moment attending (for positive affect) and nonjudgmental acceptance (for negative affect). This follows from a review of experience-sampling and daily diary studies by Grosse Reuschkamp et al. (2020) showing that people with relatively higher levels of well-being tend to profit less from positive events compared to those who report lower levels of well-being; thus suggesting that positive events may be associated with mood brightening effects in the particular context of lower rather than higher well-being. Furthermore, mindfulness (both trait and state) may be associated with a broader savouring of life in general (and hence more stable and enhanced mood) as opposed to cognitions and

behaviors that serve to amplify momentary positive mood in the context of pleasant occurrences (Garland et al., 2015; Grosse Rueschkamp et al., 2020).

Another subtle finding in the second study of this thesis involved a moderating role of future time perspective in associations between present-moment attention, uplifts, and negative affect. In summary, for adults with a more open-ended future time perspective, occasions characterised by higher-than-usual present-moment attention predicted relatively low and stable negative affect, irrespective of whether an uplift occurred. In contrast, when individuals with a more limited future time perspective reported relatively high present-moment attention, negative affect appeared to be somewhat higher in the absence of an uplift. Again, in Section 3.5.1, I speculate that having a more expansive future time perspective could be linked with a more optimistic disposition in general (Windsor et al., 2012), and that for these individuals, higher present-moment attending might intensify appreciation for life and its possibilities, thus resulting in slightly less negative mood regardless of whether overtly pleasant events are occurring. Alternatively, recent research has demonstrated that individuals with a more open-ended future time perspective also tend to report a high sense of purpose in life (Pfund & Hill, 2019); and that having greater purposefulness predicts positive outcomes and attenuates affective reactivity to daily events (Hill, Sin, Almeida, & Burrow, 2020; Hill, Sin, Turiano, Burrow, & Almeida, 2018). Although it is only possible to speculate based on the present data, it could be that future time perspective acts as a proxy for purposefulness, so that for individuals guided by a stronger sense of purpose, observation of the here-and-now more strongly reduces the potential for negativity associated with future-focused planning; thus, resulting in somewhat lower and more stable negative emotions in general.

Overall, the second study of the present thesis contributes new knowledge on the topic of mindfulness in several ways. First, to my knowledge, it is the first study to use micro-

longitudinal methods to examine intra-individual variability in multifaceted state mindfulness and affective well-being within the context of later adulthood. Second, it extends beyond the first study in this thesis and a focus on trait-like qualities to show that mindful states (i.e., present-moment attention and nonjudgmental acceptance) are linked with more positive mood states within middle-aged and older adults' daily lives. Third, in addition to corroborating Blanke et al.'s (2018) finding that higher states of nonjudgmental acceptance buffer the adverse effects of daily hassles on emotional experience, the results also revealed age moderation; that is, the positive link between nonjudgmental acceptance and affective reactivity was stronger at older ages. Fourth, the study provides the first known examination of associations between state mindfulness facets, uplifts, and affect among later middle-aged and older adults; and between future time perspective (as defined by Carstensen and colleagues, 1999, 2006) and state-level mindfulness. Finally, the study is situated within the broader historical context of the COVID-19 pandemic and supports the notion that mindful states—in particular, the capacity to view potentially uncontrollable and ever-changing events with equanimity—may well represent effective coping strategies that can mitigate affective reactivity to adverse events and enhance emotional well-being for older adults.

5.1.3 App-Based Mindfulness-Meditation Among Older Adults

The findings of the first two studies in this thesis indicated that interventions designed to facilitate mindfulness skills could be particularly efficacious for enhancing well-being in later life. As outlined in Section 1.3, relatively few studies have focused on the utility of mindfulness-meditation for well-being in older adults. Further, to my knowledge, none have specifically examined the use of contemporary forms of mindfulness training (e.g., app-based programs) with this population. These are important research gaps, particularly in light of the COVID-19 pandemic which occurred soon after the completion of the third study of the thesis and resulted in prolonged restrictions to global mobility and social interaction. This

was especially the case for older individuals who were deemed vulnerable to physical health complications should they be exposed to the virus and were thus encouraged to remain homebound. In this context, the final study in this thesis (Chapter 4) offered a timely investigation of the feasibility and acceptability of digitally delivered mindfulness-meditation among community-dwelling older adults and the preliminary efficacy for mindfulness and well-being outcomes. Specifically, meditation-naïve older participants from the general community were recruited to engage with a 30-day app-based mindfulness-meditation program for 10-minutes daily on their smartphones. Given that older adults tend to have comparatively lower technological literacy and less inclination to incorporate technology within their everyday lives than their younger counterparts (Hülür & Macdonald, 2020), the role of older adults' attitudes toward smartphones was also examined.

As reported in Chapter 4 (Sections 4.4 and 4.5), older users appeared to engage well with the app-based mindfulness-meditation training, as evidenced by participants' objective app-use data, ratings of intrinsic motivation for meditation following the 30-day intervention, and evaluations of the Headspace program. In summary, participants completed an average of 25 sessions and almost 4 hours of application use across the 30 days and generally rated mindfulness-meditation as interesting, enjoyable, valuable, and useful. Most participants indicated that they found the Headspace application easy to use, perceived benefits from participating in the program, and were interested in both continued use and recommending the app to others. Only three participants (7%) reported neutral or less favourable experiences.

In addition to providing evidence of the feasibility and acceptability of the app-based meditation program for older users, the results also demonstrated significant improvements in positive affect and life satisfaction, and reductions in negative affect, across the study interval, but no meaningful change in total or facet-level mindfulness or perceived stress. As

discussed in Section 4.5.1, these preliminary findings are partially consistent with previous studies utilising the Headspace application with younger cohorts where well-being has been shown to increase over relatively brief periods (i.e., 10–30 days; Champion et al., 2018; Economides et al., 2018; Flett et al., 2019; Yang et al., 2018). Furthermore, I speculate that: (a) consistent with research showing a positive relationship between age and dispositional mindfulness (Geiger et al., 2016; Mahlo & Windsor, 2020b), the present sample of older participants may have commenced the study with relatively mindful dispositions, thus reducing the potential for improvement in this particular domain; (b) one month of a low-dose intervention may not be sufficient to develop reliable increases in complex mindfulness skills; and (c) the results may also reflect the need to resolve the important and ongoing issue of how to best conceptualise and operationalise the complex skills associated with mindfulness (Grossman, 2019; see Section 5.3 of this thesis for further discussion).

Regarding the role of older users' attitudes toward smartphones, the most robust pattern of findings was that participants who reported relatively lower levels of smartphone efficacy appeared to experience higher perceived stress and negative affect, and less life satisfaction at study commencement *and* exhibited greater improvements on each of these outcomes over the intervention period, relative to those who reported greater competence with smartphones. Here, and in Section 4.5.1, it is proposed that app-based mindfulness-meditation interventions—such as Headspace—could potentially promote improvements to well-being by providing a novel avenue for routine positively reinforcing activity, accompanied by a sense of mastery or competence through successful use of a (perhaps previously avoided) digital-platform (Hopko et al., 2016).

A further notable finding in the third study was that completion of a relatively lower number of Headspace sessions was linked with both lower levels of life satisfaction at baseline, and an increase in life satisfaction across the study interval. As also postulated in

Section 4.5.1, it is possible that individuals who used the Headspace application to a lesser degree may have been experiencing particularly challenging life circumstances with less discretionary time available to engage with the application; yet these individuals demonstrated comparative benefits despite lower (but perhaps sufficient) adherence to the program. This is consistent with recent research demonstrating beneficial effects following both daily and intermittent engagement with another commercially available meditation app (i.e., "Calm"; Clarke & Draper, 2020). Alternatively, it is possible that older adults who were less compliant and less satisfied with life may have achieved greater life satisfaction through other means, independent of their participation in the intervention.

To my knowledge, this final study of the thesis is the first to investigate digitally delivered mindfulness specifically with older adults. The results provide novel and useful information regarding older users' evaluations of a popular commercially available mindfulness-meditation program (i.e., Headspace) and suggest that brief daily use of the application (i.e., approximately 10 minutes a day) could enhance well-being. The findings also add to the nascent evidence-base for low intensity mindfulness-meditation programs designed for individual users (Heppner & Shirk, 2018). The collection of objective frequency and duration (or 'dose') of mindfulness-meditation app use was an important feature of the study, as was the examination of older participants' attitudes toward smartphones. Here, research on the optimal dosage of meditation for tangible benefits is needed, although this is likely to vary between individuals (Clarke & Draper, 2020; Creswell, 2017). In addition, I am not aware of any other research incorporating older adults' attitudes toward smartphones. In the context of app-based mindfulness-meditation—and perhaps app-based programs more generally—it appears that older adults' perceptions of smartphone competency may well play an important role in outcomes.

5.2 Clinical Implications

Taken together, the set of findings in this thesis can potentially contribute to the development of targeted strategies and intervention programs to promote well-being across the adult lifespan. In particular, the sequence of studies described herein provides knowledge based on three different conceptualisations of mindfulness, representing (a) dispositional or trait-like characteristics; (b) dynamic multidimensional states that fluctuate across short time frames; and (c) an intervention or type of practice.

First, as outlined in Sections 2.5 and 5.1, mindful qualities may well develop naturally over time and with life experience. Moreover, certain characteristics of mindfulness appear to be especially linked with well-being in midlife and beyond. Thus, programs or activities that aim to develop the specific mindfulness skills of present-moment attention and nonjudgment may both complement age-related strengths and facilitate an enhanced sense of well-being for older adults, including improved mood, greater satisfaction with life, and a sense of flourishing. Examples include mind-body practices such as everyday mindfulness, formal meditation practice, yoga, tai chi, and qi gong, as well as more clinically focused “packaged” programs along the lines of MBSR. Using such means to cultivate enhanced capacities for both engaging with the present-moment and adopting a nonevaluative orientation to experiences is also likely to facilitate other mindfulness-related attitudinal qualities (e.g., acceptance, nonattachment, and decentering) that can, in turn, further contribute to increased perceptions of well-being.

Decentering, or the ability to view experiences from a more objective perspective, was found to be especially important for psychological flexibility across the second half of the lifespan. This finding suggests that the capacity to appreciate the transitory nature of experiences might be particularly useful in the context of age-related changes: where once-meaningful pursuits that are no longer viable need to be relinquished and the ability to

reorient and reengage with alternative goals becomes adaptive (e.g., in relation to changing social roles and responsibilities, physical health, loss of loved ones, financial affairs, etc.). Therefore, in addition to the mind-body practices listed above, emphasising techniques that promote decentering as a metacognitive skill may be a valuable and useful focus when working with older adults in clinical and applied settings. Some examples include identification of thoughts and feelings (e.g., “I am having the thought that...”; “I am not my pain”, etc.) and using metaphor to represent the passing nature of events and experiences (e.g., imagining ‘clouds passing across a blue sky’, ‘leaves floating by on a stream’, or ‘sitting on a park bench and allowing people in conversation to pass by without following after them’). Such techniques are incorporated to varying degrees within most formal mindfulness- and acceptance-based interventions (e.g., ACT; DBT; MBSR; and MBCT) and could potentially be emphasised when working within the context of older adulthood.

Extending and complementing the findings on the benefits of cultivating a mindful disposition more broadly, the second study in this thesis demonstrated that, for later middle-aged to older adults, everyday occasions of higher present-moment attention and nonjudgmental acceptance were characterised by more positive mood states. Moreover, occasions of higher nonjudgmental acceptance mitigated affective reactivity to daily hassles (evidenced by less decrease in positive affect and less rise in negative affect) and this effect was stronger with age. In other words, adopting a nonevaluative and accepting orientation in the face of unpleasant events appears to be an increasingly adaptive and effective strategy for fostering emotional equanimity with advancing age.

In line with the suggestions outlined above, techniques and programs that enhance older adults’ capacity to approach experiences with nonjudgmental acceptance (rather than labelling them as necessarily good or bad or trying to avoid them in some way) should be incorporated into clinical treatments and educational programs more broadly. This is

especially pertinent in the context of SAVI, which posits that with age, people become more vulnerable to heightened reactivity and decreased well-being in response to prolonged and potentially aversive experiences (e.g., chronic illness or caregiving demands). Thus, mindfulness-based practices designed to target stress-related processes and associated negative impacts on health and well-being (e.g., MBSR) are likely particularly useful in older adulthood (Geiger et al., 2016; Klimecki et al., 2019). Overall, mindfulness skills that can be readily applied within peoples' everyday lives appear to represent attentional and cognitive strategies that can be intentionally cultivated to optimise immediate experience and regulate momentary mood states in later adulthood.

The third study in this thesis contributes to the nascent knowledge base regarding mindfulness-based interventions with older adults, and further, provides new knowledge regarding the use of digitalised meditation training with this population. As discussed in Section 1.5.2, digital interventions for older adults are of particular importance given the increasing digital uptake and online presence of older adults (Pew Research Center, 2017) and predictions that this age-group will account for 22% of the world's population by 2050 (WHO, 2018). With this broader context in mind, the present research demonstrated that digitally delivered mindfulness training—via the popular Headspace program—was perceived by older people to be interesting, enjoyable, valuable, useful, and not too difficult. Moreover, most participants indicated that they would continue to engage with the program and that they would recommend it to others.

Older adults in this study completed an average of 10 minutes of meditation practice on most days over a one-month period. This relatively high level of engagement is noteworthy considering previous research highlighting that finding time to incorporate meditation practice within daily lives (or indeed to undertake more intensive mindfulness-based programs) can be a barrier to uptake (e.g., Laurie et al., 2016; Mallya & Fiocco, 2016;

Martinez et al., 2015). Moreover, Strohmaier (2020) recently reported meta-analytic evidence that larger ‘doses’ of mindfulness practice (assessed via a number of different ‘dose’ variables, e.g., amount of facilitator contact, duration/frequency of program and sessions, etc.) are no more beneficial for psychological outcomes than comparatively less intense doses; although there was some mixed evidence for a positive dose-response relationship for mindfulness as an outcome. Consistent with these findings, and the notion that lower-dose meditation practice can offer tangible benefit, older adults in the present Headspace study reported significant improvements in mood and life satisfaction over 30 days of brief daily meditation, but no meaningful change in mindfulness or perceived stress scores. (See Sections 4.5.1 and 5.3 for further discussion of non-significant findings and methodological limitations, respectively).

Overall, the findings suggest that regular low-dose app-based mindfulness practice may facilitate enhanced well-being for older adults, and therefore, could potentially be a useful self-management strategy and/or adjunct to psychological therapy—with the caveats that (a) the mechanisms for enhanced well-being are not yet identified, (b) a longer or more intense course of app-based meditation training might be required to reliably increase the use of complex mindfulness skills, and (c) the digital nature of the resource could be prohibitive for some people. As discussed in Chapter 1, engagement with app-based training may appeal to older adults who prefer the convenience and flexibility of home-based training that can be integrated within existing routines, and/or who are experiencing resource constraints such as mobility or financial limitations. Moreover, in the context of the recent COVID-19 pandemic and possible consequent widespread disruptions to social mobility across the globe, the potential utility of digitally based mindfulness training for adults of all ages has increased in both relevance and importance.

5.3 Limitations and Future Directions

As outlined in Sections 2.5.2, 3.5.2, and 4.5.3, the findings reported within the present thesis have some limitations that can help to inform future research endeavours. First, across the three studies, participants were mostly Caucasian (80.7–100%), female (61.5–89.1%), and well educated (34.5–49.7% with a tertiary degree) and were recruited online. Furthermore, the studies utilising experience sampling and app-based meditation training required participants to also be smartphone owners. Thus, it is unknown whether the results would generalise to more representative samples that include greater cultural and socioeconomic diversity and individuals with more limited digital access and literacy. As highlighted by Carlson (2018), future research should prioritise inclusion of a broader range of cultural and ethnic groups so that conclusions regarding the usefulness of mindfulness and meditation are not biased toward ‘wealthy white Western women’ (see also Henrich, Heine, & Norenzayan, 2010). Moreover, participation in research and intervention programs that require technology use and online connectivity is limited by factors associated with digital inequity; that is, age, education, income, gender, and generational status (Fang et al., 2018; Mitzner et al., 2019; Pruchno, 2019). In this regard, it is important that opportunities to acquire technological access and competence—and thus avenues for participation in online programs and interventions that may be of benefit—are promoted for people who might otherwise be excluded due to the digital divide, including older adults (Mitzner et al., 2019; Pruchno, 2019).

It is also important to acknowledge that data for the second study in this thesis (see Chapter 3) was collected during the COVID-19 pandemic. However, at the time of the study (May–June 2020), compared to some other parts of the world, Australia was experiencing less dire consequences as a result of the pandemic, including lower infection rates and associated fatalities (Australian Government Department of Health, 2020). Notably, older

adults in the second study reported relatively high levels of well-being and low daily hassle occurrence. Nevertheless, the findings must be considered within the particular historical context of the 2020 pandemic. On a positive note, while the third study investigating digitally delivered mindfulness training with older adults (see Chapter 4) was conducted prior to the emergence of COVID-19, the relevance and importance of this study increased significantly as people around the world—particularly older adults—were advised to practice physical distancing and remain homebound as much as possible.

A second limitation is that all three studies in this thesis relied on self-report measures that are potentially subject to recall, social-desirability, and in the case of intervention research, expectancy biases. However, in the second study, the use of experience-sampling methodology and intensive repeated assessments within participants' daily lives both provided high ecological validity and minimised retrospective biases, and was thus an important strength of this particular research project (Mehl & Conner, 2012). Moreover, the second study went beyond the assessment of dispositional or trait-level characteristics and examined mindfulness and affect as multidimensional experiential states that can fluctuate from moment to moment; thus contributing to a more nuanced understanding of the dynamic relationships between mindfulness and emotional well-being in the everyday lives of older adults. This type of empirical investigation focusing on intrapersonal momentary processes is of increasing interest within the field of mindfulness (Blanke & Brose, 2017; Blanke et al., 2018, 2020) and within psychology more generally (Nofle & Fleeson, 2015). An important consideration for future research of this type—particularly within a developmental context—is the potential for “measurement reactivity” (i.e., where repeated measurement can influence phenomena of interest) due to the relatively engaging nature of repeated online data collection (Barta, Tenner, & Litt, 2012).

Furthermore, the question of how to best conceptualise and operationalise the centuries-old Buddhist notion of mindfulness within the context of contemporary research is an open and evolving area of enquiry (Gethin, 2015; Grossman, 2019). Christopher, Woodrich, and Tiernan (2014, p. 148) describe how “... in undergoing exportation from a Buddhist context to the world of scientific psychotherapy, [the assessment and practice of] mindfulness has been adapted to ensure fit with Western ideals and to enhance its palatability to Western patients”. For example, it is proposed that psychological conceptualisations of mindfulness do not adequately encapsulate core underlying concepts fundamental within a Buddhist philosophical perspective, such as the development of *insight* and *compassion* and more broad considerations of the inherent *suffering* in life (Christopher et al., 2014; see also Gunaratana, 2011). Accordingly, some scholars have deemed existing mindfulness questionnaires to be insufficient in both definition and scope, particularly as cross-cultural research has revealed validity issues and consensus regarding the specific ‘constituent elements’ of mindfulness has not yet been reached (Christopher, Charoensuk, Gilbert, Neary, & Pearce, 2009; Christopher, Christopher, & Charoensuk, 2009; Christopher et al., 2014; Feng, Krägeloh, Billington, & Siegert, 2018; Karl et al., 2020; Grossman, 2019). Notably, existing measures (e.g., the Comprehensive Inventory of Mindfulness Experiences [CHIME; Bergomi et al., 2013a; Bergomi, Tschacher, & Kupper, 2015], FFMQ, MAAS, and MSMQ) are comprised of varying numbers of dimensions (e.g., 1–8 facets) and include divergent conceptual content across subscales designed to capture comparable characteristics (e.g., present-moment attention, nonjudgment, acceptance, etc.). Further concerns include differential semantic interpretation of questionnaire items between experienced and non-experienced mindfulness practitioners, and inconsistent findings related to improvements (or lack of) within the context of mindfulness training (Grossman, 2019; Visted, Vøllestad, Nielsen, & Nielsen, 2015).

For now, mindfulness researchers should carefully consider the use and interpretation of existing mindfulness questionnaires and potentially seek to incorporate different methods of assessment, such as focusing on: (a) specific elements of interest (e.g., attentional flexibility, emotional reactivity, prosocial behaviour, etc.; Grossman, 2019); (b) processes in real-time using experience-sampling (e.g., via the Applied Mindfulness Process Scale [Li, Black, & Garland, 2016], Mindfulness Process Questionnaire [Erisman & Roemer, 2012], or MSMQ); and (c) objective measurement (e.g., via breath awareness or breath counting; Frewen, Lundberg, MacKinley, & Wrath, 2011; Hadash & Bernstein, 2019; Levinson et al., 2014; Wong, Massar, Chee, & Lim, 2018).

A third limitation of the present research relates to study design; that is, the temporal sequence among variables in Studies 1 and 2 cannot be directly inferred due to the correlational nature of the data; and the direct cause of the favourable intervention response in Study 3 cannot be determined due to lack of a control group. However, design strengths include the sizeable sample and broad age range of participants in the first study ($N = 623$, 18–86 years; see Chapter 2); the relatively large sample in the context of micro-longitudinal research and high number of assessment occasions within the second study ($N = 157$, total observations = 4761; see Chapter 3); and in the final study, the low attrition rate and use of a mindfulness-meditation training program that does not include non-meditation specific elements inherent within well-known didactic group-based mindfulness courses (e.g., MBSR; see Chapter 4).

Prior research points to both unidirectional and reciprocal associations between mindfulness and well-being outcomes. For example, mutual enhancement of mindfulness and positive emotions in ‘upward spirals’ has been demonstrated both within the daily lives of university students (Du et al., 2019) and in the context of a single-group walking intervention with middle-aged adults (Gotink, Hermans, et al., 2016). Whereas, Snippe et al. (2015)

analysed data from daily diaries completed by middle-aged participants throughout an 8-week mindfulness-based treatment (i.e., MBSR) to demonstrate that increased mindfulness preceded improved affect, rather than mindfulness being a product of improved mood. Hence, experimental study designs with multiple assessment points are needed to provide more definitive information about causal relationships between mindful characteristics, active mechanisms, and well-being outcomes within a lifespan developmental perspective.

The primary aim of the third study in this thesis was to provide an initial assessment of the feasibility and acceptability of the Headspace mindfulness-meditation application for older adults as a means of informing future larger-scale studies. Therefore, in order to build on the preliminary findings reported herein, future research should focus on randomised controlled trials with older adults using the Headspace program or similar meditation-focused apps that (a) incorporate active comparison conditions to control for non-meditation specific effects, and (b) include long-term follow-ups to more reliably establish efficacy and sustainability of both well-being gains and persistence with daily meditation practice. One challenging issue is identification of active control conditions (vs. waitlist) that can serve as an adequate comparison for digitally delivered mindfulness training. Prior research investigating the Headspace intervention has utilised a number of different control tasks, including a sham meditation protocol (i.e., breathing exercises delivered via the Headspace interface but without meditation-specific instruction; Noone & Hogan, 2018); an audiobook on the topic of mindfulness (also via the Headspace interface but without meditation practice per se; Economides et al., 2018); online cognitive games (Bennike et al., 2017; DeSteno et al., 2018; Lim et al., 2015); and note-taking applications (Flett et al., 2019; Howells et al., 2016). However, an ideal digitally based comparison activity is yet to be established. It may be that control tasks unrelated to mindfulness should be considered when designing future trials involving Headspace, such as listening to audiobook or podcast segments that require a

comparable amount of attention (albeit with a different focus) but contain more neutral content (e.g., conversational interviews or fiction; Basso, McHale, Ende, Oberlin, & Suzuki, 2019; Economides et al., 2018; Kramer, Weger, & Sharma, 2013; Noone and Hogan, 2018).

Extending further on the research in this thesis, randomised controlled trials such as those described above could also incorporate experience-sampling methodology (e.g., pre-, during, and post-trial) to provide a more fine-grained analysis of the dynamic associations between mindfulness-based training, mindfulness-related states, and emotional well-being. Importantly, such methods could facilitate insight into intra-individual processes and trajectories of change in response to meditation (e.g., across varying time frames) that would likely show high variability between individuals (Rosenkranz, Dunne, & Davidson, 2019). In addition, further data regarding level of engagement with interventions and control tasks (i.e., quantity and quality; e.g., see Del Re, Flückiger, Goldberg, & Hoyt, 2013; Hased et al., 2020) and intervention-specific mechanisms could be obtained (Enkema et al., 2020; Rosenkranz et al., 2019).

Another consideration that deserves attention going forward is the potential for adverse meditation-related effects (Farias, Maraldi, Wallenkampf, & Lucchetti, 2020). It is recognised that for some individuals learning and engaging with meditation can lead to discomfort in the form of agitation, anxiety, and confusion, and is sometimes linked with more serious psychosomatic complaints, particularly in the context of past trauma exposure (Creswell, 2017; Farias et al., 2020; Lomas, Cartwright, Edginton, & Ridge, 2015; Vieten et al., 2018; Zhu, Wekerle, Lanius, & Frewen, 2019). While brief low-dose meditation practice is not likely to be associated with intensely negative experiences, information regarding adverse meditation-related events is currently underreported within the literature (Creswell, 2017; Farias et al., 2020; Wong, Chan, Zhang, Lee, & Tsoi, 2018). Future research trials—including those with older adults—should aim to assess for and monitor adverse meditation-

related phenomena. In particular, experience-sampling methodology could be employed to provide specific insight into intrapersonal difficulties as they occur in real-time while undergoing meditation training (Farias et al. 2020). Furthermore, in the context of digitally delivered mindfulness programs, it would be useful to understand the potential benefits as well as possible risks of engaging in online forums and communities designed to support participants undertaking specified programs (e.g., the “Everybody Headspace” private Facebook group).

A final consideration for future research involves the possible role of mindfulness in development of compassion for self and others. According to Gilbert (2017, p. 11), compassion is defined as “a sensitivity to suffering in self and others with a commitment to try to alleviate and prevent it.” Research suggests that mindfulness-based practices naturally give rise to greater compassion (Baer, Lykins, & Peters, 2012; Condon, Desbordes, Miller, & DeSteno, 2013; Donald et al., 2019; Feldman & Kuyken, 2011; Golden, Vosper, Kingston, & Ellett, 2020; Keng, Smoski, Robins, Ekblad, & Brantley, 2012; Kuyken et al., 2010; Luberto et al., 2018), and that compassion is linked with enhanced well-being and pro-social outcomes (Barnard & Curry, 2011; Cosley, McCoy, Saslow, & Epel, 2010; Lim & DeSteno, 2016; MacBeth & Gumley, 2012; Neff & Beretvas, 2012; Neff et al., 2018; Weng, Fox, Hesselthaler, Stodola, & Davidson, 2015; Yarnell & Neff, 2013; Zessin, Dickhäuser, & Garbade, 2015). Moreover, there are specific contemplative practices—such as loving-kindness and compassion meditations—that are especially designed to cultivate compassionate attributes (e.g., care-focused motivation and empathy) and skills (e.g., compassionate thinking, feeling, and behaviour; Gilbert & Choden, 2013; Hofmann, Grossman, & Hinton, 2011).

In addition to the mindful qualities identified within this thesis, compassion for both self and others may also be psychological resources that capitalise on age-related regulatory

strengths and have particular utility for adaptation and well-being in older adulthood (Allen, Goldwasser, & Leary, 2012; Allen & Leary, 2014; Brown, Huffman, & Bryant, 2019; Homan, 2016; Phillips & Ferguson, 2013). For example, Brown et al. (2019) highlight how adopting a self-compassionate stance (comprising mindfulness, self-kindness, and appreciation for shared humanity) may facilitate adaptive responding to age-related difficulties, including psychological concerns (e.g., geriatric anxiety and depression) and challenges to physical health. Moreover, a well-developed sense of compassion is likely to enhance the quality of important social relationships; and as outlined by Carstensen and colleagues (2006, 1999), older adults are especially motivated to preference, invest in, and derive meaning from emotionally rewarding relationships. Furthermore, the relational benefits of compassion may be particularly helpful in the context of caregiving arrangements, for both caregivers and their recipients (e.g., see Sikder et al., 2019). Finally, cultivation of older people's compassionate attributes and skills may promote generative processes (i.e., investment in caring for and contributing to the development of future generations; Erikson, 1968), postulated to be an important aspect of 'ageing well' (Pratt, Lawford, Matsuba, & Villar, 2020; Villar, 2012).

According to Brown et al.'s (2019) recent systematic review, so far, a nascent body of research focusing on self-compassion from a lifespan developmental perspective has suggested (a) positive correlations with age; (b) associations with enhanced psychosocial outcomes and a protective effect in the context of health challenges for older adults; and (c) that the relationship between self-compassion and well-being may become stronger with increasing age (see Hwang, Kim, Yang, & Yang, 2016). However, in two recent meta-analytic examinations of compassion-based intervention research, no reviewed studies included older adults aged 65 and over (Kirby, Tellegen, & Steindl, 2017; Ferrari et al.,

2019). Overall, more research examining compassion (for self *and* others) in the context of adaptive ageing is needed.

A recent systematic and meta-analytic review by Linardon (2020) found preliminary evidence that self-compassion can be cultivated via smartphone-delivered interventions. Of relevance within the current thesis, only a few studies have investigated compassion-related (or prosocial) outcomes utilising Headspace. For example, two studies have showed that after three-weeks of Headspace training and compared to those in an active control condition (comprising online cognitive games), young adults were more likely to engage in both compassionate behaviour (i.e., giving up their chair in a waiting room for another person on crutches; Lim et al., 2015) and less aggressive behaviour (operationalised as the amount of ‘hot sauce’ distributed to a spice-averse provocateur; DeSteno et al., 2018). Furthermore, Bostock et al. (2018) found that after 8 weeks of Headspace training, working adults reported enhanced perceptions of social connection and support from colleagues compared to wait-list controls. Future studies could investigate the effects of the Headspace training program on older adults’ compassion for self and others along with other prosocial outcomes. As an example, Mak et al. (2018) recently employed an elegant randomised controlled design using a study-specific app to compare the effects of mindfulness-meditation training, self-compassion training, and cognitive behavioral psychoeducation for mental health. As compassion-focused meditations are also available within the Headspace interface (e.g., addressing themes of ‘loving-kindness’ and ‘skilled-compassion’), a similar design strategy could be used to examine differential outcomes associated with mindfulness- versus compassion-based meditation practice among older adults.

5.4 Conclusion

Overall, this thesis contributes knowledge on the utility of mindfulness and meditation for well-being in older adulthood and demonstrates the value of considering mindfulness

within a lifespan developmental perspective. The findings reported herein show that mindful qualities may naturally develop with time and life experience; and that particular dispositional tendencies (i.e., focusing on the present-moment, approaching experiences in an open and nonjudgmental way, and appreciating the transitory nature of experiences and events) may become especially important for adaptation and well-being across the second half of life. Moreover, everyday states of relatively high present-moment attention and nonjudgmental acceptance may also contribute to greater emotional well-being among middle-aged and older adults. A finding of central interest was that adopting a nonevaluative and accepting orientation toward momentary experiences appeared to have particular utility for mitigating emotional reactivity to daily stressors at older ages. Hence, this could be a particularly efficacious coping strategy in the context of age-related vulnerabilities to prolonged and potentially aversive experiences (e.g., chronic illness or caregiving demands). Finally, the findings provide preliminary support for the feasibility and acceptability of app-based mindfulness-meditation training with community-based older adults and suggest a potential avenue for enhancing well-being. Importantly, older adults generally found brief daily engagement with the app-based program relatively easy, enjoyable, and useful. Taken together, the findings in this thesis can help to inform both future research and the development of programs (including digital interventions) aimed at promoting mindfulness-related qualities and skills, flexible adaptation, and well-being for adults in midlife and beyond.

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APPENDICES

Appendix A

Study 1 Advertisement Posted via TurkPrime

RESEARCH PARTICIPATION: Well-Being Across the Lifespan

This study investigates how different experiences, thoughts and behaviors relate to feelings of well-being among adults of different ages. You will be asked to complete an anonymous and confidential online survey about you and your everyday experiences. The survey is estimated to take approximately 20 minutes to complete. Upon completion of the study, you will receive compensation in the amount that you have agreed to with the platform through which you entered this survey.

Appendix B

Study 1 'Letter of Introduction' Presented via Qualtrics



LETTER OF INTRODUCTION

This letter is to introduce Leeann Mahlo, a PhD Candidate in the College of Education, Psychology and Social Work at Flinders University.

Leeann is undertaking research leading to the production of a thesis or other publications on the subject of mindfulness and well-being. We would like to invite you to participate in this project by completing an online questionnaire.

Participation is voluntary, and you are free to discontinue your participation at any time. The project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project Number 7920).

Thank you for your time.

Yours Sincerely,

Dr Tim Windsor

Director, Flinders Centre for Ageing Studies

College of Education, Psychology and Social Work, Flinders University

Appendix C

Study 1 'Information Sheet' Presented via Qualtrics

SURVEY INFORMATION**Title: Well-Being Across the Lifespan****Investigators:**

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Description of the study:

This study is part of the project entitled 'Well-Being Across the Lifespan'. This project will investigate how peoples' experiences, thoughts and behaviours relate to feelings of well-being across adulthood. The project is supported by the Flinders University College of Education, Psychology and Social Work.

Inclusion Criteria:

To participate you must be aged 18 years and over and fluent in the English language.

What will I be asked to do?

You are invited to complete an anonymous and confidential questionnaire about you, your everyday experiences, and feelings of well-being. For example, you will be asked to rate your degree of agreement or disagreement with different statements regarding your views on life, and your emotional experiences (e.g., "The key to a good life is never feeling any pain" and "I can let go of regrets and feelings of dissatisfaction about the past"). The questionnaire is estimated to take approximately 20-30 minutes to complete on one occasion.

Will I be identifiable by being involved in this study?

No, the survey is anonymous. Names will not be recorded, and your responses will not be able to be linked directly to you.

What benefits are anticipated from participating in this study?

The sharing of your experiences will contribute to the understanding of how well-being is experienced across the lifespan. Such knowledge may assist in the development of programs targeted to promote well-being for people at various stages of life.

Are there any risks or discomforts if I am involved?

We do not anticipate any risks or discomforts from your involvement in this study. However, it is possible that questions may address personal issues for some participants. If completing the survey raises any issues of concern, you may wish to contact your local health care provider or medical practitioner.

How do I agree to participate?

Participation is voluntary. You may refuse to answer any questions and you are free to withdraw at any time by ending your online session. Completed and submitted questionnaires will indicate your informed and voluntary consent.

Will I receive payment for my participation in this study?

Upon completion of the study, you will receive compensation in the amount that you have agreed to with the platform through which you entered this survey.

Thank you for taking the time to read this information sheet and we hope that you will accept our invitation to be involved.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number 7920). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on +61 8 8201 3116, by fax on +61 8 8201 2035 or by email human.researchethics@flinders.edu.au

Appendix D

Study 1 Participant Questionnaire Presented via Qualtrics

Names of measures were not presented to participants but are presented here in italics.

SECTION 1: About You

Please tell us your age:

[Years]

Please indicate your gender:

[Male; Female]

Please indicate your ethnicity *(select all that apply)*:

[Caucasian/White; Latino/Hispanic; African American; Middle Eastern; Asian; Native American/Alaska Native; Native Hawaiian/Pacific Islander; Aboriginal/Torres Strait Islander; Māori; Other (please specify)]

Please indicate your religious affiliation:

[Bahá'í; Buddhist; Catholic; Christian; Hindu; Jewish; Islam; Non-Religious; Other (please specify)]

Please indicate your highest level of educational attainment:

[Did not complete High School; Completed High School or Equivalent; Some College or Tertiary; Bachelor's Degree; Postgraduate Degree (e.g., Master's or Doctorate Degree)]

Please indicate your employment status:

[Full-time employment; Part-time employment; Casual employment; Homemaker; Student; Retired; Unemployed]

Please indicate your relationship status:

[Single (never married); Married or Domestic partnership; Separated; Divorced; Widowed]

SECTION 2: Your Everyday Experiences*'Acting with Awareness' Subscale of the FFMQ (Baer et al., 2006)*

Please rate each of the following statements with the number that best describes *your own opinion* of what is *generally true for you*.

(1 = *Never or very rarely true*, 2 = *Rarely true*, 3 = *Sometimes true*, 4 = *Often true*, 5 = *Very often or always true*)

1. When I do things, my mind wanders off and I'm easily distracted.
2. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.
3. I am easily distracted.
4. I find it difficult to stay focused on what's happening in the present.
5. It seems I am "running on automatic" without much awareness of what I'm doing.
6. I rush through activities without being really attentive to them.
7. I do jobs or tasks automatically without being aware of what I'm doing.
8. I find myself doing things without paying attention.

'Nonjudging of Experience' Subscale of the FFMQ (Baer et al., 2006)

Please rate each of the following statements with the number that best describes *your own opinion* of what is *generally true for you*.

(1 = *Never or very rarely true*, 2 = *Rarely true*, 3 = *Sometimes true*, 4 = *Often true*, 5 = *Very often or always true*)

1. I criticise myself for having irrational or inappropriate emotions.
2. I tell myself I shouldn't be feeling the way I'm feeling.
3. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.
4. I make judgments about whether my thoughts are good or bad.
5. I tell myself that I shouldn't be thinking the way I'm thinking.
6. I think some of my emotions are bad or inappropriate and I shouldn't feel them.
7. When I have distressing thoughts or images, I judge myself as good or bad depending what the thought or image is about.
8. I disapprove of myself when I have irrational ideas.

'Noticing' and 'Emotional Awareness' Dimensions of the MAIA (Mehling et al., 2012)

Below you will find a list of statements. Please indicate how often each statement applies to you generally in daily life.

(1 = Never to 5 = Always)

1. When I am tense I notice where the tension is located in my body.
2. I notice when I am uncomfortable in my body.
3. I notice where in my body I am comfortable.
4. I notice changes in my breathing, such as whether it slows down or speeds up.
5. I notice how my body changes when I am angry.
6. When something is wrong in my life I can feel it in my body.
7. I notice that my body feels different after a peaceful experience.
8. I notice that my breathing becomes free and easy when I feel comfortable.
9. I notice how my body changes when I feel happy/joyful.

Brief Experiential Avoidance Questionnaire (BEAQ; Gámez et al., 2014)

Please indicate the extent to which you agree or disagree with each of the following statements.

(1 = strongly disagree, 2 = moderately disagree, 3 = slightly disagree, 4 = slightly agree, 5 = moderately agree, 6 = strongly agree)

1. The key to a good life is never feeling any pain.
2. I'm quick to leave any situation that makes me feel uneasy.
3. When unpleasant memories come to me, I try to put them out of my mind.
4. I feel disconnected from my emotions.
5. I won't do something until I absolutely have to.
6. Fear or anxiety won't stop me from doing something important.
7. I would give up a lot not to feel bad.
8. I rarely do something if there is a chance that it will upset me.
9. It's hard for me to know what I am feeling.
10. I try to put off unpleasant tasks for as long as possible.
11. I go out of my way to avoid uncomfortable situations.

12. One of my big goals is to be free from painful emotions.
13. I work hard to keep out upsetting feelings.
14. If I have any doubts about doing something, I just won't do it.
15. Pain always leads to suffering.

7-Item Nonattachment Scale (NAS-7; Sahdra et al., 2015)

To help us understand your general approach to life and your views about yourself, others, and life in general, tell us the extent to which the following statements reflect your experiences **at this point in your life**. Select a number from 1 to 6 on the scale provided with each statement to rate the extent to which you agree with it. Please answer according to what **really reflects** your experience rather than what you think your experience should be.

(1 = Disagree Strongly, 2 = Disagree Moderately, 3 = Disagree Slightly, 4 = Agree Slightly, 5 = Agree Moderately, 6 = Agree Strongly)

1. I can let go of regrets and feelings of dissatisfaction about the past.
2. I can enjoy pleasant experiences without needing them to last forever.
3. I view the problems that enter my life as things/issues to work on rather than reasons for becoming disheartened or demoralised.
4. I can enjoy my family and friends without feeling I need to hang on to them.
5. I can take joy in others' achievements without feeling envious.
6. I do not get "hung up" on wanting an "ideal" or "perfect" life.
7. When pleasant experiences end, I am fine moving on to what comes next.

Experiences Questionnaire (EQ; Fresco et al., 2007)

We are interested in your recent experiences. Below is a list of things that people sometimes experience. Next to each item are five choices: "never", "rarely", "sometimes", "often", and "all the time". Please darken one of these to indicate how much you currently have experiences similar to those described. Please do not spend too long on each item – it is your first response that we are interested in. Please be sure to answer every item.

1. I am better able to accept myself as I am.
2. I can observe unpleasant feelings without being drawn into them.
3. I notice that I don't take difficulties so personally.

4. I can treat myself kindly.
5. I can separate myself from my thoughts and feelings.
6. I have the sense that I am fully aware of what is going on around me and inside me.
7. I can slow my thinking at times of stress.
8. I can actually see that I am not my thoughts.
9. I am consciously aware of a sense of my body as a whole.
10. I can take time to respond to difficulties.
11. I view things from a wider perspective.

Goal Adjustment Scale (GAS; Wrosch et al., 2003, 2013)

If I have to stop pursuing an important goal in my life...

(1 = strongly disagree to 5 = strongly agree)

1. It's easy for me to reduce my effort toward the goal.
2. I find it difficult to stop trying to achieve the goal.
3. It's easy for me to stop thinking about the goal and let it go.
4. I stay committed to the goal for a long time, I can't let it go.
5. I think about other new goals to pursue.
6. I seek other meaningful goals.
7. I convince myself that I have other meaningful goals to pursue.
8. I tell myself that I have a number of other new goals to draw upon.
9. I start working on other new goals.
10. I put effort toward other meaningful goals.

Scale of Positive and Negative Experience (SPANE; Diener et al., 2010)

Please think about what you have been doing and experiencing during the past four weeks. Then report how much you have experienced each of the following feelings, using the scale below. For each item, select a number from 1 to 5, and indicate that number on your response sheet.

(1 = Very Rarely or Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Very Often or Always)

Positive
Negative
Good
Bad
Pleasant
Unpleasant
Happy
Sad
Afraid
Joyful
Angry
Contented

Satisfaction with Life Scale (SWLS; Diener et al., 1985)

Below are five statements with which you may agree or disagree. Using the 1-7 scale below, indicate your agreement with each item by placing the appropriate number in the line preceding that item. Please be open and honest in your responding.

(1 = Strongly Disagree, 2 = Disagree, 3 = Slightly Disagree, 4 = Neither Agree or Disagree, 5 = Slightly Agree, 6 = Agree, 7 = Strongly Agree)

- _____ 1. In most ways my life is close to my ideal.
_____ 2. The conditions of my life are excellent.
_____ 3. I am satisfied with life.
_____ 4. So far, I have gotten the important things I want in life.
_____ 5. If I could live my life over, I would change almost nothing.

Flourishing Scale (FS; Diener et al., 2010)

Below are eight statements with which you may agree or disagree. Using the 1-7 scale below, indicate your agreement with each item by indicating that response for each statement.

(1 = Strongly disagree, 2 = Disagree, 3 = Slightly disagree, 4 = Mixed or neither agree nor disagree, 5 = Slightly agree, 6 = Agree, 7 = Strongly agree)

I lead a purposeful and meaningful life
My social relationships are supportive and rewarding
I am engaged and interested in my daily activities
I actively contribute to the happiness and well-being of others
I am competent and capable in the activities that are important to me
I am a good person and live a good life
I am optimistic about my future
People respect me

'Physical Functioning' subscale of the RAND 36-Item Health Survey 1.0 (Hays et al., 1993)

The following items are about activities you might do during a typical day. Does **your health now limit** you in these activities? If so, how much?

(1 = Yes, limited a lot, 2 = Yes, limited a little, 3 = No, not limited at all)

Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports

Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf

Lifting or carrying groceries

Climbing **several** flights of stairs

Climbing **one** flight of stairs

Bending, kneeling, or stooping

Walking **more than a mile**

Walking **several blocks**

Walking **one block**

Bathing or dressing yourself

Thank you for participating in this study!

Appendix E

Study 2 Recruitment Email for the Flinders University Research Data Base

Dear [Name],

We are contacting you because you have previously expressed an interest in taking part in research projects related to ageing being conducted by Flinders University.

This email is to introduce Leeann Mahlo and Bethany Wilton-Harding, PhD candidates in the College of Education, Psychology and Social Work at Flinders University. Leeann and Bethany are undertaking research leading to the production of theses or other publications on the subject of well-being in daily life.

If you are aged 50 or older and own a smartphone with text messaging and internet capability, we would like to invite you to participate in this project by completing a 10-day intensive mobile study. You will first be invited to complete a confidential survey about you, your everyday experiences and feelings of well-being, that will take approximately 20-30 minutes to complete. You will then be invited to complete a series of similar but shorter surveys (approximately 2-3 minutes) delivered to your mobile phone via text message links, five times daily for a period of 10 consecutive days.

Be assured that any information provided will be treated in the strictest confidence and no respondents will be individually identifiable in the resulting theses or other publications. Participation is voluntary, and you are entirely free to discontinue your participation at any time or to decline to answer particular questions. This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number 8368).

If you would like further information on this study, please click on the link below (or copy and paste the link into your internet browser). This will direct you to the information sheet. From there, you can choose whether or not you wish to continue with the online screening questions and consequently enroll in the study. Recognising that the study asks for a substantial time commitment from participants (approximately 2 hours in total spread across 11 days), financial compensation for participants' time will be provided (see the information sheet for details).

['Well-Being in Daily Life' - Study Information](#)

If you have any enquiries regarding this project, please contact Leeann or Bethany:

Ms Leeann Mahlo
Ph: (08) 8201 2264

E: leeann.mahlo@flinders.edu.au

Ms Bethany Wilton-Harding
Ph: (08) 8201 3064

E: bethany.wiltonharding@flinders.edu.au

You can also contact me via email (tim.windsor@flinders.edu.au) or phone (08 8201 7588).

Thank you for your time.

Yours sincerely,

Tim Windsor

Associate Professor

College of Education, Psychology & Social Work

Sturt Road, Bedford Park South Australia 5042

GPO Box 2100 Adelaide SA 5001

I P: +61 8 8201 7588 I F: +61 8 8201 3877

E: tim.windsor@flinders.edu.au | flinders.edu.au/people/tim.windsor

CRICOS No: 00114A This email and any attachments may be confidential. If you are not the intended recipient, please inform the sender by reply email and delete all copies of this message.



Appendix F

Study 2 Advertisement for the 'Office of Ageing Well' Feedback Network (via Email) and Digital Magazine, "Weekend Plus"

**'Well-Being in Daily Life': Research Participation Opportunity**

You are invited to participate in a research project that seeks to understand the well-being of adults aged 50 and over in their everyday lives.

***Are you aged 50 or over and own a smartphone with text messaging and internet capability?
Are you interested in contributing to research about well-being in daily life?
If so your help is needed!***

What is this study about?

Researchers from the Flinders University College of Education, Psychology and Social Work are undertaking a project concerned with well-being in daily life. The project seeks to identify how moment-to-moment experiences, thoughts and behaviours relate to everyday well-being across middle and older adulthood.

What does participation involve?

You will first be invited to complete a confidential online survey about you, your everyday experiences and feelings of well-being, that will take approximately 20-30 minutes to complete. You will then be invited to complete a series of similar but shorter surveys (approximately 2-3 minutes) delivered to your mobile phone via text message links, five times daily for a period of 10 consecutive days. Participation is voluntary, and you are entirely free to discontinue your participation at any time or to decline to answer particular questions. Recognising that the study asks for a substantial time commitment from participants (approximately 2 hours in total spread across 11 days), financial compensation for participants' time will be provided.

Why get involved?

The sharing of your experiences will contribute to the understanding of how well-being is experienced across middle and older adulthood. Such knowledge may assist in the development of programs targeted to promote well-being for people at different stages of life.

If you are interested in participating or would like more information, please visit

['Well-Being in Daily Life' - Study Information](#)

or contact the researchers:

Ms Leeann Mahlo
Ph: (08) 8201 2264
E: leeann.mahlo@flinders.edu.au

Ms Bethany Wilton-Harding
Ph: (08) 8201 3064
E: bethany.wiltonharding@flinders.edu.au

Appendix G

Study 2 'Letter of Introduction' Presented via Qualtrics



LETTER OF INTRODUCTION

This letter is to introduce Leeann Mahlo and Bethany Wilton-Harding, PhD Candidates in the College of Education, Psychology and Social Work at Flinders University.

Leeann and Bethany are undertaking research leading to the production of theses or other publications on the subject of well-being in daily life. We would like to invite you to participate in this project by completing a 10-day intensive mobile study.

Participation is voluntary, and you are free to discontinue your participation at any time. The project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project Number 8368).

Thank you for your time.

Yours Sincerely,

Associate Professor Tim Windsor

College of Education, Psychology and Social Work, Flinders University

Appendix H

Study 2 'Information Sheet' Presented via Qualtrics and Email

Study Information**Title: Well-Being in Daily Life****Flinders**
UNIVERSITYCollege of Education,
Psychology & Social Work**Investigators:**

Ms Leeann Mahlo

College of Education, Psychology & Social Work, Flinders University

Ph: +61 (8) 8201 2264

E: leeann.mahlo@flinders.edu.au

Ms Bethany Wilton-Harding

College of Education, Psychology & Social Work, Flinders University

Ph: +61 (8) 8201 3064

E: bethany.wiltonharding@flinders.edu.au

Associate Professor Tim Windsor

College of Education, Psychology & Social Work, Flinders University

Ph: +61 (8) 8201 7588

E: tim.windsor@flinders.edu.au

Description of the study:

This study is part of the project entitled 'Well-Being in Daily Life'. This project will investigate how peoples' experiences, thoughts and behaviours relate to feelings of well-being across middle and older adulthood. The project is supported by the Flinders University College of Education, Psychology and Social Work.

Inclusion Criteria:

To participate you must be aged 50 years and over, fluent in the English language, and own and be able to operate a smartphone with text messaging and internet capability.

What will I be asked to do?

You will first be invited to complete a confidential survey about you, your everyday experiences, and feelings of well-being. For example, you will be asked to rate your degree of agreement or disagreement with different statements regarding your views on life, and your emotional experiences (e.g., "I feel a sense of choice and freedom in the things I undertake" and "I have the sense time is running out"). This survey is estimated to take approximately 20-30 minutes to complete.

You will next be invited to complete a series of similar but shorter surveys delivered to your mobile phone via text message, five times daily for a period of 10 consecutive days. The mobile surveys will be confidential and are estimated to take 2-3 minutes to complete on each occasion. Specifically, each day you will receive four text message prompts between the hours of 9am and 8pm (ACST)* - it is best if you respond to these survey notifications as soon as possible as they will only be available for 30 minutes. If you miss a survey, you will need to wait until the next text message prompt to complete the next survey. The fifth, end-of-day survey will become available at 8:30pm (ACST)* each night and will remain open for 3 hours.

**Please note: These times will vary depending on your location and time zone.*

Will I be identifiable by being involved in this study?

No, the survey responses you provide will not be stored with your name or other identifying information. Only the researchers will have the potential to link your responses to your identity information via a unique identification code and will only do so to manage payments for participation (see below). All data will be stored securely. Please note that you will be asked to provide your email address and phone number so that information regarding the study can be sent to you and we can contact you regarding payment on conclusion of the study. However, your contact details will never be shared with any third parties.

What benefits are anticipated from participating in this study?

The sharing of your experiences will contribute to the understanding of how well-being is experienced moment-to-moment and day-to-day across middle and older adulthood. Such knowledge may assist in the development of programs targeted to promote well-being for people at different stages of life.

Are there any risks or discomforts if I am involved?

We do not anticipate any risks or discomforts from your involvement in this study. However, it is possible that questions may address personal issues for some participants. If completing the surveys raises any issues of concern, you may wish to contact your local health care provider or medical practitioner.

How do I agree to participate?

Your informed and voluntary consent will be indicated when registering for the study online. Throughout the study, you may refuse to answer any questions and you are free to withdraw at any time by ending your online sessions or contacting the study administrators.

Will I receive payment for my participation in this study?

Upon completion of the study, you will receive \$10 as base compensation for your time. Because the success of the study depends on participants responding to as many mobile surveys as possible, you will earn an additional compensation of \$25 if you respond to at least 60% of the mobile surveys (i.e., 30 out of 50), and another \$15 if you respond to at least 80% of the mobile surveys (i.e., 40 out of 50). The total available compensation is \$50. On completion of the study, you will receive an email requesting your preferred payment method (i.e., PayPal, Electronic Funds Transfer or Gift Card).

How will I receive feedback?

A summary of the results will be emailed to you once the project is complete (from late 2020).

Thank you for taking the time to read this information sheet and we hope that you will accept our invitation to be involved.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number 8368). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on +61 8 8201 3116, by fax on +61 8 8201 2035 or by email human.researchethics@flinders.edu.au

Appendix I

Study 2 Participant Eligibility Questions Presented via Qualtrics

1. Are you 50 years of age or older? (*Yes; No*)
2. How fluent in the English language are you? (*Not at all; Somewhat; Very; Completely*)
3. Do you own a smartphone (or mobile phone with a touchscreen)? (*Yes; No*)
4. Are you able to receive text messages and regularly access the internet on your mobile phone? (*Yes; No; Unsure*)
5. Are you willing to respond to multiple, short mobile surveys per day (in exchange for compensation) in order to provide us with information about your daily experiences? (Note that all your responses will be completely confidential and will be linked only with the help of a numerical participation code.) (*Yes; No*)

Appendix J

Study 3 Participant Consent Form Presented via Qualtrics

Congratulations - you are eligible to participate in this study!

If you are interested in participating in this study, please indicate your informed consent below.

I consent to participate as requested in the Information Sheet for the research project on Well-Being in Daily Life.

- I have read the information provided.
- Details of procedures and any risks have been explained to my satisfaction. I am aware that I should retain a copy of the Information Sheet for future reference. (Note: A copy of the Information Sheet will also be emailed to you.)
- I understand that:
 - I may not directly benefit from taking part in this research.
 - Participation is entirely voluntary and I am free to withdraw from the project at any time; and am free to decline to answer particular questions.
 - While the information gained in this study will be published as explained, my participation and my individual information will remain confidential.

***IMPORTANT:** Please enter the same contact details below (i.e., email and phone number) that you will use throughout the entire study, including for receipt of any payment.

Name:

Date of Birth:

Email:

Mobile Phone:

Postcode:

Appendix K

Study 2 Participant Instruction Sheet Provided via Email

Study Instructions

Thank you for your participation in the 'Well-Being in Daily Life' study!

Please read through the entire set of instructions below before starting the intake survey. You can complete the intake survey at a time of your choosing, but please note: the mobile phase of the study will begin the day after the intake survey is completed.

Completing the Intake Survey:

Please use the following link to access the Intake Survey. This is estimated to take approximately 20-30 minutes to complete and can be completed on your desktop or laptop computer.

[Well-Being in Daily Life - Intake Survey](#)

Enrolling in the Mobile Phase of the Study:

Immediately after completion of the Intake Survey, you will be redirected to the sign-up page for the mobile phase of the study

1. Please ensure you select your correct time zone:

QLD/NSW/VIC/TAS = GMT +10

NT/SA = GMT +9:30

WA = GMT +8

2. You will be asked to enter your unique study code: **00000**

During this process, you will be asked to verify your phone by responding to a text message prompt. On the following day, you will begin receiving text message links for the mobile surveys delivered to your smartphone over a period of 10 days. (Note: If you sign up later than 9pm, the text message prompts will start one day later.)

Payment Following Study Completion:

You will receive an email regarding payment within 10 working days of completion of the study.

Thank you once again for your participation!

A pdf copy of the Study Information Sheet and Instructions can be downloaded here:

[Well-Being in Daily Life Study Information and Instructions.pdf](#)

Appendix L

Study 2 Participant Baseline Questionnaire Presented via Qualtrics⁹

Names of measures were not presented to participants but are presented here in italics.

SECTION 1: About You

Please tell us your age:

[Years]

Please indicate your gender:

[Male; Female; Non-binary; Prefer not to say]

Please indicate your ethnicity (*select all that apply*):

[Aboriginal/Torres Strait Islander; African; Asian; Caucasian/White; Other (please specify)]

Please indicate your highest level of educational attainment:

[Did not complete High School; Completed High School or Equivalent; Some College or Tertiary; Bachelor's Degree; Postgraduate Degree (e.g., Master's or Doctorate Degree)]

Please indicate your most relevant employment status:

[Full-time employment; Part-time employment; Casual employment; Homemaker; Student; Retired; Unemployed]

Please indicate your relationship status:

[Single (never married); Married or Domestic partnership; Separated; Divorced; Widowed; Other (please specify)]

⁹ These study-specific measures were presented to participants within a larger questionnaire comprising additional measures for an unrelated study.

SECTION 2: Your Everyday Thoughts, Feelings, and Experiences

Future Time Perspective (FTP) Scale (Carstensen & Lang, 1996)

Read each item and, as honestly as you can, answer the questions: “How true is this of you?” Select the appropriate number on the scale, where **1** means the statement is **very untrue** for you and **7** means that the statement is **very true** for you.

1. Many opportunities await me in the future.
2. I expect that I will set many new goals in the future.
3. My future is filled with possibilities
4. Most of my life lies ahead of me.
5. My future seems infinite to me.
6. I could do anything I want in the future.
7. There is plenty of time left in my life to make new plans.
8. I have the sense time is running out. (R)
9. There are only limited possibilities in my future. (R)
10. As I get older, I begin to experience time as limited. (R)

‘Physical Functioning’ subscale; RAND 36-Item Health Survey 1.0 (Hays et al., 1993)

The following items are about activities you might do during a typical day. Does **your health now limit** you in these activities? If so, how much?

(1 = Yes, limited a lot, 2 = Yes, limited a little, 3 = No, not limited at all)

Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports

Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf

Lifting or carrying groceries

Climbing **several** flights of stairs

Climbing **one** flight of stairs

Bending, kneeling, or stooping

Walking **more than a mile** (1.6km)

Walking **several blocks**

Walking **one block**

Bathing or dressing yourself

Meditation Question

Do you regularly engage in formal meditation practice (i.e., at least once a week over the past month)? *(Yes/No)*

Thank you for your participation!

Appendix M

Study 2 Experience Sampling Questions Presented via Qualtrics

Names of measures were not presented to participants but are presented here in italics.

Multidimensional State Mindfulness Questionnaire (MSMQ; Blanke et al., 2017)

Please recall the period since the last measurement / you woke up: How did you behave, what did you think and feel? That is what the following questions are about...

(0 = *Does not apply at all*, 6 = *Applies strongly*)

1. I focused my attention on the present moment.
2. I opened myself up to what was happening.
3. I concentrated on what I was doing at that moment.
4. I did things/tasks automatically without being aware of what I'm doing.
5. I did things without paying attention.
6. I sometimes did not stay focused on what was happening in the present.
7. I thought some of my thoughts/feelings were slightly off.
8. Things went through my mind that I should not really be engaging myself with.
9. I thought I could have acted more appropriately at a certain time.

State Positive and Negative Affect (based on Blanke et al., 2018)

How have you primarily felt since the last measurement / waking up: Please rate how well the following emotion adjectives describe your feelings during this time period.

(0 = *Does not apply at all*, 6 = *Applies strongly*).

Happy
Relaxed
Content
Nervous
Downhearted
Distressed

Hassle and Uplift Occurrence (based on Blanke et al., 2018)

Since the last measurement / waking up... (Yes/No)

Did something unpleasant happen?

Did something pleasant happen?

Appendix N

Study 2 Payment Information Request Provided to Participants via Email and Qualtrics

Dear Participant,

Thank you for taking the time to participate in the 'Well-Being in Daily Life' study.

Please click the link below to provide your details for payment:

[Well-Being in Daily Life - Payment Survey](#)

After you have submitted your preferred payment method, we will process your payment within 10 business days.

Thank you again for your participation.

Thank you for taking the time to participate in this study.

Our research is focused on how individuals adjust their goals and priorities in middle and older adulthood, and how this relates to aspects of emotional well-being within everyday life. We are also interested in how awareness of changes related to getting older - both in terms of losses and gains - could relate to emotional well-being and how people respond to both positive and stressful experiences in daily life.

If you would like further information on the study aims and outcomes, please contact the researchers via email at:

leeann.mahlo@flinders.edu.au
bethany.wiltonharding@flinders.edu.au

If participating in this survey has raised any personal issues that you would like to discuss further, you may wish to contact your local health-care provider or medical practitioner.

To start your payment request, please enter your name and the email address that you used throughout the study:

Name:

Email:

Please select your preferred payment method:

[Paypal / Electronic Funds Transfer (EFT) / WISH Gift Card (via email or post)]

Appendix O

Study 2 'Summary of Results' Provided to Participants via Email

Well-Being in Daily Life - Study Outcomes**Investigators:**

Ms Leeann Mahlo

College of Education, Psychology & Social Work, Flinders University

Ph: +61 (8) 8201 2264

E: leeann.mahlo@flinders.edu.au

Associate Professor Tim Windsor

College of Education, Psychology & Social Work, Flinders University

Ph: +61 (8) 8201 7588

E: tim.windsor@flinders.edu.au

What was the study about?

This study investigated experiences of mindfulness, everyday pleasant and unpleasant events, and emotional well-being in the daily lives of middle-aged and older adults. The research was supported by the Flinders University College of Education, Psychology and Social Work.

Who participated and what did they do?

One-hundred-and-fifty-seven people aged between 53 and 86 years completed short daily surveys delivered via text message to their smartphones, four times a day over ten consecutive days. Participants completed an average of 30 mobile surveys, resulting in 4761 total observations. (Participants also completed evening diaries unrelated to the present study).

What were the findings?

Results showed that everyday mindfulness was related to greater emotional well-being for participants. Specifically, both higher *present-moment attention* and *nonjudgmental acceptance* in daily life were linked with more positive mood states. In addition, adopting a nonjudgmental and accepting attitude in daily life (i.e., not evaluating things as necessarily good or bad) appeared to buffer the negative impact of daily hassles on emotional well-being (resulting in smaller reductions in positive mood and less rise in negative mood). Interestingly, this beneficial effect of adopting a nonjudgmental and accepting orientation to stressors was stronger at older ages. People tended to report better mood on occasions when a pleasant event occurred but being more mindful did not provide any further boosts to mood on these occasions.

Conclusions

The findings suggest that mindfulness in daily life may contribute to enhanced well-being for adults across the second half of life. Furthermore, adopting a nonevaluative and accepting orientation toward experiences may be an effective strategy that can reduce the negative effects of daily hassles on mood, particularly with increasing age.

Thank you so much to everyone who participated in the study!!

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number 8368/1923). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on +61 8 8201 3116, by fax on +61 8 8201 2035 or by email human.researchethics@flinders.edu.au

Appendix P

Study 3 Recruitment Email for the Flinders University Research Data Base

Dear [Name],

We are contacting you because you have previously expressed an interest in taking part in research projects related to ageing being conducted at Flinders University.

This email is to introduce Leeann Mahlo, a PhD candidate in the College of Education, Psychology and Social Work at Flinders University. Leeann is undertaking research leading to the production of a thesis or other publications on the subject of mindfulness-meditation in older adulthood.

If you are aged 60 or older and own a smartphone (i.e., a mobile phone with a touchscreen) with regular internet access, we would like to invite you to participate in this project by completing a 30-day app-based mindfulness-meditation training program. You will first be invited to complete a short memory assessment that is estimated to take approximately 5 minutes over the phone. You will then be invited to complete a confidential survey about you, your everyday experiences and feelings of well-being, that will take approximately 10-15 minutes to complete. Next, you will be invited to participate in a 30-day self-guided training program involving approximately 10 minutes of meditation each day. Throughout the study, you will also be invited to complete two further questionnaires that are also estimated to take approximately 10-15 minutes each.

Be assured that any information provided will be treated in the strictest confidence and no respondents will be individually identifiable in the resulting theses or other publications. Participation is voluntary, and you are entirely free to discontinue your participation at any time or to decline to answer particular questions. This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number 8420).

If you would like further information on this study, please click on the link below (or copy and paste the link into your internet browser). This will direct you to the information sheet. From there, you can choose whether or not you wish to continue with the online screening questions and indicate your interest in participating.

[‘Mindfulness-Meditation in Older Adulthood’ - Study Information](#)

Alternatively, you can contact Ms Leeann Mahlo via email (leeann.mahlo@flinders.edu.au) or phone (08 8201 2264).

You may also wish to contact me via email (tim.windsor@flinders.edu.au) or phone (08 8201 7588).

Thank you for your time.

Yours sincerely,

Tim Windsor

Associate Professor

College of Education, Psychology & Social Work

Sturt Road, Bedford Park South Australia 5042

GPO Box 2100 Adelaide SA 5001

I P: +61 8 8201 7588 I F: +61 8 8201 3877

E: tim.windsor@flinders.edu.au | flinders.edu.au/people/tim.windsor

CRICOS No: 00114A This email and any attachments may be confidential. If you are not the intended recipient, please inform the sender by reply email and delete all copies of this message.



Appendix Q

Study 3 Advertisement for the University of the Third Age (U3A) eBulletin

**Research Participation Opportunity-Flinders University
Mindfulness-Meditation in Older Adulthood**

Are you aged 65 or over and own a smartphone with regular access to the internet? Are you interested in contributing to research about mindfulness-meditation in older adulthood? If so, your help is needed!

This study is being conducted as a part of a PhD project that seeks to understand people's experience of an app-based mindfulness-meditation program and how this is related to well-being in older adulthood.

Participation involves accessing a mindfulness-meditation app on your smartphone and following a 30-day self-guided training program involving 10 minutes of meditation each day.

U3A members are invited to join this investigation.

If you are interested in participating or would like more information, please click [here](#) or contact Leeann Mahlo at leeann.mahlo@flinders.edu.au or phone(08) 8201 2264.

This project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project Number 8402).

Appendix R

Study 3 'Letter of Introduction' Presented via Qualtrics



LETTER OF INTRODUCTION

This letter is to introduce Leeann Mahlo, a PhD Candidate in the College of Education, Psychology and Social Work at Flinders University.

Leeann is undertaking research leading to the production of a thesis or other publications on the subject of mindfulness-meditation in older adulthood. We would like to invite you to participate in this project by completing a 30-day app-based mindfulness-meditation training program.

Participation is voluntary, and you are free to discontinue your participation at any time. The project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project Number 8402).

Thank you for your time.

Yours Sincerely,

Associate Professor Tim Windsor

College of Education, Psychology and Social Work, Flinders University

Appendix S

Study 3 'Information Sheet' Presented via Qualtrics and Email

Study Information

Title: Mindfulness-Meditation in Older Adulthood**Investigators:**

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Description of the study:

This study is part of the project entitled 'Mindfulness-Meditation in Older Adulthood'. This project will investigate peoples' experiences with an app-based mindfulness-meditation program and how this relates to feelings of well-being in older adulthood. The project is supported by the Flinders University College of Education, Psychology and Social Work.

Inclusion/Exclusion Criteria:

To participate you must be aged 60 years and over, fluent in English, and own and be able to operate a smartphone (i.e., mobile phone with a touchscreen) with regular internet access. However, you will not be eligible to participate if you have engaged in mindfulness and/or meditation for more than 20 total minutes over the past 6 months or have previously used a mindfulness-meditation smartphone app called "Headspace".

What will I be asked to do?

You will first be invited to complete a short memory assessment that is estimated to take approximately 5 minutes over the phone. (This assessment is solely for use during data analysis and will not provide any diagnostic information.) You will then be invited to complete a confidential online questionnaire about you, your everyday experiences and feelings of well-being. For example, you will be asked to rate your degree of agreement or disagreement with different statements regarding your views on life and your emotional experiences (e.g., "I am engaged and interested in my daily activities" and "I find it difficult to stay focused on what's happening in the present moment"). This questionnaire is estimated to take approximately 10-15 minutes to complete. Next, you will be invited to access a commercially available mindfulness-meditation app on your smartphone and participate in a 30-day self-guided training program involving approximately 10 minutes of meditation each day. Throughout the study, you will be invited to complete two further online questionnaires: one during the mindfulness-meditation program (i.e., on day 10 of the study) and another on completion of the study (i.e., day 30). These will be similar to the initial questionnaire and will also ask you about your thoughts and feelings regarding mindfulness-meditation in general and the app-based training program in particular. These confidential questionnaires are also estimated to take approximately 10-15 minutes to complete on each occasion.

Will I be identifiable by being involved in this study?

No, the questionnaire responses you provide are confidential and will not be stored with your name or other identifying information. Only the researchers will have the potential to link your responses to your identity information via a unique identification code and will only do so to manage compensation for participation (see below). All data will be stored securely. Please note that you will be asked to provide your phone number and email address so that we can enrol you in the study and provide you with information related to the study (e.g., instructions for accessing the mindfulness-meditation program and survey links). However, your contact details will be stored separately from your questionnaire responses and will never be shared with any third parties.

What benefits are anticipated from participating in this study?

The sharing of your experiences will contribute to the understanding of how app-based mindfulness-meditation training is experienced by older adults and how this relates to feelings of well-being. Such knowledge may assist in the development of programs targeted to promote well-being in older adulthood. In addition, some participants may find the mindfulness techniques practised throughout the study are helpful in managing emotions and stress in everyday life.

Are there any risks or discomforts if I am involved?

We do not anticipate any risks or discomforts from your involvement in this study. However, it is possible that questions may address personal issues for some participants and that daily meditation could be experienced as inconvenient or difficult in some way. If completing the surveys or participating in mindfulness-meditation raises any issues of concern, you may wish to contact your local health care provider or medical practitioner.

How do I agree to participate?

Your informed and voluntary consent will be obtained when you register online to participate in the study. Throughout the study, you may refuse to answer any questions and you are free to withdraw at any time by ending your online questionnaire or meditation sessions, or by contacting the study administrators.

Will I receive payment for my participation in this study?

On completion of the study, you will receive a complementary two-month subscription to the app-based mindfulness-meditation program (valued at approximately \$40) as compensation for your time.

How will I receive feedback?

A summary of the results will be emailed to you once the project is complete (from early 2020).

Thank you for taking the time to read this information sheet and we hope that you will accept our invitation to be involved.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number 8402). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on +61 8 8201 3116, by fax on +61 8 8201 2035 or by email human.researchethics@flinders.edu.au

Appendix T

Study 3 Participant Eligibility Questions Presented via Qualtrics

1. Are you 60 years of age or older? (*Yes; No*)
2. How fluent in the English language are you? (*Not at all; Somewhat; Very; Completely*)
3. Do you own a smartphone (or mobile phone with a touchscreen)? (*Yes; No*)
4. Are you able to regularly access the internet on your smartphone? (*Yes; No; Unsure*)
6. Have you engaged in any mindfulness and/or meditation practice for more than 20 total minutes during the past 6 months? (*Yes; No; Unsure*)
5. Have you ever used a mindfulness-meditation app called *Headspace*? (*Yes; No; Unsure*)
7. Are you willing to participate in a 30 day, self-guided, app-based mindfulness-meditation program? (*Yes; No*)

Appendix U

Study 3 Participant Consent Form Presented via Qualtrics

Congratulations - you are eligible to participate in this study!

If you are interested in participating in this study, please indicate your informed consent below and we will contact you shortly.

Alternatively, you may wish to contact the primary researcher:

Ms Leeann Mahlo
Ph: (08) 8201 2264
E: leeann.mahlo@flinders.edu.au

I consent to participate as requested in the Information Sheet for the research project on Mindfulness-Meditation in Older Adulthood.

- I have read the information provided.
- Details of procedures and any risks have been explained to my satisfaction. I am aware that I should retain a copy of the Information Sheet for future reference. (Note: A copy of the Information Sheet will also be emailed to you.)
- I understand that:
 - I may not directly benefit from taking part in this research.
 - Participation is entirely voluntary and I am free to withdraw from the project at any time; and am free to decline to answer particular questions.
 - While the information gained in this study will be published as explained, my participation and my individual information will remain confidential.
- I acknowledge that the research conducted will include data collection and analysis regarding my use of the Headspace meditation application. Such data will not include personal or financial information. I hereby authorise Headspace to furnish Flinders University with data regarding my use of the Headspace Application.

Name:

Date of Birth:

Email Address:

Phone Number:

Appendix V

Study 3 Participant Instruction Sheet Provided via Email

HOW TO ACCESS YOUR HEADSPACE ACCOUNT & APP

Here are the instructions for (1) creating a Headspace account and (2) downloading the *Headspace* meditation app that you will be using on your smartphone for the next 30 days.

1. Go to <https://www.headspace.com/code> (on your computer or smartphone).
2. Enter your unique study participation code (see email) and click 'Submit'.
3. Click 'Sign Up For Free' and then enter your email address and create your password.
4. Click 'Sign Up' and then 'Redeem Code' to complete the creation of your account.
5. As you progress through the set-up pages, please select:
 - '10 minutes' for your session length;
 - 'Just checking it out' as your main reason; *and*
 - Any preferred time (Don't worry, you'll be able to access Headspace anytime).
6. To download the Headspace app onto your smartphone, visit the App Store or Google Play (on your phone). Please see the following instructions for how to do this:

If you have an iPhone (iOS):

- Go to the App Store and search for "Headspace".
(*Hint: The Headspace icon is an orange dot on a white background.*)
- Press the cloud icon or 'Get' to download.
- Go to the Headspace app on your phone (look for the orange dot) and log in with the information you used to create your account.

If you have a Smartphone (ANDROID):

- Go to the Google Play Store and search for "Headspace."
(*Hint: The Headspace icon is an orange dot on a white background.*)
- Press the 'Install' button on the Headspace screen to download.
- Go to the Headspace app on your phone (look for the orange dot) and log in with the information you used to create your account.

If you experience any technical issues while using the Headspace app, please email:

help@headspace.com

We encourage you to begin your meditation program within the next 24 hours and to aim for 10 minutes of meditation daily over the next 30 days. You will follow the 'Basics' program (Levels 1-3) which will unlock progressively as you complete each session. If you miss a day, just continue with the program the following day.

Thank you for your participation!

Appendix W

Study 3 Participant Questionnaire Items Presented via Qualtrics

Names of measures were not presented to participants but are presented here in italics.

DEMOGRAPHIC QUESTIONS

Please tell us your age:

[Years]

Please indicate your gender:

[Male; Female; Non-binary; Prefer not to say]

Please indicate your ethnicity (*select all that apply*):

[Aboriginal/Torres Strait Islander; African; Asian; Caucasian/White; Other (please specify)]

Please indicate your highest level of educational attainment:

[Did not complete High School; Completed High School or Equivalent; Some College or Tertiary; Bachelor's Degree; Postgraduate Degree (e.g., Master's or Doctorate Degree)]

Please indicate your most relevant employment status:

[Full-time employment; Part-time employment; Casual employment; Homemaker; Student; Retired; Unemployed]

Please indicate your relationship status:

[Single (never married); Married or Domestic partnership; Separated; Divorced; Widowed; Other (please specify)]

KEY MEASURES

Five Facet Mindfulness Questionnaire (FFMQ-SF; Baer et al., 2006; Bohlmeijer et al., 2011)

Please rate each of the following statements with the number that best describes *your own opinion* of what is *generally true for you*.

(1 = Never or very rarely true, 2 = Rarely true, 3 = Sometimes true, 4 = Often true, 5 = Very often or always true)

1. I'm good at finding words to describe my feelings.
2. I can easily put my beliefs, opinions, and expectations into words.
3. I watch my feelings without getting carried away by them.
4. I tell myself I shouldn't be feeling the way I'm feeling.
5. It's hard for me to find the words to describe what I'm thinking.
6. I pay attention to physical experiences, such as the wind in my hair or sun on my face.
7. I make judgments about whether my thoughts are good or bad.
8. I find it difficult to stay focused on what's happening in the present moment.
9. When I have distressing thoughts or images, I don't let myself be carried away by them.
10. Generally, I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing by.
11. When I feel something in my body, it's hard for me to find the right words to describe it.
12. It seems I am "running on automatic" without much awareness of what I'm doing.
13. When I have distressing thoughts or images, I feel calm soon after.
14. I tell myself that I shouldn't be thinking the way I'm thinking.
15. I notice the smells and aromas of things.
16. Even when I'm feeling terribly upset, I can find a way to put it into words.
17. I rush through activities without being really attentive to them.
18. Usually when I have distressing thoughts or images I can just notice them without reacting.
19. I think some of my emotions are bad or inappropriate and I shouldn't feel them.
20. I notice visual elements in art or nature, such as colours, shapes, textures, or patterns of light and shadow.
21. When I have distressing thoughts or images, I just notice them and let them go.
22. I do jobs or tasks automatically without being aware of what I'm doing.
23. I find myself doing things without paying attention.
24. I disapprove of myself when I have illogical ideas.

Perceived Stress Scale (PSS-10; Cohen, 1983; Cohen & Williamson, 1988)

The questions in this scale ask you about your feelings and thoughts during the last week. In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way. (0 = Never, 1 = Almost never, 2 = Sometimes, 3 = Fairly often, 4 = Very often)

11. In the last week, how often have you been upset because of something that happened unexpectedly?
12. In the last week, how often have you felt that you were unable to control the most important things in your life?
13. In the last week, how often have you felt nervous and “stressed”?
14. In the last week, how often have you felt confident about your ability to handle your personal problems?
15. In the last week, how often have you felt that things were going your way?
16. In the last week, how often have you found that you could not cope with all the things that you had to do?
17. In the last week, how often have you been able to control irritations in your life?
18. In the last week, how often have you felt that you were on top of things?
19. In the last week, how often have you been angered because of things that were outside of your control?
20. In the last week, how often have you felt difficulties were piling up so high that you could not overcome them?

Scale of Positive and Negative Experience (SPANE; Diener et al., 2010)

Please think about what you have been doing and experiencing during the past week. Then report how much you have experienced each of the following feelings, using the scale below. For each item, select a number from 1 to 5, and indicate that number on your response sheet. (1 = *Very Rarely or Never*, 2 = *Rarely*, 3 = *Sometimes*, 4 = *Often*, 5 = *Very Often or Always*)

Positive

Negative

Good

Bad

Pleasant

Unpleasant

Happy

Sad
 Afraid
 Joyful
 Angry
 Contented

Satisfaction with Life Scale (SWLS; Diener et al., 1985)

Below are five statements with which you may agree or disagree. Using the 1-7 scale below, indicate your agreement with each item by placing the appropriate number in the line preceding that item. Please be open and honest in your responding. (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Slightly Disagree*, 4 = *Neither Agree or Disagree*, 5 = *Slightly Agree*, 6 = *Agree*, 7 = *Strongly Agree*)

- _____ 1. In most ways my life is close to my ideal.
 _____ 2. The conditions of my life are excellent.
 _____ 3. I am satisfied with life.
 _____ 4. So far, I have gotten the important things I want in life.
 _____ 5. If I could live my life over, I would change almost nothing.

Attitudes Toward Smartphones (based on Jay & Willis, 1992)

We are interested in your thoughts and feelings about smartphones (i.e., mobile phones with a touchscreen). Please indicate the extent to which you agree or disagree with each of the following statements. (1 = *strongly agree*, 2 = *agree*, 3 = *neither agree or disagree*, 4 = *disagree*, and 5 = *disagree strongly*)

- I feel comfortable with smartphones (i.e., mobile phones with a touchscreen).
 Smartphones make me nervous. (R)
 I don't feel confident about my ability to use a smartphone. (R)
 Smartphones are confusing. (R)
 Smartphones make me feel incapable. (R)
 I know that if I worked hard to learn about smartphones, I could do well.
 Smartphones are *not* too complicated for me to understand.
 I think I am the kind of person who would learn to use a smartphone well.
 I think I am capable of learning to use a smartphone.
 Given a little time and training, I know I could learn to use a smartphone.

Learning about smartphones is a worthwhile and necessary subject.

Reading or hearing about smartphones is boring. (R)

Smartphones are fun to use.

Learning about smartphones is a waste of time. (R)

'Physical Functioning' subscale; RAND 36-Item Health Survey 1.0 (Hays et al., 1993)

The following items are about activities you might do during a typical day. Does **your health now limit** you in these activities? If so, how much?

(1 = Yes, limited a lot, 2 = Yes, limited a little, 3 = No, not limited at all)

Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports

Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf

Lifting or carrying groceries

Climbing **several** flights of stairs

Climbing **one** flight of stairs

Bending, kneeling, or stooping

Walking **more than a mile** (1.6km)

Walking **several blocks**

Walking **one block**

Bathing or dressing yourself

INCLUDED IN DAY 10 & 30 QUESTIONNAIRES ONLY

Intrinsic Motivation Inventory (IMI; Ryan, 1982)

For each of the following statements, please indicate how true it is for you, using the following scale (*1 = not at all true, 4 = somewhat true, 7 = very true*)

Interest / Enjoyment

I enjoyed mindfulness-meditation very much.

Mindfulness-meditation was fun to do.

I thought mindfulness-meditation was boring. (R)

Mindfulness-meditation did not hold my attention at all. (R)

I would describe mindfulness-meditation as very interesting.

I thought mindfulness-meditation was quite enjoyable.

After doing mindfulness-meditation, I was thinking about how much I enjoyed it.

Value / Usefulness

I believe mindfulness-meditation could be of some value to me.

I think that doing mindfulness-meditation is useful.

I think mindfulness-meditation is important to do.

I would be willing to do mindfulness-meditation again because it has some value to me.

I think doing mindfulness-meditation could help me.

I believe doing mindfulness-meditation could be beneficial to me.

I think mindfulness-meditation is an important activity.

Perceived Difficulty

I found mindfulness-meditation difficult to complete

Acceptability and Usability of the Headspace Application (based on Mistler et al., 2017)

Please think about your experiences with the mindfulness-meditation app and rate each statement on a scale from 1 (strongly disagree) to 5 (strongly agree), with 3 rated as neutral.

1. I would use the app often
2. It was too complicated
3. It was easy to use
4. I felt confident using it
5. I felt comfortable using it
6. It was easy to learn
7. The info was easy to understand
8. I could see the screen
9. I had enough meditation time
10. I did not have enough meditation time
11. I did not like the voice
12. I did like the voice

13. The app helped me focus
14. The app did not help me focus
15. The app functions the way I want
16. I would use the app in the future
17. The app was fun to use
18. I would recommend the app to others
19. I was comfortable with the info collected on the app
20. I was worried about the privacy of my info

Appendix X

Study 3 'Summary of Results' Provided to Participants via Email

Mindfulness-Meditation in Older Adulthood - Study Outcomes**Investigators:**

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What was the study about?

This study investigated older adults' experiences of an app-based mindfulness-meditation program and how this related to feelings of well-being. The research was supported by the Flinders University College of Education, Psychology and Social Work.

Who participated and what did they do?

Forty-six individuals aged between 63 and 81 years from the Australian community were invited to engage with a 30-day app-based mindfulness-meditation program for 10 minutes daily. The meditation sessions included focusing on the breath, mentally scanning the body, monitoring the mind's activity, and cultivating a nonjudgmental orientation towards experiences. On average, participants completed 25 sessions and almost 4 hours of application use across the 30 days.

What were the findings?

In general, participants reported significant improvements in mood and satisfaction with life across the 30 days of app use, but no changes in mindfulness or perceptions of stress. On average, participants rated the app-based mindfulness meditation training as interesting, enjoyable, valuable, and useful. In addition, most participants indicated that they found the program easy to use and that they were interested in both using the application in the future and recommending it to others.

Conclusions

The findings provide support for the acceptability of app-based mindfulness-meditation training with community-dwelling older adults and demonstrate potential benefits for well-being. The results also suggest the value of further research investigating the use of digital mindfulness-meditation interventions with older adults.

Thank you so much to everyone who participated in the study!!

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number 8402). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on +61 8 8201 3116, by fax on +61 8 8201 2035 or by email human.researchethics@flinders.edu.au