# Mindfulness as a transdiagnostic prevention programme in secondary schools

by

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# ABSTRACT

Three common mental health disorders show the greatest impact on mortality and disability in young adults: anxiety, depression and eating disorders. These conditions typically emerge in adolescence and tend to influence lifelong trajectories. Mindfulness is a promising approach for prevention across this group of disorders given its robust effects here in adults. However, enthusiasm for this approach in youth outstrips the current evidence base, which shows a paucity of well-controlled trials, none that have tested existing curricula independent of programme developers, and no theoretical or evidence based developmental models to inform adaptation of the successful adult mindfulness based interventions (MBIs).

The purpose of this research was therefore to expand on preliminary MBI research with youth in schools, providing independent tests of the effectiveness of an existing curriculum across a wider range of outcome factors, and investigating potential mediators that might inform active ingredients to emphasise for youth. Further, we tested whether early adolescence, a proposed key developmental window, was an effective time to teach MBIs.

We undertook two RCTs of an existing MBI for adolescents in schools ($N$ = 863; $M_{age}$ 13.5) with null results at post-intervention and 3-12 month follow-up across a wide range of outcome factors. Hypotheses for our lack of intervention effects included the younger age of our sample compared to similar trials, and content/format of current youth curricula modelled on adult MBIs. We report on the preliminary results (at post-intervention) from a third, small RCT ($N$ = 90) testing an alternative mindfulness curriculum for youth with longer weekly sessions and more inquiry, and comparing its effectiveness across adolescent age bands ($M_{age}$ 13.5-16.5).

We also present a series of five experiments adapting and validating a multifactor measure of mindfulness (CHIME-A) for use from early adolescence. This new measure enabled us to investigate the relationship between baseline levels of eight aspects of mindfulness and natural longitudinal trajectories of depression, anxiety and eating disorder risk factors in early adolescents ($N$ = 499). We found a transdiagnostic protective effect related to three key facets of mindfulness (*Accepting and Nonjudgemental Orientation*, *Decentering and Nonreactivity*, and *Acting with Awareness*), although this effect reduced over time. Amplification of these components may improve effectiveness of current youth MBIs.

Drawing these findings together, we suggest that mindfulness curricula in secondary schools may not be universally robust in real-world settings independent of programme

developers. We propose a range of future research options to investigate optimal content, format and age of delivery.

# 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.

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# Chapter 1 : Introduction

## 1.1 Overview

Three mental health disorders show the greatest impact on mortality and disability in young adults: anxiety, depression and eating disorders (Whiteford et al., 2013). These conditions typically emerge in adolescence and tend to become chronic, influencing lifelong trajectories (Agras, 2001; Neil & Christensen, 2009). Mindfulness is a promising approach for a transdiagnostic prevention programme as it teaches skills that counteract three shared risk factors: emotional dysregulation, rumination and maladaptive perfectionism (e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010; Bieling et al., 2012; Egan, Wade, & Shafran, 2011).

Mindfulness has been defined as "the awareness that emerges through paying attention on purpose, in the present moment, and non-judgementally to the unfolding of experience moment by moment" (Kabat-Zinn, 2003, p. 145). Put another way, this allows us to see clearly what is happening in the present moment (both internally and externally) and steady ourselves to be with this (whether it is pleasant, unpleasant or neutral, which are all a normal part of life), thereby creating a space between what happens to us and how we respond. This space allows us to respond consciously rather than with habitual, automatic reactions that are often unskilful (Burnett & Cullen, 2013). Theoretically at least, mindfulness addresses the transdiagnostic risk factors of interest by fostering the capacity to notice and allow strong unpleasant emotions, with patience and curiosity; to step back from thoughts and recognise them as transient mental events that may not be factual; and to cultivate a friendly, compassionate and non-judgemental stance towards oneself. Mindfulness stems from Buddhist origins, but gained more mainstream traction through Kabat-Zinn's pioneering work in the late seventies, bringing these ideas into a scientific and secular context with his 8-week programme for adults (Mindfulness Based Stress Reduction, MBSR; Kabat-Zinn, 1990). Weekly sessions include guided meditation, didactic presentations, and group discussion of experience during the meditations. Discussion is facilitated in a particular way ("Inquiry") by the instructor to allow participants to discover key ideas experientially, such as observation and acceptance (McCown, Reibel & Micozzi, 2010 pp. 127; 137 – 142). Segal, Williams, and Teasdale (2002) built on this framework, incorporating cognitive behaviour therapy (CBT) elements with the core meditation practices and 8-week structure of MBSR to develop Mindfulness Based Cognitive Therapy (MBCT) for people with recurrent depression (McCown, Reibel, & Micozzi, 2010).

While there is robust evidence for the helpful effects of mindfulness-based interventions (MBIs) in adults across the disorders of interest (e.g., Gotink et al., 2015;

Katterman, Kleinman, Hood, Nackers, & Corsica, 2014), research in youth and within schools is a much newer field, with the first randomised controlled trial (RCT) published with primary school children in 2005 (Napoli, Krech, & Holley) and in adolescent school students in 2014 (Raes, Griffith, van der Gucht, & Williams, 2014).

At the time of commencing this thesis, three reviews of MBIs in youth supported the feasibility of this approach across clinical and non-clinical populations (Burke, 2010; Greenberg & Harris, 2012; Meiklejohn et al., 2012) with a range of purported benefits including reduced negative affect and rumination, together with greater wellbeing, socioemotional competence, emotional regulation and attention. However, many limitations with the evidence base were also evident. This included the predominance of uncontrolled studies and/or small sample sizes with a lack of follow-up, the wide array of interventions (length, content, instructor training) preventing direct comparison, an absence of theoretical models to guide these modifications for youth and the dearth of sophisticated measures of mindfulness in this population. Further, no programme had been tested in more than one RCT, nor replicated independent of programme developers. Replication of published psychology research has become an key issue recently (Open Science Collaboration, 2015), and is paramount when interventions impact important policies (such as education) and/or large groups of people (such as children; Makel, Plucker, & Hegarty, 2012). Even when no overt author bias exists, important "tacit knowledge" by developers may not be conveyed in training or manuals, which may impact effectiveness at scale (Maynard, Solis, Miller, & Brendel, 2017).

While MBIs have been conducted with children as young as five (e.g., Napoli, Krech, & Holley, 2005) it has been suggested that adolescence may be a "key developmental window" on the cusp of increasing academic and social pressures (Kuyken et al., 2013) and thus an important opportunity for intervention. Affective processing matures earlier than prefrontal cortical control resulting in a unique mismatch during adolescence that challenges emotional regulation (Riediger & Klipker, 2014, p. 188). MBIs "exercise" networks connecting these regions and may therefore scaffold and strengthen self-regulation (Zelazo & Lyons, 2011). Further, the increased cognitive capacity of adolescents with the emergence of abstract thinking (Cook-Cottone, 2017, p. 94; Williamson, Modecki, & Guerra, 2015) opens the way for MBIs that include higher level skills such as metacognition.

The overall purpose of this thesis was therefore to contribute to the evidence base related to the use of MBIs with youth. This included expanding preliminary MBI research in young people using rigorous experimental design independent of programme developers,

validation of a multidimensional measure of mindfulness in this group, and examination of whether early adolescence was an effective time to teach MBIs. Summarised below are the specific aims and results for each of the six studies that comprise the thesis.

## 1.2 Summary of chapters

The first study (**Chapter 2)** was a randomised controlled trial ($N$ = 308) of a popular 9-week UK curriculum (*.b*: *Mindfulness in Schools*) delivered to early adolescents ($M_{age}$ 13.63, $SD$ = .43). This paper details the long-term impact of the three pathologies of interest, expands the case for mindfulness as a transdiagnostic prevention programme in secondary schools, and describes the conflicting evidence for the benefits of home practice. The aims of the study were to replicate the promising results of an earlier controlled trial using this curriculum by programme developers (Kuyken et al., 2013) but across a broader range of transdiagnostic outcomes. Also examined were the roles of potential mediators (transdiagnostic risk factors as well as mindfulness itself) and moderators (e.g., increased adherence to home practice, gender and baseline levels of pathology). We obtained null results across all outcome factors at post-intervention and 3-month follow-up. This paper has been published in *Behaviour Research and Therapy* (Johnson, Burke, Brinkman, & Wade, 2016).

The adult mindfulness measure we used in the first study proved problematic for young adolescents. Although validated mindfulness scales exist for young people, these are all single factor measures, described fully within the second paper **(Chapter 3)**. A multifactor measure that could individually track the various elements of mindfulness comprising this complex construct would be an important step in understanding its developmental emergence in young people and would enable exploration of mediational pathways in this population. Aiming to investigate whether mindfulness was a measurable, multifactor construct in adolescents, the second study describes a series of five experiments adapting and validating the 8-factor Comprehensive Inventory of Mindfulness Experiences – Adolescents (CHIME-A). This paper has been published in *Psychological Assessment* (Johnson, Burke, Brinkman, & Wade, 2017a).

The third study (**Chapter 4)** was a tighter replication of the *.b* curriculum in a larger sample ($N$ = 555) of early adolescents ($M_{age}$ 13.44), with a secondary aim to test whether increased dose might be achieved by involving parents. Follow-up extended to 12 months (the longest in a school MBI study to date) in order to track whether these skills took longer

to flourish and show effect. Again, there were no differences in outcomes between groups at any time point. This paper has been published in *Behaviour Research and Therapy* (Johnson, Burke, Brinkman, & Wade, 2017b) as a shorter communication. Chapter 4 contains a longer version of this manuscript, with more qualitative detail.

One model of delivery for youth MBIs is training classroom teachers to deliver curricula, with benefits including scalability of the programme, and increased mindfulness input between and beyond formal weekly lessons with students. The amount of training needed for safe and effective teaching of mindfulness to youth is unknown. We sought qualitative feedback from a group of volunteer school teachers ($N = 19$) who completed a full 8-week Mindfulness Based Stress Reduction (MBSR) course on whether they thought a condensed course format would yield sufficient understanding to instruct students. **Chapter 5** presents this as a brief qualitative report**.**

The fifth study (**Chapter 6)** investigated the relationship between baseline levels of mindfulness (eight aspects) and natural longitudinal trajectories of depression, anxiety and eating disorder risk factors in early adolescents ($M_{age}$ at baseline 13.45) over twelve months ($N = 499$). We found a transdiagnostic protective effect for those high in three key facets of mindfulness (*Accepting and Nonjudgemental Orientation*, *Decentering and Nonreactivity*, and *Acting with Awareness*), although this effect reduced over time. This paper will appear in *Early Interventions in Psychiatry* (Johnson & Wade, *in press,* accepted 20.8.17).

Two hypotheses were proposed for the lack of effect for the *.b* curriculum across our two RCTs. First, that the content and/or format of the programme is insufficient to gain traction with youth. Second, that early adolescents are less receptive to conceptually based MBIs than slightly older teens. Our final study (**Chapter 7)** was a preliminary investigation of a youth MBI (*Mindfulness Training for Teens)* more closely modelled on adult curricula (content and session duration) that had shown improvements in depression in a Belgian RCT ($M_{age}$ 15.4; Raes et al., 2014). We compared this programme across adolescent age bands ($M_{age}$ 13.5-16.5) for feasibility, acceptability and relative effectiveness ($N = 90$). Although our results did not reach significance at post-intervention with a relatively small sample size, effect sizes were relatively large compared to our earlier trials and similar school based studies, and with a suggestion that older adolescents might gain more benefit. Collection of six-month follow-up data beyond this PhD will test whether any significant benefits emerge, prior to submission for publication.

The thesis concludes with a general discussion **(Chapter 8)** that summarises the main findings, incorporates these with recent research in the field, considers study limitations and presents suggestions for future research.

## 1.3 Reader navigation

This thesis incorporates one *in press* and three published manuscripts. The format of each paper as a stand-alone peer-reviewed article necessitates some repetition of background information to contextualise each study. To minimise further duplication, a literature review has therefore been omitted with the reader directed to the manuscripts in sequence for this information. References, tables and figures appear at the end of every chapter.

References

Agras, W. (2001). The consequences and costs of the eating disorders. *Psychiatric Clinics of North America, 24*, 371- 379. doi:10.1016/S0193-953X(05)70232-X

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review, 30*, 217-237. doi:10.1017/S0954579416000638

Bieling, P. J., Hawley, L. L., Bloch, R. T., Corcoran, K. M., Levitan, R. D., Young, L. T., . . . Segal, Z. V. (2012). Treatment-Specific Changes in Decentering Following Mindfulness-Based Cognitive Therapy Versus Antidepressant Medication or Placebo for Prevention of Depressive Relapse. *Journal of Consulting & Clinical Psychology, 80*(3), 365-372. doi:10.1037/a0027483

Burke, C. (2010). Mindfulness-Based Approaches with Children and Adolescents: A Preliminary Review of Current Research in an Emergent Field. *Journal of Clinical and Family Studies, 19*(2), 133-144. doi:10.1007/s10826-009-9282-x

Burnett, R., & Cullen, C. (2013). *.b Mindfulness in Schools Curriculum. https://mindfulnessinschools.org/*

Cook-Cottone, C. (2017). *Mindfulness and Yoga in Schools. A Guide for Teachers and Practitioners*. New York: Springer.

Egan, S., Wade, T., & Shafran, R. (2011). Perfectionism as a transdiagnostic process: A clinical review. *Clinical Psychology Review, 31*(2), 203-212. doi:10.1016/j.cpr.2010.04.009

Gotink, R., Chu, P., Busschbach, J., Benson, H., Fricchione, G., & Hunink, M. (2015). Standardised Mindfulness-Based Interventions in Healthcare: An Overview of Systematic Reviews and Meta-Analyses of RCTs. *PLoS One, 10*(4), e0124644. doi:10.1371/journal.pone.0124344

Greenberg, M. T., & Harris, A. R. (2012). Nurturing Mindfulness in Children and Youth: Current State of Research. *Child Development Perspectives, 6*(2), 161-166. doi:10.1111/j.1750-8606.2011.00215.x

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2016). Effectiveness of a school-based mindfulness program for transdiagnostic prevention in young adolescents. *Behaviour Research and Therapy, 81*, 1-11. doi:10.1016/j.brat.2016.03.002

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2017a). Development and Validation of a Multifactor Mindfulness Scale in Youth: The Comprehensive Inventory of

Mindfulness Experiences-Adolescents (CHIME-A). *Psychological Assessment, 29*(3), 264-281. doi:10.1037/pas0000342

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2017b). A randomized controlled evaluation of a secondary school mindfulness program for early adolescents: do we have the recipe right yet? *Behaviour Research and Therapy, 99,* 37-46. doi:10.1016/j.brat.2017.09.001

Johnson, C., & Wade, T. (*in press,* accepted 20.8.17). Which aspects of mindfulness are important to include in adolescent interventions? *Early Interventions in Psychiatry.* doi:10.1111/eip.12490

Kabat-Zinn, J. (1990). *Full Catastrophe Living*. New York: Dell.

Kabat-Zinn, J. (2003). Mindfulness-Based Interventions in Context: Past, Present, and Future. *Clinical Psychology: Science and Practice, 10*(2), 144-156. doi:10.1093/clipsy.bpg016

Katterman, S. N., Kleinman, B. M., Hood, M. M., Nackers, L. M., & Corsica, J. A. (2014). Mindfulness meditation as an intervention for binge eating, emotional eating, and weight loss: A systematic review. *Eating Behaviors, 15*(2), 197-204. doi:10.1016/j.eatbeh.2014.01.005

Kuyken, W., Weare, K., Ukoumunne, O., Vicary, R., Motton, N., Burnett, R., . . . Huppert, F. (2013). Effectiveness of the Mindfulness in Schools Programme: non-randomised controlled feasibility study. *British Journal of Psychiatry, 203*, 126-131. doi:10.1192/bjp.bp.113.126649

Makel, M., Plucker, J., & Hegarty, B. (2012). Replications in Psychology Research: How Often Do They Really Occur? *Perspectives on Psychological Science, 7*(6), 537-542. doi:10.1177/1745691612460688

Maynard, B., Solis, M., Miller, V., & Brendel, K. (2017). Mindfulness-based interventions for improving cognition, academic achievement, behavior and socio-emotional functioning of primary and secondary students. *Campbell Systematic Reviews, 5*. doi:10.4073/csr2017.5

McCown, D., Reibel, D., & Micozzi, M. (2010). *Teaching mindfulness: A practical guide for clinicians and educators*. New York: Springer.

Meiklejohn, J., Phillips, C., Freedman, M., Griffin, M., Biegel, G., Roach, A., . . . Saltzman, A. (2012). Integrating mindfulness training into K-12 education: Fostering the resilience of teachers and students. *Mindfulness, 3*(4), 291-307. doi:10.1007/s12671-012-0094-5

Napoli, M., Krech, P., & Holley, L. (2005). Mindfulness training for elementary school students: The attention academy. *Journal of Applied School Psychology, 21*, 99-125. doi:10.1300/J370v21n01_05

Neil, A. L., & Christensen, H. (2009). Efficacy and effectiveness of school-based prevention and early intervention programs for anxiety. *Clinical Psychology Review, 29*(3), 208-215. doi:10.1016/j.cpr.2009.01.002

Open Science Collaboration. (2015). Estimating the reproducibility of psychological science. *Science, 349*(6251). doi:10.1126/science.aac4716

Raes, F., Griffith, J., Van der Gucht, K., & Williams, J. (2014). School-based prevention and Reduction of Depression in Adolescents: A Cluster-Randomized Trial of a Mindfulness Group Program. *Mindfulness, 5*(5), 477-486. doi:10.1007/s12671-013-0202-1

Riediger, M., & Klipker, K. (2014). Emotion Regulation in Adolescence. In J. J. Gross (Ed.), *Handbook of Emotion Regulation* (2nd ed.). New York: Guilford Press.

Segal, Z., Williams, J., & Teasdale, J. (2002). *Mindfulness-based cognitive therapy for depression: a new approach to preventing relapse*. New York: Guilford.

Whiteford, H. A., Degenhardt, L., Rehm, J., Baxter, A. J., Ferrari, A. J., Erskine, H. E., . . . Vos, T. (2013). Global burden of disease attributable to mental and substance use disorders: Findings from the Global Burden of Disease Study 2010. *The Lancet, 382*(9904), 1575-1586. doi:10.1016/S0140-6736(13)61611-6

Williamson, A., Modecki, K., & Guerra, N. (2015). SEL Programs in High School. In J. A. Durlak, C. Domitrovich, R. P. Weissberg, & J. Gullotta (Eds.), *Handbook of Socioemotional Research and Practice*. New York: Guilford.

Zelazo, P., & Lyons, K. (2011). Mindfulness Training in Childhood. *Human Development, 54*, 61-65. doi:10.1159/000327548

# Chapter 2 :

# Effectiveness of a school-based mindfulness programme for transdiagnostic prevention in young adolescents

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**Candidate's contribution:**
CJ reviewed the literature, designed the study in collaboration with supervisors, trained in and delivered the intervention in schools, collected data, analysed data and prepared manuscript under supervision of Wade. Minor comments on interpretation by Burke and Brinkman.
Research design 90%; Data collection 100%; Analysis 90%; Writing and editing 90%.

## 2.1 Abstract

Anxiety, depression and eating disorders show peak emergence during adolescence and share common risk factors. School-based prevention programmes provide a unique opportunity to access a broad spectrum of the population during a key developmental window, but to date, no programme targets all three conditions concurrently. Mindfulness has shown promising early results across each of these psychopathologies in a small number of controlled trials in schools, and therefore this study investigated its use in a randomised controlled design targeting anxiety, depression and eating disorder risk factors together for the first time. Students ($M_{age}$ 13.63; $SD$ = 0.43) from a broad band of socioeconomic demographics received the eight lesson, once weekly *.b* ("Dot be") mindfulness in schools curriculum ($N$ = 132) or normal lessons ($N$ = 176). Anxiety, depression, weight/shape concerns and wellbeing were the primary outcome factors. Although acceptability measures were high, no significant improvements were found on any outcome at post-intervention or 3-month follow-up. Adjusted mean differences between groups at post-intervention were .03 (95% CI: -.06-.11) for depression, .01 (-.07-.09) for anxiety, .02 (-.05-.08) for weight/shape concerns, and .06 (-.08-.21) for wellbeing. Anxiety was higher in the mindfulness than the control group at follow-up for males, and those of both genders with low baseline levels of weight/shape concerns or depression. Factors that may be important to address for effective dissemination of mindfulness-based interventions in schools are discussed. Further research is required to identify active ingredients and optimal dose in mindfulness-based interventions in school settings.

## 2.2 Introduction

Anxiety and depression typically emerge in mid-late adolescence (Neil & Christensen, 2009; Teesson et al., 2014; Zisook et al., 2007) and although eating disorders can emerge earlier, a peak also occurs at this time (Doyle, Smyth, & Grange, 2012) with high levels of comorbidity (Pearlstein, 2002). Twelve month prevalence rates for anxiety and depression in young Australians are 15% and 6% respectively (Australian Bureau of Statistics, 2007). These conditions tend to become chronic and episodic, spreading to impact academic achievement, employment, social relationships and physical health (Neil & Christensen, 2009). Eating disorders in Australia, affecting approximately ten percent of adolescents (Fairweather-Schmidt & Wade, 2014), are severe, chronic conditions that are usually associated with other serious physical and psychological pathologies, and result in lowered quality of life (Agras, 2001). However, even subclinical disordered eating, affecting over 20% of young women in one Australian study, is associated with significant reductions in quality of life (Wade, Wilksch, & Lee, 2012). Evidence is accumulating for transdiagnostic risk factors across these three disorders, including difficulties in emotional regulation (Aldao, Nolen-Hoeksema, & Schweizer, 2010), rumination (McEvoy, Watson, Watkins, & Nathan, 2013; Nolen-Hoeksema & Watkins, 2011) and maladaptive perfectionism (Egan, Wade, & Shafran, 2011) with its key element of harsh self-criticism (Dunkley, Zuroff, & Blankstein, 2003). Hence a combined intervention approach might be possible.

School-based prevention programmes offer a means of targeting a broad portion of the population at or before peak emergence of these conditions (Calear & Christensen, 2010; Nehmy, 2010). A strong case exists for "universal" programmes which are offered to all students, thus avoiding the disadvantages of programmes that select out at-risk individuals e.g., lack of failsafe screening, potential stigmatisation and the loss of opportunity for immunising all youth (Nehmy, 2010). To date, no prevention programme successfully targets anxiety, depression and eating disorders simultaneously, which would be an advantage in terms of cost effectiveness and reducing demands on school curricula.

Mindfulness presents as one promising strategy, defined as "the awareness that emerges through paying attention on purpose, in the present moment, and non-judgementally to the unfolding of experience moment by moment" (Kabat-Zinn, 2003, p. 145). Kabat-Zinn brought ideas stemming from Buddhist origins into a scientific and secular context with his 8-week programme for adults (Mindfulness Based Stress Reduction, MBSR; Kabat-Zinn, 1990). Segal, Williams, and Teasdale (2002) built on this framework, incorporating cognitive

behaviour therapy (CBT) elements to develop Mindfulness Based Cognitive Therapy (MBCT) for people with recurrent depression (McCown, Reibel, & Micozzi, 2010). Mindfulness addresses the transdiagnostic risk factors of interest by fostering the capacity to notice and allow strong unpleasant emotions (e.g., Arch & Craske, 2006; Leahey et al., 2008), to step back from thoughts and recognise them as transient mental events that may not be factual (e.g., Bieling et al., 2012; Teasdale et al., 2002) and to cultivate a friendly, compassionate and non-judgemental stance towards oneself (e.g., Kuyken et al., 2010; Shapiro, Brown, & Biegel, 2007).

Over thirty years of research on mindfulness-based interventions (MBSR and MBCT) in adults shows robust support for treatment of anxiety and depression (especially of a recurrent nature) with moderate effect sizes (Baer, 2003; Grossman, Niemann, Schmidt, & Walach, 2004; Khoury et al., 2013). More recently, benefits are emerging for eating disorders, particularly binge and emotional eating (Katterman, Kleinman, Hood, Nackers, & Corsica, 2014). However, the current state of research in youth is a much newer field overrepresented at this nascent stage by uncontrolled trials (Britton, Lepp, Niles, Rocha, Fisher, & Gold, 2014; Burke, 2010; Felver, Celis-de Hoyos, Tezanos, & Singh, 2015; Meiklejohn et al., 2012; Tan, 2015; Waters, Barsky, Ridd, & Allen, 2014; Zack, Saekow, Kelly, & Radke, 2014).

It has been suggested that adolescents may receive particular benefit from school based mindfulness programmes given the confluence between adequate cognitive development and the increase in academic and social stressors (Broderick & Metz, 2009; Kuyken et al., 2013). To date there have been eight controlled studies of mindfulness interventions derived from MBCT or MBSR in secondary schools. Improvements have been reported across a range of outcomes including negative affect (Bluth et al., 2016; Broderick & Metz, 2009; Kuyken et al., 2013; Raes, Griffith, van der Gucht, & Williams, 2014; Sibinga et al., 2013), stress (Kuyken et al., 2013; Metz, Frank, Reibel, Cantrell, Sanders, & Broderick, 2013), optimism/wellbeing (Kuyken et al., 2013), rumination (Sibinga et al., 2013), emotional regulation, calmness and somatization (Broderick & Metz, 2009; Metz et al., 2013), and eating disorder risk factors/symptoms (Atkinson & Wade, 2015).

Four of these eight studies are of note, three being randomised controlled trials (Raes et al., 2014; Sibinga et al., 2013; Atkinson & Wade, 2015) and three including follow-up (3 months, Kuyken et al., 2013; and 6 months, Raes et al., 2014; Atkinson & Wade, 2015). Two of these studies found significant improvements for depression, both showing between-group effect sizes of $d$ =.3 at post-intervention and follow-up (Kuyken et al., 2013; Raes et al.,

2014) and with both a treatment and prevention effect demonstrated by Raes and colleagues. A broadening of results at follow-up to include reduced stress ($d$ = .25) and increased wellbeing ($d$ =.3) was also shown by Kuyken et al., (2013) suggesting mindfulness skills may strengthen over time, in contrast to the gradually decreasing long term effects of many school prevention programmes (Stockings et al., 2015; Weare & Nind, 2011). Although no improvement in negative affect was found in either of the following studies, Sibinga et al. (2013) showed reduced anxiety and rumination compared to controls at the end of the intervention, with medium to large between-group effect sizes ($d$ = .64 and .79 respectively), and Atkinson and Wade (2015) demonstrated improvements in a broad range of eating disorder variables, with medium between-group effect sizes ranging from .47 to .67 at 6-month follow-up. The limitations of these studies include the lack of randomisation (Kuyken et al., 2013), small sample size and large attrition rates (Sibinga et al., 2013), use of an eating disorder specific programme (Atkinson & Wade, 2015), and limited outcome variables (Raes et al., 2014). However, findings across these four studies suggest that mindfulness programmes are worthy of replication and continued exploration under more rigorous experimental conditions.

Mindfulness-based interventions (MBSR and MBCT) traditionally place an emphasis on the importance of daily home practice to maximise benefits, although empirical support for this is conflicting. Some researchers have demonstrated a positive association between formal practice and outcome in adults (e.g., Crane et al., 2014; Perich, Manicavasagar, Mitchell, & Ball, 2013) and youth (Huppert & Johnson, 2010; Kuyken et al., 2013) but other adult studies have shown no benefit without a trauma background (Williams et al., 2013) and no relationship between informal practice and outcomes (Crane et al., 2014). Given the conscript audience in school-based mindfulness interventions, and the competing demands for homework time across subjects, the benefits of home practice are particularly important to investigate further in youth.

Therefore, the first aim of our study was to assess whether the promising effects of mindfulness-based interventions in schools could be replicated in a randomised controlled trial independent of programme developers in an Australian context. The second related aim was to investigate a broad range of primary outcome measures, including anxiety, depression, wellbeing, and a risk factor for eating disorders (weight and shape concerns), in order to assess the potential of this intervention as a transdiagnostic prevention programme. Secondary measures were two transdiagnostic risk factors that have shown a relationship to mindfulness in non-experimental research in adolescents: emotional dysregulation (Ciarrochi,

Kashdan, Leeson, Heaven, & Jordan, 2011; Kerrigan et al., 2011) and self-compassion (a potential antidote to self-critical perfectionism; Bluth & Blanton, 2014). Changes in the mindfulness construct were investigated as well, as recommended by Tan (2016). The third aim was to assess whether any benefits were moderated by increased adherence to home practice. We predicted that all of our outcome measures would show improvement in the mindfulness group compared to the control group at post-intervention and follow-up. It was also predicted that, compared to the control group, the mindfulness intervention would be more effective in improving the primary outcome variables in those with high levels of home mindfulness practice.

## 2.3 Method

### 2.3.1 Participants

A range of urban coeducational secondary schools in Adelaide, South Australia who were either known to the researchers, had expressed interest in being involved in research or were conveniently located were contacted by email with telephone follow up, and four schools (one private, three public) agreed to participate. One public primary school also expressed interest in taking part and was included in the study. Students in Year 7 (primary school) and 8 (secondary school) were targeted as representing a crucial developmental point where abstract reasoning capacity has developed sufficiently, but before the escalating pressures of mid-late adolescence, a key time for emergence of common mental health disorders (Calkins, 2010; Zisook et al., 2007).

Power analysis showed that to detect a Cohen's *d* effect size of 0.3, typical for a universal school-based study (Kuyken et al., 2013; Raes et al., 2014), with a power level of 0.80, 228 participants were required; 115 in each group (Hedeker, Gibbons, & Waternaux, 1999).

### 2.3.2 Design

A cluster (class) based randomised controlled design was used. Within the same year level (i.e., age matched), pairs of classes nominated by each school were randomly allocated to one of two groups, either control or mindfulness. Although clustering at school level would have prevented contamination, clustering at the class level within schools allowed for optimal matching across demographic variables e.g., socioeconomic status, school type (public, private) and individual school culture. The threat of contamination within schools was

considered low due to the class based training and student practice activities being conducted at home. Outcome measures were taken on three occasions, one week pre- and post-intervention, as well as 11 weeks later at the end of the school year. This represents a 3 (time) by 2 (group) repeated measures design.

### 2.3.3 Procedure

Research approval was granted by each School Principal, the South Australian Department for Education and Child Development, and the Social and Behavioural Research Ethics Committee of Flinders University, South Australia. Active (opt-in) consent was sought from both students and their parents or guardians for use of questionnaire data only, as the Mindfulness Programme was considered standard socio-emotional learning curriculum.

Pairs of classes nominated by each school were randomly allocated to either the control or mindfulness groups using the randomisation function available in Excel 2010. This was performed by the principal investigator prior to any contact with participating teachers, and following an *a priori* rule such that the higher random numbers were assigned to mindfulness classes within each school. Participants filled out questionnaires either online using Qualtrics Survey software, or on paper. Testing was performed in a classroom setting with students requested to observe test conditions (i.e., work individually and silently), with the principal investigator and teacher present to answer any questions. It was not possible for students or the researcher to be blind to the allocated treatment group.

### 2.3.4 Intervention

The mindfulness-based intervention chosen was the *.b* ("Dot be") Mindfulness in Schools curriculum which is based on the adult programmes MBCT/MBSR but modified for adolescents in line with principles identified from reviews of effective school-based mental health and wellbeing programmes (e.g., explicit teaching of skills and attitudes, shorter practices, interactive and experiential teaching methods, and age appropriate resources such as the course manual and guided practices for home; Kuyken et al., 2013). Use of this tightly manualised curriculum enabled us to make direct comparison with a non-randomised, controlled UK trial showing promising results in secondary schools (Kuyken et al., 2013) and training is available internationally including Australia. The programme consists of nine weekly lessons (for detailed lesson structure see http://mindfulnessinschools.org/what-is-b/nine-lessons/), the length of which can be modified to suit a school's normal lesson length. This varied from 35-60 minutes in the schools in our study. In order to fit the length of the

school term and to allow follow–up a term later, the programme was reduced to 8 lessons, with the introductory lesson shortened for inclusion in the first session.

Throughout the course, a range of mindfulness practices were taught: short unguided practices (breath counting, *.b*: stop and be present, mindfulness of routine daily activities including walking, and watching thought traffic) and two 9-minute guided audio files ("FOFBOC: Feet on floor and bum on chair", a seated body scan and breath awareness; and "Beditation", a lying down body scan and relaxation practice). Guided by a homework manual, students were encouraged to practice these at home in a structured way outside of formal lessons. The control group undertook normal curricular lessons, which were mostly pastoral care or community projects. All mindfulness lessons were conducted by the first author (CJ), a mindfulness practitioner with ten years of personal practice, who in addition to *.b* curriculum certification had undergone adult facilitator training. Before this study commenced, she had also run a small pilot community youth group with the *.b* programme to establish familiarity with the curriculum.

### 2.3.5 Primary outcome measures

***Anxiety and Depression.*** Negative affect was measured using the Depression Anxiety Stress Scale – Short form (DASS-21; Lovibond & Lovibond, 1995). Sound psychometric properties have been demonstrated in adults (Brown, Chorpita, Korotitsch, & Barlow, 1997; Henry & Crawford, 2005; Tully, Zajac, & Venning, 2009) and the anxiety and depression factors show good fit in non-clinical adolescents (Szabo, 2010; Tully et al., 2009; Willemsen, Markey, Declercq, & Vanheule, 2011), thus these two seven-item subscales were used in the current study. Each item is scored on a 4-point scale from 0 *"never"* to 3 *"almost always"*, with higher scores reflecting higher depression or anxiety over the past week. Examples of items include *"I couldn't seem to experience any positive feeling at all"* and *"I was worried about situations in which I might panic and make a fool of myself".* Cronbach's alpha in this study for depression was .91 and for anxiety was .78.

***Weight and Shape Concerns.*** The weight and shape subscales form two of the four subscales assessed by the Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 1994), and are considered to best represent the broad construct of weight concerns that has been found to be one of the strongest risk factors for disordered eating in adolescents (Jacobi & Fittig, 2010; Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004). This questionnaire correlates well with the interview format, which itself has excellent psychometric properties (Berg, Peterson, Frazier, & Crow, 2012; Luce & Crowther, 1999;

Mond, Hay, Rodgers, Owen, & Beaumont, 2004). These 12 items use a 7-point rating scale ranging from 0*"not at all"* to 6*"markedly"*, but in order to simplify for this age group, a 4-point scale was used with the same anchors. Questions relate to the last 28 days and include "*How dissatisfied have you felt about your weight?"* and "*Has your shape influenced how you think about yourself as a person?"* Higher scores indicate greater concerns. Internal consistency of the combined score in this study was α = .96.

***Wellbeing.*** This construct was measured using the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS). This 14-item scale has been validated in both university student and community adult populations (Tennant et al., 2007). The WEMWBS was also used by Kuyken et al. (2013) in their secondary school sample. This 14 item scale surveys the last two weeks, using items such as *"I've been feeling optimistic about the future"* and *"I've been feeling close to other people".* Items are rated on a 5-point scale from 1 *"none of the time"* to 5 "*all of the time*", with higher scores signifying higher wellbeing. Internal consistency in the current study was α =.92.

### 2.3.6 Secondary outcome measures

***Mindfulness***. The Child and Adolescent Mindfulness Measure (CAMM) was used in this study, and this scale has been validated in 10 – 17 year olds (Greco, Baer, & Smith, 2011). The CAMM is a 10-item scale, rated from 0 *(never true)* to 4 *(always true)*. Items include statements such as "I keep myself busy so I don't notice my thoughts or feelings", and "At school, I walk from class to class without noticing what I'm doing". All items are reversed to score the questionnaire, with higher scores reflect greater mindfulness. Internal reliability for the current study was α = .85.

***Emotional Dysregulation.*** This was measured using the Difficulties in Emotional Regulation Scale (DERS; Gratz & Roemer, 2004) which has shown sound psychometric properties in a large community sample of adolescents for the subscales and the overall score (Weinberg & Klonsky, 2009), with the latter being used in the current study. The 36 DERS items are rated from 1 *"almost never"* to 5 *"almost always"* and include items such as *"When I am upset, I feel out of control"* and *"I have difficulty making sense out of my feelings".* Higher scores indicate greater difficulty in regulating emotions. Cronbach's alpha for the current study was α =.92.

***Self-compassion.*** The Self-compassion scale (SCS) is a widely used 26-item questionnaire with sound psychometric properties (Neff, 2003). Six subscales or an overall score can be derived, the latter of which was used in this study. The SCS has also been used

in two adolescent samples with good internal consistency (Bluth & Blanton, 2014; Neff & McGeehee, 2010) which was supported in the current study, $\alpha = .91$. The SCS uses 5-point Likert scales spanning 1 (*almost never)* to 5 (*almost always)* with higher scores indicating greater self-compassion. Items include *"When things are going badly for me, I see the difficulties as part of life that everyone goes through"* and *"When I'm going through a very hard time, I give myself the caring and tenderness I need"*.

### 2.3.7 Homework practice.

At the two post-intervention time points, additional questions were added to the questionnaire package, surveying amount of home practice. At T2 (one week post completion) students were asked *"During the 8 week course, how often did you practice each of the following techniques outside of the lessons?* Students were supplied with a list of techniques learnt during the mindfulness course and asked to rate each on a 5-point scale as follows: 1 *"never",* 2 *"once or twice in total",* 3 *"greater than twice in total but less than once a week",* 4 *"once or twice each week"* to 5 *"three times or more each week".* At T3 (end of school year, 11 weeks later) the question was reworded *"Since the mindfulness course at school, how often have you used the following mindfulness techniques?"*

### 2.3.8 Course Acceptability Measures

***Student feedback.*** Participants in the mindfulness intervention group undertook a survey in the last lesson of the course based on a similar measure used by Kuyken et al. (2013). Students were asked to rate the following four questions on a 0-10 point Likert scale with higher scores indicating greater satisfaction/likelihood: *"How would you rate the course in terms of being enjoyable and interesting?", "How much do you think you have learnt during the course?", "In the future, how likely are you to use any of the techniques you have learnt?" and "How would you rate the instructor?".*

***Teacher feedback.*** Teachers in the mindfulness intervention classes as well as school counsellors who attended any lessons also undertook a survey in the last lesson of the course. Staff were asked to rate the same four questions relating to their own experience of the course. In addition, staff were asked *"In your opinion, do you think the course would be more effective if run by the regular class teacher (with some supported mindfulness training) or by an experienced mindfulness trainer (not necessarily a school teacher) coming into the school? Why?".*

***Post hoc qualitative interview*.** Given the very poor consent rate (25%) for the lowest socioeconomic school rendering statistical analysis of this subgroup impossible, and marked difficulties with classroom behaviour in this setting during intervention delivery, a further face to face debriefing meeting was conducted with the school counsellor and classroom teacher following the course. Questions raised by the researcher included whether the content and structure of the *.b* curriculum lessons were appropriate for these students with high rates of trauma backgrounds, challenging home environments and/or behaviour issues; and how the course might be modified to maximise input for engaged students but still expose disruptive students to the ideas (e.g., smaller groups, different setting to usual classroom, shorter and more frequent lessons).

### 2.3.9 Statistical Analysis

All analyses were performed using IBM Statistical Package for the Social Sciences, Version 22 (IBM SPSS). One-way ANOVA tests were conducted to examine potential baseline differences between groups completing one, two or three waves of data. Data were not adjusted for the effect of clustering, given that each school contained mindfulness and control groups, and the same instructor delivered all mindfulness classes. Primary and secondary outcome analyses were conducted using Linear Mixed Modelling (LMM), enabling inclusion of cases with missing data via maximum likelihood estimation, with baseline measures entered as covariates. The amount of home practice was investigated as a moderator of outcome at T2 (amount of home practice during the course) and T3 (amount of home practice since the course) for the mindfulness group, using hierarchical multiple regression and controlling for baseline at Step 1, with the overall mean frequency of homework practices during the relevant period entered in Step 2. Where Cohen's *d* effect sizes appear throughout this thesis, the following formula is used: $M_1 - M_2/SD_{pooled}$.

## 2.4 Results

### 2.4.1 Description of participants

**Figure 2.1** shows the flow of participants through the study. Ten parents (2.4% of eligible students) actively requested that their child not be involved in the study, and of these, the four students in the mindfulness group undertook private study outside of the classroom during these lessons while the six students in the control group did not take part in survey analysis. Consent forms were not returned for a further 97 students (23.4% of eligible

students), and these data were not included in the analysis. Non-return of consent forms was over-represented by the lowest socioeconomic school, rendering 75% of student data unable to be used in this setting.

Participating schools represented a broad range of socioeconomic status as measured on the Index of Community Socio-Educational Advantage (ACARA, 2011), whereby 1000 represents the mean, with a standard deviation of 100. The participating schools ranged from 951 to 1160, with a mean index of 1047 (*SD* = 85.77). Schools were categorised for this study as low SES (within one *SD* below mean; two participating schools), medium SES (within one *SD* above mean; two participating schools) or high SES (greater than one *SD* above mean; one participating school).

Of the 308 students who participated, the mean age was 13.63 (*SD* = 0.43) and 47.7% were female. At a participant level, 16.2% of students were in the low SES band, 39% were in the medium category, and 44.8% were in the high SES category. At baseline, 21.6 % of the sample scored in the clinical range for depression (moderate or above on DASS-21) and 22.2% for anxiety.

### 2.4.2 Preliminary Analyses

Data for anxiety, depression, emotional dysregulation and weight/shape concerns were positively skewed. Following square root transformations *Z* scores for these variables improved to acceptable parameters for normality. After transformation there were between one and six outliers at baseline for the following variables: depression, anxiety, self-compassion and emotional dysregulation. These were retained in the analyses.

Comparable percentages of students were missing at each time point, and one-way ANOVA analyses showed no significant differences on baseline characteristics between those participants who were present for one, two or three waves of data collection. It is noted that for mindfulness, one of the secondary outcomes, this approached significance, $F(2,271) = 3.0$, $p = .051$, such that those who missed two waves of data collection trended towards showing lower levels of mindfulness than those who were missed one or no waves. However, numbers of students missing two waves of data were small ($N = 13$; 4.2%).

Attendance over the 8-lesson course was high ($M = 7.09$; SD = 1.56), with 87% attending at least six of the eight lessons. Due to the very low consent rates at the SES schools, this data is more representative of middle-high SES bands.

### 2.4.3 Repeated Measures Analyses

Descriptive statistics (means and standard deviations) for the mindfulness intervention and control groups across each of the three time points are shown in **Table 2.1,** including within-group effect sizes from baseline. **Table 2.2** presents results from the mixed models analysis after adjusting for baseline scores, demonstrating only a main effect of time for anxiety, with no main effects of group or group-time interactions for any primary or secondary outcome variable. Between group effect sizes were small at both time points for all outcome variables, ranging from .01 to .28.

Given the absence of significant differences, LMM was also used to investigate gender, depression, anxiety and weight/shape concerns as moderators. For depression and anxiety, "high" classifications were based on scoring moderate or above ($\geq 7$ or $\geq 6$ respectively). For weight/shape concerns, a median split was used. Results of these analyses are shown in **Table 2.3.** All significant moderator by group by time interactions were found at three-month follow-up, where anxiety was higher in the mindfulness group compared to controls for males (Cohen's $d = .22$), and also for those with low baseline weight/shape concerns ($d = .30$) or low baseline depression ($d = .27$). A previous study showing higher levels of mindfulness on the CAMM in adolescent males aged 12-15 years (Kuby, McLean, & Allen, 2015) suggested testing for gender differences in this measure might be instructive in interpreting these results. A subsequent independent t-test demonstrated that in our sample, males ($M = 2.63$, $SD = .76$) were higher at baseline on mindfulness than females ($M = 2.23$, $SD = .73$), $t(272) = 4.36$, $p < .001$, $d = .54$.

### 2.4.4 Home Practice Analyses

Mean frequencies for each type of home practice both during the course (measured post-intervention) and since the course (measured at follow-up) are shown in **Table 2.4**. Across all techniques, on average, students undertook self-directed mindfulness practice less than once a week at both time-points. Overall, 26.25% of students undertook homework once a week or more during the course, and this had reduced to 12.72% at follow-up. Longer practices requiring audio files were done less frequently at both time points, and at follow up, and frequencies for all practices had reduced compared to immediately post-intervention.

Amount of home practice was investigated as a moderator. As can be seen in **Table 2.5**, frequency of homework did not account for significant variance in any of the primary dependent variables after accounting for baseline scores.

### 2.4.5 Course Acceptability

Students in the mindfulness group completed course acceptability questionnaires during the last lesson ($N$ = 129). On 0-10 Likert scales, mean scores were as follows: enjoyment and interest 6.67 (median 7, range 0-10); amount learnt 6.73 (median 7, range 0-10) and likelihood of using techniques in the future 6.14 (median 7, range 0-10). These scores are comparable to those reported by Kuyken et al. (2013). Instructor rating by students for the current course was 8.49 (median 9, range 0-10).

Seven classroom teachers and two school counsellors who also attended lessons completed course questionnaires pertaining to their personal experience of the course, with mean scores as follows: enjoyment and interest 9.44 (median 10, range 8-10); amount learnt 8.56 (median 9, range 5-10); likelihood of using techniques in the future 8.88 (median 10, range 8-10) and instructor rating 9.67 (median 10, range 8-10). Teachers were also asked to comment on whether an external facilitator or an embedded school teacher should deliver the course. Of the seven respondents, three preferred an external facilitator, citing increased student engagement with a novel presenter, and the need for extensive teacher training to deliver such a specialised topic. Four respondents nominated a co-teaching role as ideal, benefitting from the combination of an expert in mindfulness working with the teacher taking care of classroom behaviour. One of these teachers suggested that teachers could progress to become self-sufficient with delivery in this model. The final two respondents felt both approaches had merit, with external facilitators lacking detailed knowledge of student background, but embedded teachers needing to be engaged and well trained to deliver the programme adequately.

A *post hoc* qualitative interview with the school teacher and counsellor from the lowest SES school was conducted following the intervention, prompted by the poor consent rates and behaviour problems at this school. Importantly, school staff felt that the content and structure of this course was appropriate for this cohort, and that it worked well to give students the freedom to "tune out" by inviting them to put their heads down on the desk to rest at any time, but at the same time allowing them to be exposed to alternative strategies for dealing with unpleasant emotions and thoughts. Staff felt this course compared favourably to other programmes that had been trialled in the school, as it contained less theory and did not require expensive equipment to implement, but had good practical strategies for immediate use. Suggestions were made to spend longer in the introductory session to engage students, as immediate defence strategies such as "I've coped in the past; I don't need this" were noted by

the classroom teacher. A firm team–teaching alliance was also seen as important, with someone always present who knew the students' backgrounds, with expectations of behaviour more firmly outlined in the introductory lesson, and with consistent classroom teacher follow-up if boundaries were crossed. Reinforcement of ideas during pastoral care lessons was cited as an ideal accompaniment to the course. Moving forwards, staff suggested using a different room for future delivery in order to interrupt classroom dynamics, including use of smaller groups to increase interaction and better manage behaviour issues, and running sessions twice a week to reinforce ideas.

## 2.5 Discussion

This study investigated an existing 8-week mindfulness curriculum in early adolescents within a randomised controlled design, with a wide range of outcome measures: depression, anxiety, wellbeing, eating disorder risk factors, emotional dysregulation, self-compassion and mindfulness. Unlike earlier promising studies in secondary schools (Kuyken et al., 2013; Raes et al., 2014; Sibinga et al., 2013; Atkinson & Wade, 2015), we found no improvements in any of the outcome variables either immediately post-intervention or at three-month follow-up, despite high acceptability of the programme amongst students and teachers.

In contrast, self-rated anxiety was higher in the mindfulness group at follow-up across a range of subgroups: males, and those of both genders with low baseline levels of weight/shape concerns or depression. Increases in negative affect post mindfulness-based intervention have been demonstrated previously in adults (Brooker et al., 2013). These authors suggested that this may be due to increased awareness of emotional states as mindfulness increases, which was supported by improvement in the "observing" subscale of their mindfulness measure (Five Facet Mindfulness Questionnaire, Baer et al., 2008). While we did not see a concomitant increase in mindfulness in our study, we used a short, single factor youth measure (CAMM) which may not have had the capacity to detect this type of change. Males showed higher baseline scores for mindfulness in our adolescent sample, replicating a recent finding by Kuby et al. (2015), and this may have amplified the effect of increasing awareness. It is more difficult to explain the increases in anxiety for those low in depression and weight/shape concerns at baseline. One possibility is a jump in awareness of emotional states in these groups which may become somewhat ruminative in nature. Brooker et al. (2013) hypothesised that as mindfulness continues to develop, one might then start to

see a decrease in negative affect. However, at the three month follow-up mark in our study, anxiety levels remained greater in these subgroups. Taken overall, effect sizes for all subgroup interactions were small ($d < .30$) and further investigations of moderators in this age group will be instructive.

Universal studies can be subject to floor or ceiling effects on measures, given the relative health of the sample compared to clinical groups. We were able to compare our low baseline measures for depression on the DASS-21 to two other similar school based studies to explore this possibility. Clinical levels of depression at baseline, using standard clinical cut-offs for the DASS-21, were similar in our sample (intervention group = 16.7%; control = 23.3%) to Raes et al. in their 2014 study demonstrating improvement (21%; 24%). Further, Nehmy & Wade (2015) reported similarly low mean scores at baseline (.57; .59) to our study (.53; .64), yet were still able to detect improvement (lowering of scores) in their 6-week CBT intervention in schools. Together with the lack of improvement across any of the other six outcome measures, the presence of floor or ceiling effects do not adequately explain our findings.

Given the exponential growth of studies supporting mindfulness in young people, it is sobering to find that under tightly controlled experimental conditions we were unable to replicate the postulated improvements in mental health. One explanation for a lack of effect is that while mindfulness programmes for youth are downward derivations of adult curricula, underlying mechanisms of change may differ between these two populations given incomplete neurocognitive development in the maturing brain (Meiklejohn et al., 2012; Tan, 2015). As yet, no model of mindfulness in youth exists to describe the developmental trajectory of its various facets with and without intervention. In the absence of cross-sectional measurement of mindfulness facets in different age groups in youth, and mediational pathway research within age brackets, programme developers are, to a degree, "flying blind" in applying a model that may have limited applicability to this group (Burke, 2010; Meiklejohn et al., 2012).

In the effective 8-week adult mindfulness programmes, classes are 2.5 hours supplemented by 40 minutes of daily home practice. Questions remain as to how to best dilute youth programmes so they are digestible and safe while still achieving an effect. Of the four controlled trials in secondary schools to date, all were once weekly, single module programmes, based on the traditional structure of adult interventions. The *.b* curriculum allows variable lesson length to fit school timetables, and although not reported by Kuyken et al. (2013), this varied in our trial from 35 minutes to 60 minutes. By contrast, dosage within

weekly lessons was greater in the curricula used by Sibinga et al. (2013) and Raes et al. (2014): 50 minutes per lesson over 12 weeks, and 100 minutes over eight weeks, respectively. However, Atkinson and Wade (2015) also allowed variable lesson length in a comparatively short (3-week) curriculum that focused on applying aspects of mindfulness to body image. Although there was no change in negative affect, lasting improvement occurred across a broad range of eating disorder variables (weight/shape concerns, dietary restraint, thin ideal and eating disorder symptoms). This suggests that applying mindfulness principles to specific scenarios (e.g., body image in magazines, mirror exercises) might increase its effectiveness in youth, and this is worthy of further investigation across a broader range of applications. Future studies might also formally investigate optimal lesson length, or whether alternative strategies to increase the dose of mindfulness (e.g., short daily classroom practices, extending curriculum length or teaching additional modules over subsequent year levels) achieve more robust replication of positive effects in young people.

An alternative explanation for the lack of effect in our study relates to programme adherence. While the *.b* curriculum is tightly manualised, there were three variations made during delivery in our trial that may have inadvertently had an impact on dosage and effect. First, the nine week course was shortened to eight weeks by reducing the introductory lesson (designed to engage students in why mindfulness might be of benefit) to a ten minute presentation combined with Lesson 1. In retrospect this may have been a key omission, potentially impacting on home practice commitment, particularly with a conscript audience. Second, course manuals were supplied to students in most schools in e-format in our trial, which meant that students had to either convert the file or print a hard copy in order to complete the home practice log, which created extra barriers to undertaking homework that was not being checked or graded. Third, this particular curriculum is designed to be delivered by embedded teachers in schools rather than an external facilitator, such as was used in our programme. The benefits of class teacher delivery extend beyond increased disseminability to include more regular contact with the class for embodiment of mindful behaviour, drip-feeding of ideas across the curriculum, regular reminders of daily home practice, and the opportunity to conduct extra mindfulness practices between the formal weekly lessons. Taken together, these adherence changes may have reduced the overall dose of mindfulness outside of formal lessons, in particular through home practice compliance. Illustrating this, only 26.25% of our students undertook home practice once a week or more during the course, which contrasts sharply with Huppert and Johnson (2010) who, in an earlier iteration of the *.b* curriculum, reported nearly 70% of students undertaking self-directed practice more than

once a week. Rates of ongoing mindfulness practice at 3-month follow-up were also lower in our study (12.72% practising once a week or more) compared to Kuyken et al. (2013) who found 21% of students continued practising at least once a week. Although our study did not support a relationship between degree of home practice and outcome, this may reflect the small numbers of participants in the high compliance group, and future school-based studies should continue to carefully evaluate self-directed practice to either clearly demonstrate its benefit to students or conversely, to remove this added demand if results do not support an effect.

Competent delivery of the mindfulness programme evaluated in this trial must be examined as another potential issue. In our study, ratings from students and school staff support the *.b* instructor's competency in engaging students in the classroom, despite the lack of prior teaching experience. However, a separate issue is instructor experience in delivering mindfulness-based interventions. Although the *.b* instructor exceeded the mindfulness prerequisites for delivering the *.b* curriculum, she would be considered an early phase adult mindfulness instructor (Mindfulness Training Institute of Australasia, MTIA, 2014). This does raise questions about competencies to teach mindfulness-based interventions to youth, as evidenced in a previous study which found such competency to be critical to obtaining significant improvements (Atkinson & Wade, 2015). Certainly in adults, competencies are becoming more tightly prescribed (Crane et al., 2012) and it could be argued that competency to teach youth should be just as tightly monitored, or even more so, given the vulnerability of this population. However, this would prevent large-scale dissemination, and Felver et al. (2015) suggest the possibility that mindfulness-based interventions for young people, being more simplistic, may require less extensive training than the more comprehensive adult programmes. How much training is enough for safe and effective dissemination of mindfulness on a large scale to young people remains an important area for future research.

Given the benefits of school teachers conducting mindfulness-based programmes through increased contact with students, it was interesting that from an experiential perspective, staff preference in our trial leant towards an external facilitator or a team teaching approach. Certainly there was an emerging theme that school teacher motivation in developing competence to teach mindfulness (ranked as very important by staff in this trial) would vary. While the novelty of an external presenter may be of benefit in mid to high socioeconomic demographics, the behavioural challenges apparent with the lowest socioeconomic school in our study support the idea that teacher familiarity and trust may be a crucial element in successfully imparting skills with this group (Bluth et al., 2016).

The design of this study addresses several shortcomings identified in the literature (Britton et al., 2014; Burke, 2010; Felver et al., 2015; Meiklejohn et al., 2012; Tan, 2015; Waters et al., 2014). First, it was a multi-site, randomised controlled design with a moderately large sample size based on *a priori* power calculations. Second, it included follow-up (three months). Third, it sought to replicate an existing mindfulness-based intervention for youth. Fourth, socioeconomic status was not only reported but a broad range of socioeconomic bands included, although it was unfortunate that poor opt-in consent rates resulted in high data wastage in the lower range schools. Use of the same instructor for all classes in the intervention arm represents a strength (consistency) and a limitation (generalisability of findings). Another limitation is the reliance on self-report measures. It is recommended that future studies aim to include multiple source measures such as parent and teacher reports. Accessing existing school databases for academic and behaviour records may also be worth considering as a relatively simple way to add weight to self-report results.

## 2.6 Conclusion

In a tightly controlled experimental design, evaluating the impact of an existing and widely available school-based mindfulness programme, no improvements were demonstrated on any outcome measure either immediately post-intervention or at 3-month follow-up. Further research, including investigation of mediators and moderators in experimental designs, is required to identify active ingredients and optimal dose in mindfulness-based programmes in school settings.

References

ACARA (2011). *Guide to understanding ICSEA*. Sydney: Australian Curriculum Assessment and Reporting Authority.

Agras, W. (2001). The consequences and costs of the eating disorders. *Psychiatric Clinics of North America, 24*, 371- 379. doi: 10.1016/S0193-953X(05)70232-X

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review, 30*, 217-237. doi:10.1016/j.cpr.2009.11.004

Arch, J., & Craske, M. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy, 44*(12), 1849-1858. doi:10.1016/j.brat.2005.12.007

Atkinson, M., & Wade, T. (2015). Mindfulness-based prevention for eating disorders: A school-based cluster randomised controlled pilot study. *International Journal of Eating Disorders, 48*(7), 1024-1037. doi:10.1002/eat.22416

Australian Bureau of Statistics. (2007). *National Survey of Mental Health and Wellbeing*. Retrieved from http://www.ausstats.abs.gov.au/

Baer, R. (2003). Mindfulness Training as a Clinical Intervention: A Conceptual and Empirical Review. *Clinical Psychology: Science and Practice, 10*, 125-143. doi:10.1093/clipsy/bpg015

Baer, R., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., . . . Williams, J. M. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment, 15*(3), 329-342. doi:10.1177/1073191107313003

Berg, K., Peterson, C., Frazier, P., & Crow, S. (2012). Psychometric evaluation of the eating disorder examination and eating disorder examination-questionnaire: A systematic review of the literature. *International Journal of Eating Disorders, 45*, 428-438. doi:10.1002/eat.20931

Bieling, P. J., Hawley, L. L., Bloch, R. T., Corcoran, K. M., Levitan, R. D., Young, L. T., . . . Segal, Z. V. (2012). Treatment-Specific Changes in Decentering Following Mindfulness-Based Cognitive Therapy Versus Antidepressant Medication or Placebo for Prevention of Depressive Relapse. *Journal of Consulting & Clinical Psychology, 80*(3), 365-372. doi:10.1037/a0027483

Bluth, K., & Blanton, P. (2014). Mindfulness and Self-Compassion: Exploring Pathways to Adolescent Emotional Well-Being. *Journal of Child and Family Studies, 23*(7), 1298-1309. doi:10.1007/s10826-013-9830-2

Bluth, K., Campo, R., Pruteanu-Malinici, S., Reams, A., Mullarkey, M., & Broderick, P. (2016). A School-Based Mindfulness Pilot Study for Ethnically Diverse At-Risk Adolescents. *Mindfulness, 7*(71), 90-104. doi:10.1007/s12671-014-0376-1

Britton, W., Lepp, N., Niles, H., Rocha, T., Fisher, N., & Gold, J. (2014). A randomized controlled pilot trial of classroom-based mindfulness meditation compared to an active control condition in sixth-grade children. *Journal of School Psychology, 52*, 263-278. doi:10.1016/j.jsp.2014.03.002

Broderick, P. C., & Metz, S. (2009). Learning to BREATHE: A Pilot Trial of a Mindfulness Curriculum for Adolescents. *Advances in School Mental Health Promotion, 2*(1), 35-46. doi:10.1080/1754730X.2009.9715696

Brooker, J., Julian, J., Webber, L., Chan, J., Shawyer, F., & Meadows, G. (2013). Evaluation of an Occupational Mindfulness Program for Staff Employed in the Disability Sector in Australia. *Mindfulness, 4*(2), 122-136. doi:10.1007/s12671-012-0112-7

Brown, T. A., Chorpita, B. F., Korotitsch, W., & Barlow, D. H. (1997). Psychometric properties of the Depression Anxiety Stress Scales (DASS) in clinical samples. *Behaviour Research and Therapy, 35*(1), 79-89. doi:10.1016/S0005-7967(96)00068-X

Burke, C. (2010). Mindfulness-Based Approaches with Children and Adolescents: A Preliminary Review of Current Research in an Emergent Field. *Journal of Clinical and Family Studies, 19*(2), 133-144. doi:10.1007/s10826-009-9282-x

Calear, A. L., & Christensen, H. (2010). Systematic review of school-based prevention and early intervention programs for depression. *Journal of Adolescence, 33*(3), 429-438. doi:10.1016/j.adolescence.2009.07.004

Calkins, S. D. (2010). Psychobiological models of adolescent risk: Implications for prevention and intervention. *Developmental Psychobiology, 52*(3), 213-215. doi:10.1002/dev.20435

Ciarrochi, J., Kashdan, T. B., Leeson, P., Heaven, P., & Jordan, C. (2011). On being aware and accepting: A one-year longitudinal study into adolescent well-being. *Journal of Adolescence, 34*(4), 695-703. doi:10.1016/j.adolescence.2010.09.003

Crane, C., Crane, R. S., Eames, C., Fennell, M. J. V., Silverton, S., Williams, J. M. G., & Barnhofer, T. (2014). The effects of amount of home meditation practice in

Mindfulness Based Cognitive Therapy on hazard of relapse to depression in the Staying Well after Depression Trial. *Behaviour Research and Therapy, 63*, 17-24. doi:10.1016/j.brat.2014.08.015

Crane, R., Soulsby, J., Kuyken, W., Williams, J., Eames, C., Bartley, T., . . . Silverton, S. (2012). The Bangor, Exeter and Oxford Mindfulness-Based Interventions Teaching Assessment Criteria. Bangor: Bangor University.

Doyle, P. M., Smyth, A., & Grange, D. L. (2012). Childhood and adulthood: When do eating disorders start and do treatments differ? In Alexander, J. and Treasure, J.(Eds.) *A collaborative approach to eating disorders* (pp. 217-224). New York, NY: Routledge/Taylor & Francis Group.

Dunkley, D., Zuroff, D., & Blankstein, K. (2003). Self-Critical Perfectionism and Daily Affect: Dispositional and Situational Influences on Stress and Coping. *Journal of Personality & Social Psychology, 84*(1), 234-252. doi:10.1037/0022-3514.84.1.234

Egan, S., Wade, T., & Shafran, R. (2011). Perfectionism as a transdiagnostic process: A clinical review. *Clinical Psychology Review, 31*(2), 203-212. doi:10.1016/j.cpr.2010.04.009

Fairburn, C., & Beglin, S. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders, 16*, 363-370. doi:10.1002/1098-108X(199412)16:4<363::AID-EAT2260160405>3.0.CO;2-#

Fairweather-Schmidt, K., & Wade, T. (2014). DSM-V Eating disorders and other specified eating and feeding disorders: Is there a meaningful differentiation? *International Journal of Eating Disorders*, *47*(5), 524-533. doi:10.1002/eat.22257

Felver, J. C., Celis-de Hoyos, C. E., Tezanos, K., & Singh, N. N. (2015). A Systematic Review of Mindfulness-Based Interventions for Youth in School Settings. *Mindfulness*. doi:10.1007/s12671-015-0389-4

Gratz, K., & Roemer, L. (2004). Multidimensional Assessment of Emotion Regulation and Dysregulation: Development, Factor Structure, and Initial Validation of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment, 26*(1), 41-54. doi:10.1023/B:JOBA.0000007455.08539.94

Greco, L., Baer, R., & Smith, G. T. (2011). Assessing Mindfulness in Children and Adolescents: Development and Validation of the Child and Adolescent Mindfulness Measure (CAMM). *Psychological Assessment, 23*(3), 606-614. doi:10.1037/a0022819

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*, 35-43. doi:10.1016/S0022-3999(03)00573-7

Hedeker, D., Gibbons, R., & Waternaux, C. (1999). Sample Size Estimation for Longitudinal Design With Attrition: Comparing Time-related Contrasts Between Two Groups. *Journal of Educational and Behavioral Statistics, 24*(1), 70-93. doi:10.3102/10769986024001070

Henry, J., & Crawford, J. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 44*(2), 227-239. doi:10.1348/014466505X29657

Huppert, F. A., & Johnson, D. M. (2010). A controlled trial of mindfulness training in schools: The importance of practice for an impact on well-being. *The Journal of Positive Psychology, 5*(4), 264-274. doi:10.1080/17439761003794148

Jacobi, C., & Fittig, E. (2010). Psychosocial risk factors for eating disorders. In W. Agras (Ed.), *The Oxford Handbook of Eating Disorders* (pp. 123-136). New York: Oxford University Press.

Jacobi, C., Hayward, C., de Zwaan, M., Kraemer, H., & Agras, W. (2004). Coming to Terms With Risk Factors for Eating Disorders: Application of Risk Terminology and Suggestions for a General Taxonomy. *Psychological Bulletin, 130*(1), 19-65.

Kabat-Zinn, J. (1990). *Full Catastrophe Living*. New York: Dell.

Kabat-Zinn, J. (2003). Mindfulness-Based Interventions in Context: Past, Present, and Future. *Clinical Psychology: Science and Practice, 10*(2), 144-156. doi:10.1093/clipsy.bpg016

Katterman, S. N., Kleinman, B. M., Hood, M. M., Nackers, L. M., & Corsica, J. A. (2014). Mindfulness meditation as an intervention for binge eating, emotional eating, and weight loss: A systematic review. *Eating Behaviors, 15*(2), 197-204. doi:10.1016/j.eatbeh.2014.01.005

Kerrigan, D., Johnson, K., Stewart, M., Magyari, T., Hutton, N., Ellen, J. M., & Sibinga, E. M. S. (2011). Perceptions, experiences, and shifts in perspective occurring among urban youth participating in a mindfulness-based stress reduction program. *Complementary Therapies in Clinical Practice, 17*(2), 96-101. doi:10.1016/j.ctcp.2010.08.003

Khoury, B., Lecomte, T., Fortin, G., Masse, M., Therien, P., Bouchard, V., . . . Hofmann, S. G. (2013). Mindfulness-based therapy: a comprehensive meta-analysis. *Clinical Psychology Review, 33*(6), 763-771. doi:10.1016/j.cpr.2013.05.005

Kuby, A., McLean, N., & Allen, K. (2015). Validation of the Child and Adolescent Mindfulness Measure (CAMM) with Non-Clinical Adolescents. *Mindfulness, 6*, 1448-1455. doi:10.1007/s12671-015-0418-3

Kuyken, W., Watkins, E., Holden, E., White, K., Taylor, R., Byford, S., . . . Dalgleish, T. (2010). How does mindfulness-based cognitive therapy work? *Behaviour Research and Therapy, 48*, 1105-1112. doi:10.1016/j.brat.2010.08.003

Kuyken, W., Weare, K., Ukoumunne, O., Vicary, R., Motton, N., Burnett, R., . . . Huppert, F. (2013). Effectiveness of the Mindfulness in Schools Programme: non-randomised controlled feasibility study. *British Journal of Psychiatry, 203*, 126-131. doi:10.1192/bjp.bp.113.126649

Leahey, T. M., Crowther, J. H., & Irwin, S. R. (2008). A Cognitive-Behavioral Mindfulness Group Therapy Intervention for the Treatment of Binge Eating in Bariatric Surgery Patients. *Cognitive and Behavioral Practice, 15*(4), 364-375. doi:10.1016/j.cbpra.2008.01.004

Lovibond, S., & Lovibond, P. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Sydney: Psychology Foundation.

Luce, K. H., & Crowther, J. H. (1999). The reliability of the eating disorder examination—Self-report questionnaire version (EDE-Q). *International Journal of Eating Disorders, 25*(3), 349-351. doi: 10.1002/(SICI)1098-108X(199904)25:3<349::AID-EAT15>3.0.CO;2-M

McCown, D., Reibel, D., & Micozzi, M. (2010). *Teaching mindfulness: A practical guide for clinicians and educators*. New York: Springer.

McEvoy, P., Watson, H., Watkins, E., & Nathan, P. (2013). The relationship between worry, rumination, and comorbidity: Evidence for repetitive negative thinking as a transdiagnostic construct. *Journal of Affective Disorders, 151*(1), 313-320. doi:10.1016/j.jad.2013.06.014

Meiklejohn, J., Phillips, C., Freedman, M., Griffin, M., Biegel, G., Roach, A., . . . Saltzman, A. (2012). Integrating mindfulness training into K-12 education: Fostering the resilience of teachers and students. *Mindfulness, 3*(4), 291-307. doi:10.1007/s12671-012-0094-5

Metz, S., Frank, J., Reibel, D., Cantrell, T., Sanders, R., & Broderick, P. (2013). The Effectiveness of the Learning to BREATHE program on Adolescent Emotion Regulation. *Research in Human Development, 10*(3), 252-272. doi:10.1080/15427609.2013.818488

Mindfulness Training Institute Australasia (2014). *Training pathway in brief.* Retrieved from http://www.mtia.org.au/training-pathway-in-brief.

Mond, J., Hay, P., Rodgers, B., Owen, C., & Beaumont, P. (2004). Validity of the Eating Disorder Examination Questionnaire (EDE-Q) in screening for eating disorders in community samples. *Behaviour Research and Therapy, 42*, 551-567. doi:10.1016/S0005-7967(03)00161-X

Neff, K. (2003). The development and validation of a scale to measure self-compassion. *Self and Identity, 2*, 223-250. doi:10.1080/15298860390209035

Neff, K., & McGeehee, P. (2010). Self-compassion and psychological resilience among adolescents and young adults. *Self and Identity, 9*, 225-240. doi:10.1080/15298860902979307

Nehmy, T. (2010). School-based prevention of depression and anxiety in Australia: Current state and future directions. *Clinical Psychologist, 14*(3), 74-83. doi:10.1080/13284207.2010.524884

Nehmy, T. J., & Wade, T. D. (2015). Reducing the onset of negative affect in adolescents: Evaluation of a perfectionism program in a universal prevention setting. *Behaviour Research and Therapy, 67*, 55-63. doi:10.1016/j.brat.2015.02.007

Neil, A. L., & Christensen, H. (2009). Efficacy and effectiveness of school-based prevention and early intervention programs for anxiety. *Clinical Psychology Review, 29*(3), 208-215. doi:10.1016/j.cpr.2009.01.002

Nolen-Hoeksema, S., & Watkins, E. (2011). A heuristic for developing transdiagnostic models pf psychopathology: Explaining multifinality and divergent trajectories. *Perspectives on Psychological Science, 6*(6), 598 - 609. doi:10.1177/1745691611419672

Pearlstein, T. (2002). Eating disorders and comorbidity. *Archives of Women's Mental Health, 4*, 67-68. doi:10.1007/s007370200002

Perich, T., Manicavasagar, V., Mitchell, P. B., & Ball, J. R. (2013). The association between meditation practice and treatment outcome in Mindfulness-based Cognitive Therapy for bipolar disorder. *Behaviour Research and Therapy, 51*(7), 338-343. doi:10.1016/j.brat.2013.03.006

Raes, F., Griffith, J., van der Gucht, K., & Williams, J. (2014). School-based prevention and Reduction of Depression in Adolescents: A Cluster-Randomized Trial of a Mindfulness Group Program. *Mindfulness, 5*(5), 477-486. doi:10.1007/s12671-013-0202-1

Segal, Z., Williams, J., & Teasdale, J. (2002). *Mindfulness-based cognitive therapy for depression: a new approach to preventing relapse*. New York: Guilford.

Shapiro, S., Brown, K. W., & Biegel, G. M. (2007). Teaching Self-Care to Caregivers: Effects of Mindfulness-Based Stress Reduction on the Mental Health of Therapists in Training. *Training & Education in Professional Psychology, 1*(2), 105-115. doi:10.1037/1931-3918.1.2.105

Sibinga, E., Perry-Parish, C., chung, S., Johnson, S., Smith, M., & Ellen, J. (2013). School-based mindfulness instruction for urban male youth: A small randomized controlled trial. *Preventive Medicine, 57*, 799-801. doi:10.1016/j.ypmed.2013.08.027

Stockings, E., Degenhardt, L., Dobbins, T., Lee, Y., Erskine, H., Whiteford, H., & Patton, G. (2015). Preventing depression and anxiety in young people: a review of the joint efficacy of universal, selective and indicated prevention. *Psychological Medicine, 46*(1), 11-26. doi:10.1017/S0033291715001725

Szabo, M. (2010). The short version of the Depression Anxiety Stress Scales (DASS-21): Factor structure in a young adolescent sample. *Journal of Adolescence, 33*, 1-8. doi:10.1016/j.adolescence.2009.05.014

Tan, L. B. (2016). A critical review of adolescent mindfulness-based programmes. *Clinical Child Psychology and Psychiatry, 21*(2), 193-207. doi:10.1177/1359104515577486

Teasdale, J. D., Moore, R. G., Hayhurst, H., Pope, M., Williams, S., & Segal, Z. V. (2002). Metacognitive Awareness and Prevention of Relapse in Depression: Empirical Evidence. *Journal of Consulting & Clinical Psychology, 70*(2), 275-287. doi:10.1037//0022-006X.70.2.275

Teesson, M., Newton, N., Slade, T., Chapman, C., Allsop, S., Hides, L., . . . Andrews, G. (2014). The CLIMATE schools combined study: a cluster randomised controlled trial of a universal Internet-based prevention program for youth substance misuse, depression and anxiety. *Biomed Central Psychiatry, 14*(32). doi:10.1186/1471-244X-14-32

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., . . . Stewart-Brown, S. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS):

development and UK validation. *Health and Quality of Life Outcomes, 5*(63), 1-13. doi:10.1186/1477-7525-5-63

Tully, P. J., Zajac, I. T., & Venning, A. J. (2009). The Structure of Anxiety and Depression in a Normative Sample of Younger and Older Australian Adolescents. *Journal of Abnormal Child Psychology, 37*(5), 717-726. doi:10.1007/s10802-009-9306-4

Wade, T., Wilksch, S., & Lee, C. (2012). A longitudinal investigation of the impact of disordered eating on young women's quality of life. *Health Psychology, 31*, Health Psychology. doi:10.1037/a0025956

Waters, L., Barsky, A., Ridd, A., & Allen, K. (2014). Contemplative Education: A Systematic, Evidence-Based Review of the effect of Meditation Interventions in Schools. *Educational Psychology Review, 27*, 103-134. doi:10.1007/s10648-014-9258-2

Weare, K., & Nind, M. (2011). Mental health promotion and problem prevention in schools: what does the evidence say? *Health Promotion International, 26*(suppl 1), i29-i69. doi:10.1093/heapro/dar075

Weinberg, A., & Klonsky, E. (2009). Measurement of Emotion Dysregulation in Adolescents. *Psychological Assessment, 21*(4), 616 – 621. doi:10.1037/a0016669

Willemsen, J., Markey, S., Declercq, F., & Vanheule, S. (2011). Negative emotionality in a large community sample of adolescents: the factor structure and measurement invariance of the short version of the depression anxiety stress scales (DASS-21). *Stress and Health, 27*(3), e120-e128. doi:10.1002/smi.1342

Williams, M. J. G., Crane, C., Barnhofer, T., Brennan, K., Duggan, D. S., Fennell, M. J. V., . . . Russell, I. T. (2014). Mindfulness-Based Cognitive Therapy for Preventing Relapse in Recurrent Depression: A Randomized Dismantling Trial. *Journal of Consulting & Clinical Psychology, 82*(2), 275-286.

Zack, S., Saekow, J., Kelly, M., & Radke, A. (2014). Mindfulness Based Interventions for Youth. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*. doi:10.1007/s10942-014-0179-2

Zisook, S., Lesser, I., Stewart, J., Wisniewski, S., Balasubramani, G., Fava, M., & Gilmer, W. (2007). Effect of age at onset on the course of major depressive disorder. *American Journal of Psychiatry, 164*, 1539-1546. doi:10.1176/appi.ajp.2007.06101757

*Figure 2.1* Flow of participants through study

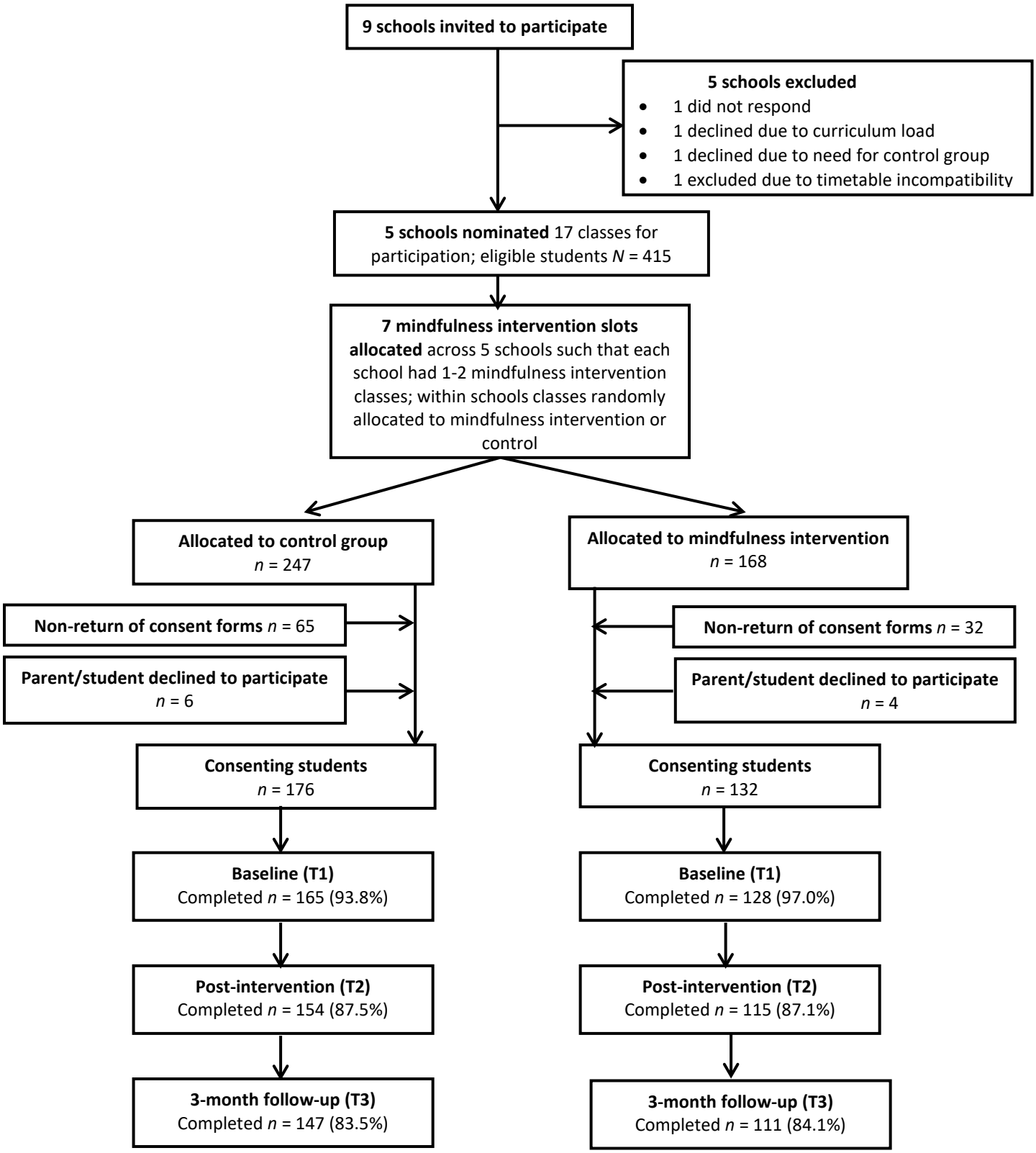

Table 2.1 *Descriptive Statistics including Within-group Effect Sizes for Mindfulness and Control groups at Baseline (T1), Post-Intervention (T2) and Follow-up (T3)*

| | | Mindfulness | | | | Control | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | *SD* | within-group ES | | Mean | *SD* | within-group ES | |
| Depression | T1 | 0.53 | *0.49* | T1 vs T2 | 0.02 | 0.64 | *0.70* | T1 vs T2 | 0.12 |
| | T2 | 0.52 | *0.50* | T2 vs T3 | 0.04 | 0.56 | *0.65* | T2 vs T3 | 0.16 |
| | T3 | 0.54 | *0.52* | T1 vs T3 | 0.02 | 0.46 | *0.56* | T1 vs T3 | 0.28 |
| Anxiety | T1 | 0.52 | *0.39* | T1 vs T2 | 0.22 | 0.50 | *0.51* | T1 vs T2 | 0.11 |
| | T2 | 0.61 | *0.42* | T2 vs T3 | 0.07 | 0.56 | *0.56* | T2 vs T3 | 0.19 |
| | T3 | 0.58 | *0.45* | T1 vs T3 | 0.14 | 0.46 | *0.51* | T1 vs T3 | 0.08 |
| Weight/Shape Concerns | T1 | 0.79 | *0.77* | T1 vs T2 | 0.09 | 0.91 | *0.86* | T1 vs T2 | 0.09 |
| | T2 | 0.86 | *0.83* | T2 vs T3 | 0.05 | 0.83 | *0.88* | T2 vs T3 | 0.00 |
| | T3 | 0.82 | *0.83* | T1 vs T3 | 0.04 | 0.83 | *0.81* | T1 vs T3 | 0.10 |
| Wellbeing | T1 | 3.57 | *0.66* | T1 vs T2 | 0.12 | 3.55 | *0.74* | T1 vs T2 | 0.09 |
| | T2 | 3.65 | *0.66* | T2 vs T3 | 0.04 | 3.62 | *0.79* | T2 vs T3 | 0.08 |
| | T3 | 3.62 | *0.70* | T1 vs T3 | 0.07 | 3.65 | *0.80* | T1 vs T3 | 0.13 |
| Emotional Regulation | T1 | 2.51 | *0.55* | T1 vs T2 | 0.40 | 2.52 | *0.64* | T1 vs T2 | 0.50 |
| | T2 | 2.28 | *0.60* | T2 vs T3 | 0.02 | 2.18 | *0.72* | T2 vs T3 | 0.04 |
| | T3 | 2.29 | *0.62* | T1 vs T3 | 0.38 | 2.15 | *0.73* | T1 vs T3 | 0.54 |
| Self-compassion | T1 | 3.09 | *0.65* | T1 vs T2 | 0.05 | 3.04 | *0.70* | T1 vs T2 | 0.17 |
| | T2 | 3.12 | *0.57* | T2 vs T3 | 0.11 | 3.16 | *0.74* | T2 vs T3 | 0.07 |
| | T3 | 3.18 | *0.53* | T1 vs T3 | 0.15 | 3.21 | *0.69* | T1 vs T3 | 0.24 |
| Mindfulness | T1 | 2.47 | *0.73* | T1 vs T2 | 0.07 | 2.41 | *0.81* | T1 vs T2 | 0.12 |
| | T2 | 2.42 | *0.78* | T2 vs T3 | 0.03 | 2.51 | *0.83* | T2 vs T3 | 0.15 |
| | T3 | 2.44 | *0.75* | T1 vs T3 | 0.04 | 2.63 | *0.82* | T1 vs T3 | 0.27 |

*Note.* ES = effect size (Cohen's *d);* At T1, *N* = 128 (mindfulness) *N* = 165 (control); T2, *N* = 115 (mindfulness) *N* = 154 (control); T3, *N* = 111 (mindfulness) *N* = 147 (control); Measures: Depression/Anxiety = DASS-21; Weight/shape concerns = Weight/shape subscales of the Eating Disorder Examination-Questionnaire; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale; Emotional Dysregulation = Disorders of Emotional Regulation Scale; Self-compassion = Self Compassion Scale; Mindfulness = Child and Adolescent Mindfulness Scale.

Table 2.2 *Mixed Model Analyses with Between-group Effect Sizes (N = 308)*

| | Treatment Group | Time | Treatment Group x time | Post-intervention (T2) | | 3-month follow-up (T3) | |
|---|---|---|---|---|---|---|---|
| Primary outcome measures | | | | Adjusted Mean difference *(95% CI)* | Between-group ES | Adjusted Mean difference *(95% CI)* | Between-group ES |
| Depression | $F(274.12) = 2.60$ | $F(243.71) = 3.29$ | $F(243.70) = 1.97$ | .03 (-.06-.11) | .01 | .09 (.003-.19) | .23 |
| Anxiety | $F(267.81) = 1.94$ | $F\ (240.22) = 6.89$** | $F(240.23) = 2.54$ | .01 (-.07-.09) | .03 | .08 (-.001-.17) | .23 |
| Weight/Shape concerns | $F(256.01\ ) = 0.26$ | $F(232.76) = 0.64$ | $F(232.77) = 2.26$ | .02 (-.05-.08) | .05 | .05 (-.03-.13) | .13 |
| Wellbeing | $F(267.02) = 0.33$ | $F(236.90) = 0.05$ | $F(236.88) = 0.37$ | .06 (-.08-.21) | .09 | .01 (-.14-.16) | .02 |
| Secondary outcome measures | | | | | | | |
| Emotional Dysregulation | $F(264.81) = 1.54$ | $F(\ 224.79) = 0.56$ | $F(224.79\ ) = 0.04$ | .02 (-.02-.06) | .11 | .03 (-.02-.07) | .12 |
| Self-compassion | $F(256.18\ ) = 0.003$ | $F(\ 221.40) = 3.42$ | $F(221.40\ ) = 0.13$ | .02 (-.11-.14) | .03 | .009 (-.12-.13) | .02 |
| Mindfulness | $F(251.85\ ) = 3.39$ | $F(226.59\ ) = 1.93$ | $F(226.64\ ) = 2.78$ | .05 (-.13-.23) | .06 | .23 (.04-.42) | .28 |

*Note.* ES = Effect Size (Cohen's *d)*; * $p < .05$ ** $p < .01$; MF = Mindfulness intervention group; C = Control group; Measures: Depression/Anxiety = DASS-21; Weight/shape concerns = Weight/shape subscales of the Eating Disorder Examination-Questionnaire; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale; Emotional Dysregulation = Disorders of Emotional Regulation Scale; Self-compassion = Self Compassion Scale; Mindfulness = Child and Adolescent Mindfulness Scale.

Table 2.3 *Mixed Model Analyses for Moderation: Estimated Marginal Means for Moderator (4) by Treatment Group (2) by Time (2)*

| Moderator | Outcome variable (moderator*treatment group*time) | Post-intervention *M (SE)* | | | | 3-month follow-up *M (SE)* | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Male | | Female | | Male | | Female | |
| | | MF (*N* =70) | C (*N* = 91) | MF (*N* = 62) | C (*N* = 85) | MF | C | MF | C |
| Gender | Wellbeing *F*(236.34) = 0.15 | 3.74 (.08) | 3.69 (.07) | 3.56 (.08) | 3.48 (.07) | 3.70 (.08) | 3.70 (.07) | 3.52 (.08) | 3.51 (.07) |
| | Depression *F*(243.43) = 1.59 | 0.58 (.05) | 0.57 (.04) | 0.67 (.05) | 0.62 (.04) | 0.57 (.05) | 0.48 (.04) | 0.67 (.05) | 0.56 (.04) |
| | Anxiety *F*(240.10) = 3.55** | 0.69 (.04) | 0.64 (.04) | 0.65 (.04) | 0.67 (.04) | **0.62 (.04)** | **0.51 (.04)** | 0.68 (.05) | 0.61 (.04) |
| | Weight/Shape concerns *F*(235.87) = 1.63 | 0.72 (.04) | 0.72 (.04) | 0.82 (.04) | 0.79 (.04) | 0.65 (.04) | 0.79 (.04) | 0.79 (.04) | 0.75 (.04) |
| | | Low Depression | | High Depression | | Low Depression | | High Depression | |
| | | MF (*N* = 110) | C (*N* = 135) | MF (*N* = 22) | C (*N* = 41) | MF | C | MF | C |
| Depression | Wellbeing *F*(238.87) =0.53 | 3.69 (.06) | 3.59 (.06) | 3.49 (.14) | 3.59 (.11) | 3.67 (.06) | 3.58 (.06) | 3.35 (.14) | 3.71 (.11) |
| | Weight/Shape concerns *F*(234.14) = 2.29 | 0.77 (.03) | 0.72 (.03) | 0.77 (.07) | 0.86 (.05) | 0.69 (.03) | 0.76 (.03) | 0.84 (.07) | 0.79 (.06) |
| | Anxiety *F*(239.67) = 3.54** | 0.66 (.03) | 0.62 (.03) | 0.74 (.07) | 0.74 (.06) | **0.61 (.03)** | **0.51 (.03)** | 0.83 (.08) | 0.71 (.06) |
| | | Low Anxiety | | High Anxiety | | Low Anxiety | | High Anxiety | |
| | | MF (*N* = 104) | C (*N* = 139) | MF (*N* = 28) | C (*N* = 37) | MF | C | MF | C |
| Anxiety | Wellbeing *F*(236.09) = 0.54 | 3.68 (.06) | 3.66 (.06) | 3.57 (.12) | 3.36 (.11) | 3.67 (.06) | 3.64 (.06) | 3.44 (.12) | 3.48 (.12) |
| | Weight/Shape concerns *F*(232.59) = 2.04 | 0.77 (.03) | 0.73 (.03) | 0.77 (.06) | 0.85 (.06) | 0.69 (.03) | 0.76 (.03) | 0.82 (.06) | 0.79 (.06) |
| | Depression *F*(243.20) = 2.34 | 0.61 (.04) | 0.55 (.03) | 0.67 (.07) | 0.76 (.07) | 0.56 (.04) | 0.48 (.03) | 0.77 (.07) | 0.69 (.07) |
| | | Low WSC | | High WSC | | Low WSC | | High WSC | |
| | | MF (*N* = 65) | C (*N* = 73) | MF (*N* = 67) | C (*N* = 103) | MF | C | MF | C |
| WSC | Wellbeing *F*(235.47) = 0.51 | 3.73 (.08) | 3.70 (.07) | 3.58 (.08) | 3.50 (.07) | 3.75 (.08) | 3.66 (.08) | 3.49 (.08) | 3.56 (.07) |
| | Anxiety *F*(240.06) = 2.84* | 0.67 (.04) | 0.61 (.04) | 0.67 (.04) | 0.70 (.04) | **0.64 (.04)** | **0.49 (.04)** | 0.65 (.04) | 0.62 (.04) |
| | Depression *F*(243.42) = 1.66 | 0.58 (.05) | 0.55 (.04) | 0.66 (.05) | 0.63 (.04) | 0.58 (.05) | 0.45 (.05) | 0.65 (.05) | 0.58 (.04) |

*Note. M* = adjusted mean after controlling for baseline value of dependent variable; *SE* = standard error; MF = Mindfulness intervention group; C = Control group; Depression/Anxiety = DASS-21; WSC (Weight/shape concerns) = Weight/shape subscales of the Eating Disorder Examination-Questionnaire; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale; ** $p < .01$ * $p < .05$ with significant pairwise comparison in bold.

Table 2.4 *Frequency of Home Practice Compliance for the Mindfulness Intervention Group (N = 132)*

| | During course | | Since course | |
|---|---|---|---|---|
| | Mean *(SD)* | Percentage with high compliance[1] | Mean *(SD)* | Percentage with high compliance[1] |
| Mindfulness Practice | | | | |
| Breath counting | 2.85 *(1.15)* | 31.2 | 2.18 *(1.13)* | 16 |
| .b[2] | 2.71 *(1.26)* | 31.2 | 2.04 *(1.15)* | 11.3 |
| Beditation[3] | 2.09 *(1.22)* | 17.8 | 1.82 *(1.09)* | 11.9 |
| FOFBOC[3] | 2.13 *(1.12)* | 14.0 | 1.73 *(0.97)* | 7.6 |
| Everyday activities | 2.83 *(1.33)* | 33.9 | 2.10 *(1.29)* | 17.1 |
| Thought Traffic | 2.59 *(1.38)* | 29.4 | 1.90 *(1.17)* | 12.4 |
| Overall | 2.54 (*0.93)* | 26.25 | 1.98 *(0.94)* | 12.72 |

*Note.* [1]undertook homework once a week or more [2]Stop and be present - brief meditation [3]Nine minute audio file guided body scan mediation

Table 2.5 *Regression Analysis Showing the Extent to which Frequency of Home Practice during the Mindfulness Intervention Predicted Change on the Primary Outcome Measures at Post-Intervention and Follow-up (N = 132)*

| | Depression | | | Anxiety | | | Weight/Shape Concerns | | | Wellbeing | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Post-intervention* | $R^2$ | $R^2$*change* | $\beta$ | $R^2$ | $R^2$*change* | $\beta$ | $R^2$ | $R^2$*change* | $\beta$ | $R^2$ | $R^2$*change* | $\beta$ |
| Model 1 | | | | | | | | | | | | |
| Baseline value for Dependent Variable | .27** | | .52** | .18** | | .43** | .65** | | .81** | .36** | | .60** |
| Model 2 | | | | | | | | | | | | |
| Baseline value for Dependent Variable | | | .51** | | | .43** | | | .81** | | | .58** |
| Mean frequency of all home practices | | .003 | -.05 | | .003 | .05 | | <.001 | -.01 | | .004 | .07 |
| *Follow-up* | | | | | | | | | | | | |
| Model 1 | | | | | | | | | | | | |
| Baseline value for Dependent Variable | .30** | | .55** | .15** | | .39** | .63** | | .79** | .42** | | .65** |
| Model 2 | | | | | | | | | | | | |
| Baseline value for Dependent Variable | | | .54** | | | .39** | | | .79** | | | .63** |
| Mean frequency of all home practices | | .01 | -.07 | | .003 | .05 | | .001 | .03 | | .02 | .08 |

*Note.* * significant at p < .05; ** significant at p < .01; Measures: Depression/Anxiety = DASS-21; Weight/shape concerns = Weight/shape subscales of the Eating Disorder Examination-Questionnaire; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale

# Chapter 3 :

# Development and Validation of a Multifactor Mindfulness Scale in Youth: The Comprehensive Inventory of Mindfulness Experiences-Adolescents (CHIME-A)

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**Note, this article originally appeared online in 2016, and is referenced as such in the published article in Chapter 4.*

**Candidate's contribution:**
CJ reviewed the literature, designed the study, collected data, analysed data and prepared manuscript under supervision of Wade. Minor comments on interpretation by Burke and Brinkman.
Research design 90%; Data collection 100%; Analysis 90%; Writing and editing 90%.

## 3.1 Abstract

Mindfulness based interventions show consistent benefits in adults for a range of pathologies, but exploration of these approaches in youth is an emergent field, with limited measures of mindfulness for this population. This study aimed to investigate whether multifactor scales of mindfulness can be used in adolescents. A series of studies are presented assessing the performance of a recently developed adult measure, the Comprehensive Inventory of Mindfulness Experiences (CHIME) in four early adolescent samples. Study 1 was an investigation of how well the full adult measure (37 items) was understood by youth ($N$ = 292). Study 2 piloted a revision of items in child friendly language with a small group ($N$ = 48). The refined questionnaire for adolescents (CHIME-A) was then tested in Study 3 in a larger sample ($N$ = 461) and subjected to exploratory factor analysis and a range of external validity measures. Study 4 was a confirmatory factor analysis in a new sample ($N$ = 498) with additional external validity measures. Study 5 tested temporal stability ($N$ = 120). Results supported an 8-factor 25-item measure of mindfulness in adolescents, with excellent model fit indices and sound internal consistency for the eight subscales. While the CFA supported an overarching factor, internal reliability of a combined total score was poor. The development of a multifactor measure represents a first step towards testing developmental models of mindfulness in young people. This in turn will aid construction of evidence based interventions that are not simply downward derivations of adult mindfulness programmes.

## 3.2 General Introduction

Mindfulness has been defined as "the awareness that emerges through paying attention on purpose, in the present moment, and non-judgementally to the unfolding of experience moment by moment" (Kabat-Zinn, 2003, p. 145). In adults, mindfulness is generally recognised as a multifactorial construct. Although different models exist, common primary elements include attention to and awareness of the present moment, and an attitude encompassing curiosity, openness, acceptance and self-compassion. Thus, practitioners develop an altered relationship with thoughts (the ability to "decenter" from thoughts and recognise them as transient and subjective phenomena), and an ability to accommodate the range of emotional states with equanimity rather than habitual, reactive behaviour (Baer, 2010; Bishop et al., 2004; Brown, Ryan, & Creswell, 2007; Hölzel et al., 2011; Kabat-Zinn, 1990; Malinowski, 2013; Shapiro, Carlson, Astin, & Freedman, 2006; Teasdale, Segal, & Williams, 1995; Vago & Silbersweig, 2012). Reviews of research on mindfulness based interventions (MBIs) over more than 30 years in adults have shown consistent positive treatment effects for anxiety, depression, stress and more recently, emotional/binge eating, with small to moderate effect sizes (Gotink et al., 2014; Goyal et al., 2015; Katterman, Kleinman, Hood, Nackers, & Corsica, 2014; Khoury et al., 2013).

Our understanding of the application of mindfulness in youth is developing but has two major limitations. First, while theorists suggest that mindfulness-based interventions in adolescents may capitalise on the emergence of higher order cognitions during a time of great neural plasticity (Broderick & Frank, 2014; Roeser & Pinela, 2014) and these interventions show early promise for positive and negative psychological states (e.g., Biegel, Brown, Shapiro, & Schubert, 2009; Bögels, Hoogstad, van Dun, de Schutter, & Restifo, 2008; Kuyken et al., 2013; Metz et al., 2013; Raes, Griffith, van der Gucht, & Williams, 2014; Sibinga et al., 2013; Tan & Martin, 2014), research in this population has few well controlled trials (Burke, 2010; Meiklejohn et al., 2012; Zack, Saekow, Kelly, & Radke, 2014). Second, although a growing and large number of mindfulness interventions exist for youth, these are all downward extensions of adult programmes (Tan, 2016) without a clear understanding of how mindfulness naturally emerges, or the ages at which certain components can be fostered, during neurocognitive maturation (Broderick & Frank, 2014; Gould et al., 2014; Greenberg & Harris, 2012). Given the monumental brain changes that occur from childhood to adolescence and then into early adulthood (Eccles et al., 1999; Luna, Garver, Urban, Lazar, & Sweeney, 2004; Luna & Sweeney, 2004; Luciana, 2009; Roeser & Pinela, 2014), and the

differences in cognitive, verbal and social skills along the way, mindfulness may be experienced and expressed differently in children, adolescents and adults, much like the phenomenological differences seen in depression (van Beek et al., 2012). A mindfulness measure that could be readily understood by young people and that could individually track the various elements comprising this complex construct would be an important step in understanding its developmental emergence in young people (Burke, 2010; Meiklejohn et al., 2012). Such a tool would also enable exploration of mediational pathways following mindfulness-based interventions in this population to identify key active ingredients (Gould et al., 2014; Kraemer, Wilson, Fairburn, & Agras, 2002).

Although validated mindfulness scales exist for young people, including the Child and Adolescent Mindfulness Measure (CAMM; Greco, Baer, & Smith, 2011), the Mindful Attention Awareness Scale - Adolescents (MAAS-A; Brown, West, Loverich, & Biegel, 2011) and the Mindful Attention Awareness Scale – Children (MAAS-C; Lawlor, Schonert-Reichl, Gadermann, & Zumbo, 2014), these are all single factor measures. The MAAS-A and MAAS-C derive from the adult Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) which conceptualises mindfulness as a unidimensional construct: acting with awareness (as opposed to operating on "autopilot"). Development of the CAMM (Greco, Baer, & Smith, 2011) was based on modifications to an adult 4-factor mindfulness measure, the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004). During development of the CAMM, two of the four scales were dropped due to developmental comprehension concerns, thus the authors concede that it remains unclear whether the single factor solution truly reflects a simpler construct in young people. A tension clearly exists when developing an instrument for younger populations that is comprehensible, yet complex enough to detect the nuanced strands of a multifactor construct as it emerges. The successful use in adolescents of scales such as the Difficulties in Emotional Regulation Scale (Weinberg & Klonsky, 2009) and the Avoidance and Fusion questionnaire for Youth (Greco, Lambert, & Baer, 2008) support the existence in young people of decentering from thoughts and aspects of emotional regulation (awareness, self-judgement and impulse control). Taken together, these findings suggest that multiple aspects of mindfulness may exist and be measurable in adolescence, although whether this includes the full spectrum of adult components is unknown.

In adults, a range of validated mindfulness measures show a multiple factor structure (for a full review, see Bergomi, Tschacher, & Kupper, 2013). Most frequently used in mindfulness research in this population is the 39-item Five Facet Mindfulness Questionnaire

(FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), with factor analysis supporting a 5-factor structure in experienced meditators (*Non-reactivity to Inner Experience, Observing/Noticing, Acting with Awareness, Describing,* and *Non-judging of Experience*), but a 4-factor structure in novice participants without the *Observing* subscale, which appears sensitive to meditation experience (Baer et al., 2006; Baer et al., 2008; Williams, Dalgleish, Karl, & Kuyken, 2014). A second more recent scale showing a multifactor structure is the 37-item Comprehensive Inventory of Mindfulness Experiences (CHIME; Bergomi, Tschacher, & Kupper, 2014), where aspects of mindfulness across all currently available adult measures were identified, numbers of items across these components equally weighted, and importantly, some items reworded to avoid any difficult language for participants inexperienced in mindfulness to comprehend. The 8-factor hierarchical structure of this German scale was validated in three adult samples: two community groups and an adult MBSR class (mean ages 35 – 46 years; total $N = 661$). The eight factors were *Awareness of Internal Experiences, Awareness of External Experiences, Acting with Awareness, Accepting and Nonjudgemental Orientation, Decentering and Nonreactivity, Openness to Experience, Relativity of Thoughts* and *Insightful Understanding*. Internal consistency across subscales was very good to excellent except for *Acting with Awareness* in one sample ($\alpha = .65$). Test-retest reliability over 8 weeks for both the overall score and subscales was good (>.7). The CHIME showed strong correlations with the total score (.85) and the relevant subscales (>.63) of the Five Factor Mindfulness Questionnaire (Baer et al., 2006), and moderately strong correlations in the predicted directions with measures of wellbeing (.40), depression (-.46) and anxiety (-.39). The English translation of the scale is currently being validated in adult English speaking populations in the United Kingdom and the United States (Bergomi, personal communication, 2014), but its applicability to youth has not yet been assessed. Should this tool be comprehensible to this subpopulation, it would enable invariance testing and direct comparison across age bands.

Therefore the aim of this study was to investigate whether this multifactor mindfulness measure could be applied to a young adolescent population as a first step towards more detailed investigation of this construct in youth. This paper presents a series of studies investigating the performance of the CHIME in four early adolescent samples. Study 1 was an investigation of how well the full adult measure was understood by youth ($N = 292$). Study 2 piloted a revision of items in child friendly language with a small group ($N = 48$). The refined questionnaire for adolescents (CHIME-A; Comprehensive Inventory of Mindfulness Experiences – Adolescents) was then tested in Study 3 in a larger sample ($N =$

461) and subjected to exploratory factor analysis and a range of external validity measures. Study 4 was a confirmatory factor analysis in a new sample ($N$ = 498) with additional external validity measures. The final study (5) tested temporal stability over seven days in an additional sample ($N$ = 120).

## 3.3 Study 1. Preliminary investigation of CHIME in a novel population (adolescents)

At an age where abstract conceptualisation, executive function, self-awareness and self-regulation are emerging (Broderick & Frank, 2014; Roeser & Pinela, 2014), we hypothesised that adolescents have the cognitive potential for at least some of the facets of mindfulness described in adult models and measures. Thus, we administered the full adult CHIME to young adolescents. Although the language of items appeared at the higher end of complexity for this age group, if the questionnaire was feasible and the adult factor structure showed invariance across this sub population, it would allow direct statistical comparisons between groups across a broad portion of the lifespan. Thus, we did a preliminary exploration of the adult scale in its full form.

### 3.3.1 Method

**Participants.** This study was nested within a pilot trial assessing the effectiveness of an 8-week mindfulness intervention in schools. A range of urban coeducational secondary schools in Adelaide were contacted by email with telephone follow up, and four schools (one private, three public) agreed for their Year 8 students to participate. One public primary school also expressed interest in taking part and their Year 7 class was included. Participating schools represented a broad range of socioeconomic status as measured on the Index of Community Socio-Educational Advantage (ICSEA; Australian Curriculum Assessment and Reporting Authority, 2010), whereby 1000 represents the mean, with a standard deviation of 100. The participating schools ranged from 951 to 1160, with a mean index of 1047 (SD = 85.77).

Participation required active return of consent forms signed by both parent/guardian and student. Of the 425 students nominated, 107 (25.2%) did not participate due to lack of consent, 26 (6.1%) were absent, and a further 12 students (28.2%) did not complete any CHIME questionnaire items, and were excluded from the analyses. Thus, 282 students (66.4

%) participated in baseline data collection with a mean age of 13.64 (*SD*= 0.43; range 12.22-14.55) years. Of these students, 144 (51.1%) were male and 138 (48.9%) were female.

**Procedure.** Only the baseline measures were utilised in the current study. Participants filled out questionnaires either online using Qualtrics Survey software, or on paper. Testing was performed in a classroom setting with students requested to observe test conditions (i.e., work individually and silently), with the principal investigator and teacher present to answer any questions. Approval for this series of studies was granted by the Flinders University Social and Behavioural Sciences Ethics Committee and the South Australian Department of Education and Child Development.

**Measures.** The measure of interest extracted from the overarching study was the 37-item Comprehensive Inventory of Mindfulness Experiences (CHIME; Bergomi et al., 2014) described earlier. Sample items include *"I am able to observe my thoughts and feelings without getting tangled up in them"* and *"I clearly notice changes in my body, such as quicker or slower breathing"*. Items are rated on a 6-point scale ranging from 1 to 6 (*almost never, infrequently, somewhat infrequently, somewhat frequently, frequently, almost always*) and considered over the preceding two weeks, as mindfulness is conceptualized as a quasi-trait by these authors. Higher scores indicate greater mindfulness.

### 3.3.2 Results and Discussion

The CHIME was not delivered independently, but within a broader suite of seven questionnaires for the purposes of a larger trial. During data collection, nearly every student question (and teacher comment) related to difficulty comprehending items from the CHIME. In the same way, student difficulties were repeatedly raised with selecting the appropriate Likert descriptors. For example, subtle differences between choosing "somewhat infrequently" and "somewhat frequently" were reported as confusing. Further, many students found it hard to stay on task while completing the 37-item questionnaire and required encouragement to persist. This confirmed our concerns regarding the tool being too complex in its current form for this age group, and that both the items and the Likert descriptors needed modification to be suitable for adolescents.

Preliminary analysis of data also indicated problems with the performance of reverse scored items within the questionnaire. Reverse coded items perform poorly on factor analysis in a diverse range of samples (e.g., Bardeen, Fergus, & Orcutt, 2012; Cooper, O'Shea, Atkinson, & Wade, 2014; Idaszak & Drasgow, 1987; Rodebaugh, Woods, & Heimberg, 2007), however items assessing the absence of mindfulness may be more readily understood

by those without exposure to mindfulness as these states are more familiar (Brown et al., 2011) and this may be even more so in young people. All items in the three currently validated youth mindfulness scales (CAMM, MAAS-C and MAAS-A) are reverse scored, i.e., measuring an absence of mindfulness, hence it appears unlikely that the use of reverse wording alone is problematic. A more likely possibility is that when reverse scored items are interspersed with forward scored items they become confusing, especially in youth. Given that uniform forward or reverse scoring of all items in this questionnaire would render some items meaningless, this suggested it may be more helpful to group the reverse scored items together in our revised tool.

Guided by this feedback, and the methodology adopted by previous researchers (Brown et al., 2011; Greco et al. 2011) regarding language simplification and contextualisation in the adaptation of mindfulness scales for youth, an adolescent version of the CHIME (Comprehensive Inventory of Mindfulness Experiences – Adolescents; CHIME-A) was constructed as follows. All 37 items were retained at this stage, but 27 items were re-worded by the research team (psychologists and mindfulness practitioners) with less sophisticated and/or more descriptive language. For example, *"When I am sitting or lying, I perceive the sensations in my body"* was changed to *"I notice sensations against my skin (like clothes, a chair or the ground)".* One contextual change was also made as follows. "*When I read, I have to reread items because I was thinking of something else"* was replaced with an example of autopilot from the CAMM ("*At school, I walk from class to class without noticing what I'm doing")* which was thought to be more familiar to all students across varying academic levels. A simpler Likert scale was also adopted, substituting the six original anchors from the CHIME (*almost never, infrequently, somewhat infrequently, somewhat frequently, frequently, almost always*) with the five anchors used and validated in the CAMM for young people (*never – rarely – sometimes – often – always*). Reverse scored items were retained but clustered together at the end of the questionnaire.

## 3.4 Study 2: Development, Refinement and Piloting of CHIME-A

Based on the method adopted by Greco et al. (2011), feedback on the CHIME-A was sought from adults and youth, in order to formulate a final version of the questionnaire as follows:

### 3.4.1 Method

**Participants and Procedure.** Prior to formal piloting, the proposed CHIME-A was circulated for preliminary feedback regarding clarity and developmental appropriateness amongst a group familiar with early adolescence and known to researchers (two secondary school English teachers and two secondary school counsellors). Two male adolescents (ages 13 and 15) accessible and known to the researcher also reviewed the scale and added informal comments. Five of these reviewers suggested minor modifications to single items, but one school counsellor questioned the wording of 19 items. The research team discussed possible revisions, balancing the need for the simplest possible language while still conveying key ideas for each item. The resultant 17 minor changes formed a second version of the CHIME-A which was tested in a small pilot sample in two classes ($N$ = 48; mean age 12.37 years, $SD$ .31, range 11.59-12.95; 39.6% female) recruited from one private urban coeducational Adelaide secondary school (ICSEA = 1183) who had expressed interest in being involved in mindfulness research. Ethics approval was gained to change to an opt-out consent procedure for the remaining studies such that consent forms only needed to be returned if participation was not desired by parents/guardians or students. No consent was withheld for participation in this study. Testing was performed in a classroom setting with students requested to observe test conditions, with the principal investigator and teacher present to answer any questions. Participants filled out questionnaires on paper and were asked to classify each question as easy or hard to understand, and also to circle any confusing words (Greco et al., 2011). Twenty seven items rated as confusing or borderline easy/confusing by more than 15% of the sample were reworded into a final version of the 37-item CHIME-A. At this stage, the research team acknowledged that not all items would be understood by the spread of cognitive development within a sample, and that the weaker items may not survive the next step of the validation procedure across the whole sample.

## 3.5 Study 3: Exploratory Factor Analysis of CHIME-A

Study 3 used exploratory factor analysis (EFA) to investigate the factor structure of this version of the CHIME-A in adolescents. It was predicted that a multiple factor structure would be demonstrated, with up to eight expected given the structure found in adults. It was also predicted that the CHIME-A would be positively correlated with an existing, validated, single factor youth measure of mindfulness and negatively correlated with transdiagnostic risk factors for pathology: measures of emotional dysregulation, rumination and

perfectionism (with its strong component of harsh self-criticism; Dunkley, Zuroff, & Blankstein, 2003).

### 3.5.1 Method

**Participants and procedure.** Three urban coeducational private secondary schools in Adelaide who had expressed an interest in being involved in mindfulness research agreed for their Year 7 or Year 8 students to participate. Participating schools ranged from 1062 to 1183 on the ICSEA, with a mean index of 1130 (*SD* = 61.76). No consent was withheld by any of the 461 students or their parents/guardians, with the sample comprised of 48.4% females, and a mean age of 13.25 years (*SD* = 0.60; range 11.41 – 17.02). Participants filled out questionnaires either online using Qualtrics Survey software, or on paper. Testing was performed in a classroom setting with students requested to observe test conditions, with the principal investigator and teacher present to answer any questions.

**Measures.** ***Convergent validity.*** *Mindfulness.* A validated child and youth mindfulness scale, the Child and Adolescent Mindfulness Measure (CAMM; Greco et al., 2011) was included to examine convergent validation with the CHIME. The CAMM is a 10-item single factor scale, rated from 1 to 5 *(never true, rarely true, sometimes true, often true, always true)*. Items include statements such as *"I keep myself busy so I don't notice my thoughts or feelings"*, and *"At school, I walk from class to class without noticing what I'm doing"*. Items are all reverse scored. For calculation of final scores, items are reversed back such that higher scores reflect greater mindfulness on this scale. Cronbach's alpha for the current study was .82, with item-total correlations ranging from .35-.67.

***Divergent validity.*** *Emotional Regulation*. This was measured using the Difficulties in Emotional Regulation Scale (DERS; Gratz & Roemer, 2004). This 36-item scale was validated by its authors in an undergraduate student population, supporting a 6-factor structure (Non-acceptance of emotional responses; Difficulties engaging in goal directed behaviour, Impulse control difficulties, Lack of emotional awareness, Limited access to emotional regulation strategies, and Lack of emotional clarity). Psychometric properties were reported as sound: internal consistency $\alpha = .93$ (overall score) and $\alpha > .80$ (subscales); test-retest reliability over 4-8 weeks ($r = .88$) together with divergent validity against emotional expressivity ($r = .60$). The DERS has also been validated in a large community sample of adolescents, showing excellent internal consistency for the overall score ($\alpha = .93$) and good to excellent for the subscales ($\alpha = .76$ - $.89$; Weinberg & Klonsky, 2009). More recently, a 30-item version of the DERS showed improved fit compared to the original version in a large

undergraduate sample of females (Cooper , O'Shea, Atkinson, & Wade, 2014) and this version was used in our study to reduce respondent load. The 30 DERS items are rated from 1 "almost never" to 5 "almost always" and include items such as "*When I am upset, I feel out of control*" and "*I have difficulty making sense out of my feelings*". Higher scores indicate greater difficulty in regulating emotions. In the current study, Cronbach's alpha for the total score was .93, with item-total correlations ranging from .10-.72.

*Perfectionism.* This construct was measured using the 11-item self-criticism subscale from the 3-factor, 21-item measure of perfectionism proposed by O'Shea, Nehmy, Shafran, and Wade (*in preparation*). This scale showed excellent internal consistency in a non-clinical sample of mid-late teenagers (Cronbach's alpha = .92) and strong positive correlations as predicted with negative affect (r = .56) and eating disorder risk factors (r = .46). Items in this subscale contain a reduced number of items (11/15) from the Self-criticism Scale of the Dysfunctional Attitudes Scale (Cane, Olinger, Gotlib, & Kuiper, 1986) and include questions such as "*If I do not do well all the time, people will not respect me*" and "*I should be upset if I make a mistake*". Items are scored on a 7-point Likert scale with choices ranging from 1 (totally agree) to 7 (totally disagree). Cronbach's alpha for the current study was .92 with item-total correlations ranging from .57-.76.

*Rumination.* The Children's Response Style Scale (CRSS; Ziegert & Kistner, 2002) is a downward extension of the adult Response Styles Questionnaire (RSQ; Butler & Nolen-Hoeksema, 1994). This measure has shown evidence for two independent factors (distraction and rumination) in early adolescence (Ziegert & Kistner, 2002) and the latter of these subscales was used in the current study. The rumination subscale has shown good internal consistency (Cronbach's alpha = .81; item–total correlations ranging from .32-.61), moderate divergent validity with measures of cognitive distractibility ($r$ = -.39) and acceptable test-retest reliability over three weeks (r = .69; Ziegert & Kistner, 2002). Internal consistency scores for the current study were $\alpha$ = .86 and item-total correlations of .47-.63.

### 3.5.2 Analysis

EFA was performed with MPlus software version 7.31, using weighted least squares with mean and variance adjustment (WLSMV) as recommended for use with categorical data (Brown, 2006). As factors were correlated, Geomin oblique rotation was used, specifying up to eight factors. Although chi-square values are reported as per convention (e.g., Mewton et al., 2016; Williams et al., 2014), it is noted that these are notoriously sensitive to large samples such that these are nearly always significant (Byrne, 2012). Thus, model fit was

judged on the following indices: Root-mean-square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker Lewis Index (TLI) with *a priori* indications following previous recommendations: good fit (RMSEA < 0.10, and CFI/ TLI both ≥ 0.9) and excellent fit (RMSEA < 0.06, and CFI/ TLI both ≥ 0.95) (Bentler, 1990; Bentler & Bonett, 1980; Dehon, Weems, Stickle, Costa, & Berman, 2005; Schreiber, Stage, King, Amaury, & Barlow, 2006; Williams et al., 2014). All remaining analyses were performed using IBM Statistical Package for the Social Sciences, Version 22 (IBM SPSS).

### 3.5.3 Results and Discussion

There were seven factors with an eigenvalue greater than 1, with the eighth factor borderline (.97). Although both the 7- and 8-factor models demonstrated a good to excellent fit (**Table 3.1**), the model fit indices showed a small advantage for the 8-factor model, and the chi-square difference test was significant, supporting the less parsimonious (8-factor) model. Item-factor loadings also showed a better conceptual fit for the 8-factor model, closely replicating the adult structure, whereas the 7-factor model did not cluster in as clean and meaningful a manner. Thus we deemed the 8-factor model to be the model of choice. **Table 3.2** shows the factor loadings and proportion of variance explained per item for this model. Three items (11, 23 and 28) loaded <.4 onto any factor and were removed from the questionnaire at this point. Two items (3, 5) loaded onto a different factor to the adult version and these were also dropped from the final model to best reflect the original intention of each factor. The resultant 32-item 8-factor model was used for the remaining analyses in Study 3. Of note, all reverse scored items showed acceptable factor loadings (>.4) and were retained in the 32-item 8-factor model, supporting a benefit of clustering reverse scored items together in younger samples.

Correlations between factors (**Table 3.3**) ranged in strength, but showed consistent, positive relationships apart from Insightful Understanding, which correlated with fewer factors, and Relativity of Thoughts, which only had a small correlation with Insight in the expected direction. External validity was first examined with zero-order correlations for the overall CHIME-A score, showing moderate to strong correlations in the expected directions with mindfulness, difficulties in emotional regulation and perfectionism, but no significant relationship with rumination (**Table 3.4**). Simultaneous regressions examining the CHIME-A subscales as independent variables entered together at Step 1 are also shown in **Table 3.4**. Of particular interest, the *Accepting and Nonjudgemental Orientation* subscale of the CHIME-A was the only significant (negative) predictor of self-critical perfectionism, showing that the

smaller package of items in this CHIME-A subscale are picking up the same construct. This analysis also showed that the *Acting with Awareness, Accepting and Nonjudgemental Orientation* and *Openness* subscales were the strongest predictors of mindfulness on the CAMM which, although unsurprising given the similarity in item content, supports the new CHIME-A measure as mirroring a currently validated scale. It also supports different concepts contained within the single factor CAMM despite these not loading as cleanly onto conceptually distinct separate factors in existing validation studies (de Bruin, Zijlstra, & Bogels, 2013; Greco et al., 2011). Although there was not a relationship with rumination at the zero-order correlation level, the strongest (negative) predictor of rumination at a subscale level (*Openness*) was a logical fit – an ability to tolerate difficult thoughts and feelings. Surprisingly, Openness was not also a strong (negative) predictor of emotional dysregulation, however other related subscales including *Decentering/Non-reactivity* (the ability to step back from difficult thoughts/emotions and not react immediately) were. It may be that rumination and emotional regulation are nuanced in a slightly different way in the mindfulness construct. Alternatively, this could reflect problems with the internal consistency of the DERS in this sample, with five items having item-total correlations < .3. Overall, the eight subscales explained a large amount of variance in all four dependent variables, ranging in magnitude from 29 – 54%, supporting ongoing testing of this measure.

## 3.6 Study 4: Confirmatory Factor Analysis of CHIME-A

Study 4 involved a confirmatory factor analysis of the 32-item 8-factor model of CHIME-A identified in Study 3 in a new sample of adolescents, together with testing two shorter versions of the questionnaire for this youth sample. Four additional measures assessed the external validity of the CHIME-A against a range of positive and negative measures of psychological wellbeing. We predicted that CHIME-A would correlate in a positive direction with wellbeing, and in a negative direction with negative affect, depression, anxiety and weight/shape concerns.

### 3.6.1 Method

**Participants and Procedure.** This study was nested within a second trial assessing an 8-week mindfulness intervention in schools. Four urban coeducational secondary schools in Adelaide who had been involved in an earlier trial with the researchers agreed for a new sample of their Year 8 students to participate. Participating schools had an ICSEA score ranging from 959 to 1144, with a mean index of 1061.50 (*SD* = 76.41). Consent was withheld

by five students and their parents/guardians, with the final sample $N = 557$ consisting of 45.0% females, and a mean age of 13.44 years ($SD = 0.33$; range 12.08-14.90). Participants filled out questionnaires either online using Qualtrics Survey software, or on paper. Testing was performed in a classroom setting with students requested to observe test conditions, with the principal investigator and teacher present to answer any questions.

**Measures.** ***Convergent validity.*** *Wellbeing.* This construct was measured using the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS). This 14-item scale has been validated in both university student and community adult populations (Tennant et al., 2007), showing moderate to good convergent validity with the Positive and Negative Affect Scale (PANAS – Negative affect, $r = -0.71$; PANAS – Positive affect, $r = 0.54$), good test-retest reliability at one week ($r = 0.83$) and high internal consistency ($\alpha > .89$). The WEMWBS was also used by Kuyken et al. (2013) in their secondary school sample. This 14 item scale surveys the last two weeks, using items such as *"I've been feeling optimistic about the future"* and *"I've been feeling close to other people".* Items are rated on a 5-point scale from 1 *"none of the time"* to 5 "*all of the time*", with higher scores signifying higher wellbeing. Internal consistency in the current study was $\alpha = .91$ with item-total correlations ranging from .52-.85.

***Divergent validity.*** *Negative Affect.* This construct was measured using the Depression Anxiety Stress Scale – Short form (DASS-21; Lovibond & Lovibond, 1995). Confirmatory factor analysis in non-clinical adolescents has shown a good fit for the anxiety and depression factors (Szabo, 2010; Tully, Zajac, & Venning, 2009; Willemsen, Markey, Declercq, & Vanheule, 2011), and also for an overarching negative affect factor comprising all three subscales (Willemsen et al., 2011), thus the two 7-item Anxiety and Depression subscales, and an overall total score for negative affect (the 21 items from the Depression, Anxiety, Stress subscales) were used in the current study. Internal consistency has been found to be very good to excellent, $\alpha = .79$ - .88 (Szabo, 2010; Tully et al., 2009). In adults, the DASS-21 depression subscale shows good convergent validity with the Beck Depression Inventory ($r = .74$) and the negative subscale of the Positive and Negative Affect Scale (PANAS, $r = .69$), good discriminant validity against the positive PANAS subscale ($r = -.48$) and excellent internal consistency, $\alpha = .88$ - .94 (Henry & Crawford, 2005).Test-retest reliability ranges from .71-.81, considered favourable given the normal weekly fluctuations in these constructs (Brown, Chorpita, Korotitsch, & Barlow, 1997). Henry and Crawford (2005) described a "cleaner latent structure" of the DASS-21 compared to the full 42 item version, in addition to its reduced respondent load. Each item is scored on a four point scale from

0 *"never"* to 3 *"almost always"*, with higher scores reflecting higher depression or anxiety over the past week. Examples of items include *"I couldn't seem to experience any positive feeling at all"* and *"I was worried about situations in which I might panic and make a fool of myself".* Cronbach's alpha in this study for negative affect was .94 (item-total correlations ranged from .24-.78), depression was .90 (.52-.79) and anxiety was .80 (.26-.68).

*Weight and Shape Concerns.* The weight and shape subscales form two of the four subscales assessed by the Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 1994), and are considered to best represent the broad construct of weight concerns that has been found to be one of the strongest risk factors for disordered eating in adolescents (Jacobi & Fittig, 2010; Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004) .This questionnaire correlates well with the interview format (shape concern subscale, $r$ = .76; weight concern, $r$ = .74; Berg, Peterson, Frazier, & Crow, 2011), which itself has excellent psychometric properties (Mond, Hay, Rodgers, Owen, & Beaumont, 2004). The questionnaire has shown good temporal stability over two weeks (shape concern subscale, $r$ = .94; weight concern, $r$ = .92; Luce & Crowther, 1999) and high internal consistency (shape concern subscale, α = .83 - .93; weight concern, α = .72 - .89; Berg, Peterson, Frazier, & Crow, 2012). These 12 items use a 7-point rating scale ranging from 0 *"not at all"* to 6 *"markedly*. Questions relate to the last 28 days and include "*How dissatisfied have you felt about your weight?"* and "*Has your shape influenced how you think about yourself as a person?"* Higher scores indicate greater concerns. Internal consistency of the combined score in this study was α = .94 with item-total correlations ranging from .37-.79.

### 3.6.2 Analysis

Confirmatory Factor Analysis (CFA) was performed with MPlus software version 7.31, using weighted least squares with mean and variance adjustment (WLSMV) as recommended for use with categorical data (Brown, 2006). All remaining analyses were performed using IBM Statistical Package for the Social Sciences, Version 22 (IBM SPSS).

### 3.6.3 Results and Discussion

In all, six models were tested (**Table 3.5**) commencing with the 32-item 8-factor model identified in the EFA (Model 1), followed by a shorter version (Model 2) retaining the top three loading items per factor from Model 1. Model 2 also replaced Item 10 (*"It is easy for me to keep my attention on what I am doing")* by Item 34 (*"At school, when I walk from class to class my mind is elsewhere)* which was considered more consistent with the other

items and overall concept of the Acting with Awareness subscale. These models were first compared based on fit indices, with an advantage to the more concise Model 2, which showed excellent fit across all indices based on *a priori* indicators described in Study 3. Internal consistency (**Table 3.5**) was also considered, measured not only by Cronbach's alpha as this may not best represent this dimension (e.g., Sijtsma, 2009), but also by item-total correlations, with values of >.3 considered a good cut-off and negative correlations considered especially problematic (Field, 2009). For Models 1 and 2, Cronbach's alpha dropped below .7 for three factors in each model, but only one factor per model contained item-total correlations < .3 and there were no negative relationships. In order to improve the internal consistency, a third model (Model 3) was tested that added back a fourth item to the *Openness to Experience* subscale. Model fit here remained excellent across all indices, and although Cronbach's alpha remained at .65-.67 for three subscales, item-total correlations were now all above .39 supporting sound internal consistency.

Each model was rerun for a hierarchical higher order factor to determine whether an overall mindfulness score could be used (Models 1a-3a). RMSEA dropped for each model while remaining within good limits for Models 1a and 3a, but all three hierarchical models contained >10 items with a negative item-total correlation, demonstrating unacceptable internal consistency. In terms of parsimony and reliability Model 3 was considered the model of choice for the final version of CHIME-A, with excellent model fit indices and sound internal consistency across all eight subscales. The poor internal consistency for all three hierarchical models suggests we do not yet have a good measure for a comprehensive, overarching factor and as such, a total CHIME-A score should not be used.

Factorial invariance between gender was tested, which demonstrated metric (weak) but not scalar (strong) invariance i.e., model factor structure could be constrained to be the same across both genders, but when thresholds were also constrained, chi-square difference tests between the two models supported the more parsimonious (metric) model (**Table 3.6**). Item thresholds were examined in more detail for the metric model. These thresholds represent the point along the underlying latent factor at which participants transition from one Likert response category (e.g., *never*) to the next category (e.g., *rarely*; for a more detailed exploration of this concept, see Mewton et al., 2016). In our study, lower thresholds (never/rarely) were the same between boys and girls, but at the higher end of the scale (often/always) males demonstrated consistently higher thresholds (**Table 3.6**). That is, more underlying mindfulness needs to be present in males before they would rate themselves as exhibiting these characteristics *often* or *always*. Putting this another way, a high mindful

score on the CHIME-A actually represents “more” mindfulness for males than females. Descriptive statistics for the whole sample and both genders are shown in **Table 3.7**. Males scored significantly higher on two subscales, *Accepting and NonjudgementalOorientation* and *Decentering and Nonreactivity*. Mean scores for both scales fall in the second (females: *rarely-sometimes*) and third (males *sometimes-often*) thresholds, where threshold scores are relatively comparable, supporting this as a true difference. However, effect sizes were small (Cohen’s $d = 0.19 – 0.21$).

Given the measurement invariance results across gender, subsequent assessments of validity and reliability looked at the whole sample as well as males and females separately. Factor loadings for the whole sample were strong and consistent (**Table 3.8**), and explained a substantial amount of variance across all items for the sample as a whole, as well as for both genders. Correlation between all factors was strong in a positive direction for both genders (**Table 3.9**) and it was interesting to note that this included *Relativity*, which had only correlated in the expected direction with *Insight* in the earlier EFA model (Model 1). The question that was dropped from *Relativit*y between these models was item 4: *"I am aware that my thoughts about people or events could easily change",* the wording of which may have been difficult for adolescents to grasp. By comparison, item 27: "*I am aware that my point of view could change"*, essentially asks the same thing but in a more succinct manner, without the addition of a double-barrelled idea by including "*easily”*.

Construct validity was tested again in this CFA sample using simultaneous multiple regression with a range of measures of psychological health as dependent variables (general negative affect, depression, anxiety, weight/shape concerns, and wellbeing) and the eight CHIME-A subscales entered together at the first step. Across all outcome variables, there was a large, significant amount of variance explained by the combined CHIME subscales, and this was even stronger in girls (**Table 3.10**). At the level of subscales, significant relationships were all in the expected direction (i.e., positive for wellbeing, and negative for general negative affect, depression, anxiety and weight/shape concerns). For the cluster of outcome variables related to negative affect, these were most strongly predicted by the subscales *Acting with Awareness* and *Accepting and Nonjudgemental Orientation* with the latter relationship stronger in girls, and more evenly spread to include the *Decentering and Nonreactivit*y subscale in boys. *Insightful Understanding* and *Accepting and Nonjudgemental Orientation* predicted wellbeing, again with the latter relationship stronger in girls, and more evenly spread to include *Decentering and Nonreactivit*y in boys. Weight and shape concerns were solely and strongly predicted by *Accepting and Nonjudgemental Orientation* in females,

with a spread to include *Acting with Awareness* in boys. Although the current study is cross-sectional, and these relationships are based on self-reported data, they make sense conceptually (the more one is caught up in thinking, especially of a self-critical nature, the worse psychopathology may become) and are supported in the literature, with both rumination and maladaptive (self-critical) perfectionism emerging as transdiagnostic risk factors across anxiety, depression and eating disorders (Egan, Wade, & Shafran, 2011; McEvoy, Watson, Watkins, & Nathan, 2013; Nolen-Hoeksema & Watkins, 2011).

## 3.7 Study 5: Test-retest reliability of CHIME-A

Study 5 involved a test for temporal stability of the final CHIME-A questionnaire in a new sample of adolescents. Consistency of test scores is important if a measure is to be useful to detect intervention change.

### 3.7.1 Method

**Participants and Procedure.** One urban coeducational private secondary school in Adelaide (ICSEA score of 1145) who had been involved in an earlier trial with the researchers agreed for a new sample of their Year 8 students to participate. Consent was not withheld for any student. Of the 138 students that took part, 18 (13%) were absent for either Wave 1 or Wave 2 and were removed from the dataset for the purposes of this paired time-point analysis. The final sample ($N$ = 120; 41.7% females) had a mean age of 13.38 years ($SD$ = 0.36; range 12.50-14.51). Participants filled out questionnaires online using Qualtrics Survey software. Testing was performed in a classroom setting with students requested to observe test conditions, with the teacher and/or principal investigator present to answer any questions. Testing occurred on two occasions one week apart, to minimise any influence of maturation in this age group.

**Measure.** The 25-item, 8-factor CHIME-A identified as the tool of choice in Study 4 was used.

**Analysis.** A paired t-test analysis was performed using IBM Statistical Package for the Social Sciences, Version 22 (IBM SPSS).

### 3.7.2 Results and Discussion

Preliminary analysis showed that data were normally distributed. Results from the paired samples t-test are shown in **Table 3.11**. Correlations for subscales were all significant in a positive direction, with three facets (*Acting with Awareness, Decentering/Nonreactivity*

and *Openness*) showing a correlation < .65. Three scales (*Awareness of Internal Experiences, Relativity,* and *Insight*) showed a significant decrease in mean scores from Wave 1 to Wave 2 although effect sizes were small ($d$ < .24), Given a lack of clear guidelines as to acceptable correlations for test-retest reliability, we place these findings in context of other studies of adolescent measures. Tsang et al (2012), in their systematic review of the psychometric properties of adolescent wellbeing self-report measures, found only 13 of 17 studies conducted test-retest reliability, and of these, only eight found correlations greater than $r$ = .7. Similarly, Stockings et al. (2015) reviewed four commonly used adolescent depression measures. Of 54 studies, test–retest data was only reported in four, all involving the Child Depression Inventory (CDI), and correlations here varied from $r$ =.62 - .81. Notably, none of the studies included in this review reported test-retest data for the other three scales: the Beck Depression Inventory (BDI), the Center for Epidemiologic Studies - Depression Scale (CES-D) or the Reynolds Adolescent Depression Scale (RADS). Within the domain of mindfulness and youth, neither the CAMM (Greco et al., 2011) nor the MAAS-C (Lawlor, Schonert-Reichl, Gadermann, & Zumbo, 2014) report test-retest data.

This does raise questions regarding the suitability of six of the CHIME-A subscales in detecting longitudinal change beyond noise inherent in the measure. However, the CHIME-A is probably performing at a similar (if not ideal) level to other currently available and frequently used youth scales, in terms of temporal stability. Whether this can be improved to a more robust level with further testing and refinement is an important consideration for future research.

## 3.8 General Discussion

This study aimed to investigate for the first time whether a multifactor mindfulness measure could be applied to an adolescent population. A validated 8-factor 37-item adult measure (CHIME) was tested, with child-friendly language modifications and in a shorter format. Results supported an 8-factor 25-item measure of mindfulness in adolescents (CHIME-A), with excellent model fit indices and sound internal consistency for the eight subscales. Internal reliability of a combined total score was poor and this is not recommended for use.

Current mindfulness-based interventions (MBIs) in youth are necessarily downward derivations of adult interventions in the absence of a clear understanding of potentially different pathways of change and age appropriate active ingredients. The development of a

multifactor measure for youth is an important step in testing the phenomenon of mindfulness in young people. We predicted that some but perhaps not all of the eight adult factors measured on the CHIME would be present at this stage of neurocognitive development. Results showed that all of these could be detected in early adolescence, including relatively sophisticated factors such as *Insight* (recognition that subjective interpretation of situations can create or compound difficulty). The capacity to measure a range of these constructs within one relatively brief instrument is an important contribution of the CHIME-A for research, given questionnaire fatigue in young people. This will facilitate investigation of a range of mediational pathways in intervention and longitudinal studies.

Invariance testing across gender showed metric but not scalar invariance. Examination of threshold scores for the metric model suggests that at the higher end of the CHIME-A Likert scale (*often – always*), boys tend to under-report levels of mindfulness compared to girls. In our study, boys scored higher on two subscales, *Accepting and Nonjudgemental Orientation* (self-kindness with perceived mistakes and weaknesses) and *Decentering and Nonreactivity* (the ability to step back from difficult thoughts and emotions, and not react immediately), with actual scores for both genders around the middle of the scale (*rarely – often)*, supporting this as a true difference, although effect sizes were small. Across both genders in our cross-sectional study, *Acting with Awareness* (awareness of the present moment as opposed to being caught up in thinking about the past/future) and *Accepting and Nonjudgemental Orientation* were the strongest, most consistent predictors of positive and negative psychological states. There was also a stronger relationship between *Accepting and Nonjudgemental Orientation* and measures of psychological states in girls. Gender differences in mindfulness have been mixed when assessed on the single factor CAMM, with Kuby, McLean and Allen (2015) reporting higher scores in males in their sample of two metropolitan private schools ($N = 555$; *M* age 12.84, *SD* 0.79, range 12-15 years; 57% female), but Tan and Martin (2012) finding no differences across gender in their smaller sample of healthy community adolescents ($N = 93$; *M* age 15.02, *SD* 1.15, range 13-18 years; 53% female). Moving forward, these relationships and differences will benefit from further investigation in intervention research using longitudinal designs with this finer grained measurement tool.

A surprising finding was the poor internal consistency of a total score across all subscales of the CHIME-A which is not the case with the original adult measure. This could reflect chronological differences in the emergence of different facets of mindfulness in youth, and support measurement of individual elements during cognitive maturation. While existing

single factor measures such as the CAMM (10 items) or the MAAS-A scale (14 items) have a place where a brief scale with a general score is desired, it should be recognised when choosing these instruments that both assess a comparatively narrow band of mindfulness, and the domain of mindfulness assessed should be reported in study results. Further, any of these self-report measures, including the CHIME-A, would ideally be supplemented by multi-informant and objective indicators when used in research.

It is interesting to consider whether simplified items in the final version of the CHIME-A might benefit adults in an upward extension. Some of the items in the original adult CHIME might be considered unnecessarily complex in their wording, for example, "I perceive colours and shapes in nature clearly and consciously" and "In everyday life, I get distracted by many memories, images or daydreaming" compared to the modified youth items "I notice details in nature (like the colour of the sky, or the shape of trees and clouds") and "I get distracted by memories and daydreams". The complexity of items may be a translation artefact from the original German CHIME, which is currently undergoing validation in a variety of English-speaking populations (Bergomi, personal communication, 2014). Further, to simplify items to their lowest common denominator may lose some of the nuanced meaning available with an extended vocabulary. Future studies might investigate these questions through qualitative research in validation of the adult CHIME. Use of the simplified CHIME-A purely for the purposes of invariance testing in adults may also be instructive to explore direct statistical comparison across an extended span of the developmental trajectory.

Strengths of this study include testing and refinement in a series of large, independent samples together with the establishment of normative data for males and females. Limitations include the testing procedure for construct validity, with Study 3 utilising the penultimate, 32-item version of the CHIME-A. (Study 4, testing the final 25-item CHIME-A, was nested within a larger trial investigating a mindfulness-based intervention, and questionnaire fatigue precluded us from also including rumination, emotional regulation and self-compassion measures in this dataset). The validity of these analyses is supported by the good to excellent 8-factor, 32-item EFA model fit to the CFA data (Model 1 in Study 4), however we concede that the final CHIME-A instrument (Model 3 in Study 4) is a shorter (25-item) version and these relationships should therefore be interpreted with some caution. More sophisticated external validity testing which compares the CHIME-A with objective neurocognitive measures such as computerised attention testing (Jha et al., 2007), electro-encephalography (Davidson et al., 2003) or event-related brain potential markers (Sanger & Dorjee, 2015)

would be informative in future investigations. Limitations of our research also include the narrow band of adolescents in the samples (98.8% were 12-14 years old) and the need to establish sensitivity to change post mindfulness-based intervention. These are priority areas for future research. Testing in younger age groups would assist in establishing a lower boundary for comprehension of the current instrument before testing across a wider range of age groups, both cross-sectionally and longitudinally, to assist in understanding the normal developmental emergence and malleability of different aspects of trait mindfulness.

## 3.9 Conclusion

The development of a multifactor measure of mindfulness for adolescents opens the way for mapping the natural emergence of different aspects of mindfulness, together with identifying potential key ingredients to emphasise in youth MBIs through mediation analyses. This may allow the development of age-matched modules targeting different aspects of mindfulness to maximise effectiveness.

References

ACARA (2011). *Guide to understanding ICSEA*. Sydney: Australian Curriculum Assessment and Reporting Authority.

Baer, R. (2010). Mindfulness- and Acceptance-Based Interventions and Processes of Change. In R. Baer (Ed.), *Assessing Mindfulness and Acceptance Processes in Clients: Illuminating the Theory and Practice of Change*. Oakland CA: Harbinger.

Baer, R. A., Smith, G. T., & Allen, K. B. (2004). Assessment of Mindfulness by Self-Report: The Kentucky Inventory of Mindfulness Skills. *Assessment, 11*(3), 191-206. doi:10.1177/1073191104268029

Baer, R., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using Self-Report Assessment Methods to Explore Facets of Mindfulness. *Assessment, 13*(1), 27-45. doi:10.1177/1073191105283504

Baer, R., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., . . . Williams, J. M. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment, 15*(3), 329-342. doi:10.1177/1073191107313003

Bardeen, J., Fergus, T., & Orcutt, H. (2012). An Examination of the Latent Structure of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment, 34*(3), 382-392. doi:10.1007/s10862-012-9280-y

Bentler, P. (1990). Comparative Fit Indexes in Structural Models. *Psychological Bulletin, 107*(2), 238-246.

Bentler, P., & Bonett, D. (1980). Significance Tests and Goodness of Fit in the Analysis of Covariance Structures. *Psychological Bulletin, 88*(3), 588-606.

Berg, K., Peterson, C., Frazier, P., & Crow, S. (2011). Convergence of scores on the interview and questionnaire versions of the eating disorder examination: A meta-analytic review. *Psychological Assessment, 23*, 714-724. doi:10.1037/a0023246

Berg, K., Peterson, C., Frazier, P., & Crow, S. (2012). Psychometric evaluation of the eating disorder examination and eating disorder examination-questionnaire: A systematic review of the literature. *International Journal of Eating Disorders, 45*, 428-438. doi:10.1002/eat.20931

Bergomi, C., Tschacher, W., & Kupper, Z. (2013). Measuring Mindfulness: First Steps Towards the Development of a Comprehensive Mindfulness Scale. *Mindfulness, 4*(1), 18-32. doi:10.1007/s12671-012-0102-9

Bergomi, C., Tschacher, W., & Kupper, Z. (2014). Konstruktion und erste Validierung eines Fragebogens zur umfassenden Erfassung von Achtsamkeit: Das Comprehensive Inventory of Mindfulness Experiences. *Diagnostica, 60*(3), 111-125. doi:10.1026/0012-1924/a000109

Biegel, G. M., Brown, K. W., Shapiro, S. L., & Schubert, C. M. (2009). Mindfulness-Based Stress Reduction for the Treatment of Adolescent Psychiatric Outpatients: A Randomized Clinical Trial. *Journal of Consulting & Clinical Psychology, 77*(5), 855-866. doi:10.1037/a0016241

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., . . . Devins, G. (2004). Mindfulness: A Proposed Operational Definition. *Clinical Psychology: Science and Practice, 11*(3), 230-241. doi:10.1093/clipsy.bph077

Bögels, S., Hoogstad, B., van Dun, L., de Schutter, S., & Restifo, K. (2008). Mindfulness Training for Adolescents with Externalizing Disorders and their Parents. *Behavioural and Cognitive Psychotherapy, 36*(02), 193-209. doi:10.1017/S1352465808004190

Broderick, P. C., & Frank, J. L. (2014). Learning to BREATHE: An intervention to foster mindfulness in adolescence. *New Directions for Youth Development, 2014*(142), 31-44. doi:10.1002/yd.20095

Brown, K., West, A., Loverich, T., & Biegel, G. (2011). Assessing Adolescent Mindfulness: Validation of an Adapted Mindful Attention Awareness Scale in Adolescent Normative and Psychiatric Populations. *Psychological Assessment, 23*, 1023-1033. doi:10.1037/a0021338

Brown, K. W., & Ryan, R. M. (2003). The Benefits of Being Present: Mindfulness and Its Role in Psychological Well-Being. *Journal of Personality & Social Psychology, 84*(4), 822-848. doi:10.1037/0022-3514.84.4.822

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical Foundations and Evidence for its Salutary Effects. *Psychological Inquiry, 18*(4), 211-237. doi:10.1080/10478400701598298

Brown, T. (2006). *Confirmatory factor analysis for applied research*. New York: Guildford.

Brown, T. A., Chorpita, B. F., Korotitsch, W., & Barlow, D. H. (1997). Psychometric properties of the Depression Anxiety Stress Scales (DASS) in clinical samples. *Behaviour Research and Therapy, 35*(1), 79-89. doi:10.1016/S0005-7967(96)00068-X

Burke, C. (2010). Mindfulness-Based Approaches with Children and Adolescents: A Preliminary Review of Current Research in an Emergent Field. *Journal of Clinical and Family Studies, 19*(2), 133-144. doi:10.1007/s10826-009-9282-x

Butler, L., & Nolen-Hoeksema, S. (1994). Gender differences in responses to a depressed mood in a college sample. *Sex Roles, 30*, 331-346.

Byrne, B. (2012). *Structural equation modeling with Mplus : basic concepts, applications, and programming*. New York: Routledge.

Cane, D., Olinger, L., Gotlib, I., & Kuiper, N. (1986). Factor structure of the dysfunctional attitude scale in a student population. *Journal of Clinical Psychology, 42*(2), 307-309. doi:10.1002/1097-4679(198603)42:2<307::AID-JCLP2270420213>3.0.CO;2-J

Cooper, J. L., O'Shea, A. E., Atkinson, M. J., & Wade, T. D. (2014). Examination of the difficulties in emotion regulation scale and its relation to disordered eating in a young female sample. *International Journal of Eating Disorders, 47*(6), 630-639. doi:10.1002/eat.22278

Davidson, R., Dunne, J., Eccles, Engle, A., Greenberg, M., Jennings, P., . . . Vago, D. (2012). Contemplative practices and mental training: Prospects for American education. *Child Development Perspectives, 6*(2), 146-153. doi:10.1111/j.1750-8606.2012.00240

de Bruin, E., Zijlstra, B., & Bögels, S. (2014). The Meaning of Mindfulness in Children and Adolescents: Further Validation of the Child and Adolescent Mindfulness Measure

(CAMM) in Two Independent Samples from The Netherlands. *Mindfulness, 5*, 422–430. doi:0.1007/s12671-013-0196-8

Dehon, C., Weems, C., Stickle, T., Costa, N., & Berman, S. (2005). A cross-sectional evaluation of the factorial invariance of anxiety sensitivity in adolescents and young adults. *Behaviour Research and Therapy, 43*(6), 799-810. doi:10.1016/j.brat.2004.06.008

Dunkley, D., Zuroff, D., & Blankstein, K. (2003). Self-Critical Perfectionism and Daily Affect: Dispositional and Situational Influences on Stress and Coping. *Journal of Personality & Social Psychology, 84*(1), 234-252. doi:10.1037/0022-3514.84.1.234

Eccles, J. S. (1999). The development of children ages 6 to 14. *The Future of Children, 9*, 30-44. doi:10.2307/1602703

Egan, S., Wade, T., & Shafran, R. (2011). Perfectionism as a transdiagnostic process: A clinical review. *Clinical Psychology Review, 31*(2), 203-212. doi:10.1016/j.cpr.2010.04.009

Fairburn, C., & Beglin, S. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders, 16*, 363-370. doi:10.1002/1098-108X(199412)16:4<363::AID-EAT2260160405>3.0.CO;2-#

Field, A. (2009). *Discovering Statistics using SPSS* (Third ed.). London: Sage.

Gotink, R., Chu, P., Busschbach, J., Benson, H., Fricchione, G., & Hunink, M. (2015). Standardised Mindfulness-Based Interventions in Healthcare: An Overview of Systematic Reviews and Meta-Analyses of RCTs. *PLoS One, 10*(4), e0124644. doi:10.1371/journal.pone.0124344

Gould, L. F., Mendelson, T., Dariotis, J. K., Ancona, M., Smith, A. S. R., Gonzalez, A. A., . . . Greenberg, M. T. (2014). Assessing fidelity of core components in a mindfulness and yoga intervention for urban youth: Applying the CORE Process. *New Directions for Youth Development, 2014*(142), 59-81. doi:10.1002/yd.20097

Goyal, M., Singh, S., Sibinga, E., Gould, N., Rowland-Seymour, A., Sharma, R., . . . Haythornthwaite, J. (2014). Meditation Programs for Psychological Stress and Well-being. A Systematic Review and Meta-analysis. *Journal of the American Medical Association: Internal Medicine, 174*(3), 357-368. doi:10.1001/jamainternmed.2013.13018

Gratz, K., & Roemer, L. (2004). Multidimensional Assessment of Emotion Regulation and Dysregulation: Development, Factor Structure, and Initial Validation of the

Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment, 26*(1), 41-54. doi:10.1023/B:JOBA.0000007455.08539.94

Greco, L., Baer, R., & Smith, G. T. (2011). Assessing Mindfulness in Children and Adolescents: Development and Validation of the Child and Adolescent Mindfulness Measure (CAMM). *Psychological Assessment, 23*(3), 606-614. doi:10.1037/a0022819

Greco, L. A., Lambert, W., & Baer, R. A. (2008). Psychological Inflexibility in Childhood and Adolescence: Development and Evaluation of the Avoidance and Fusion Questionnaire for Youth. *Psychological Assessment, 20*(2), 93-102. doi:10.1037/1040-3590.20.2.93

Greenberg, M. T., & Harris, A. R. (2012). Nurturing Mindfulness in Children and Youth: Current State of Research. *Child Development Perspectives, 6*(2), 161-166. doi:10.1111/j.1750-8606.2011.00215.x

Henry, J., & Crawford, J. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 44*(2), 227-239. doi:10.1348/014466505X29657

Hölzel, B., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S., Gard, T., & Lazar, S. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research: Neuroimaging, 191*, 36-43. doi:10.1016/j.pscychresns.2010.08.006

Idaszak, J., & Drasgow, E. (1987). A revision of the Job Diagnostic Survey: Elimination of a measurement artifact. *Journal of Applied Psychology, 72*, 69-74. doi:10.1037/0021-9010.72.1.69

Jacobi, C., & Fittig, E. (2010). Psychosocial risk factors for eating disorders. In W. Agras (Ed.), *The Oxford Handbook of Eating Disorders* New York: Oxford University Press.

Jacobi, C., Hayward, C., de Zwaan, M., Kraemer, H., & Agras, W. (2004). Coming to terms with risk factors for eating disorders: application of risk terminology and suggestions for a general taxonomy. *Psychological Bulletin, 130*(1), 19-65. doi:10.1037/0033-2909.130.1.19

Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective and Behavioral Neuroscience, 7*(2), 109-119. doi:10.3758/CABN.7.2.109

Kabat-Zinn, J. (1990). *Full Catastrophe Living*. New York: Dell Publishing.

Kabat-Zinn, J. (2003). Mindfulness-Based Interventions in Context: Past, Present, and Future. *Clinical Psychology: Science and Practice, 10*(2), 144-156. doi:10.1093/clipsy.bpg016

Katterman, S. N., Kleinman, B. M., Hood, M. M., Nackers, L. M., & Corsica, J. A. (2014). Mindfulness meditation as an intervention for binge eating, emotional eating, and weight loss: A systematic review. *Eating Behaviors, 15*(2), 197-204. doi:10.1016/j.eatbeh.2014.01.005

Khoury, B., Lecomte, T., Fortin, G., Masse, M., Therien, P., Bouchard, V., . . . Hofmann, S. G. (2013). Mindfulness-based therapy: a comprehensive meta-analysis. *Clinical Psychology Review, 33*(6), 763-771. doi:10.1016/j.cpr.2013.05.005

Kraemer, H., Wilson, G., Fairburn, C., & Agras, W. (2002). Mediators and moderators of treatment effects in randomized controlled trials. *Archives of General Psychiatry, 59*, 877-883. doi:10.1001/archpsyc.59.10.877

Kuby, A., McLean, N., & Allen, K. (2015). Validation of the Child and Adolescent Mindfulness Measure (CAMM) with Non-Clinical Adolescents. *Mindfulness, 6*, 1448-1455. doi:10.1007/s12671-015-0418-3

Kuyken, W., Weare, K., Ukoumunne, O., Vicary, R., Motton, N., Burnett, R., . . . Huppert, F. (2013). Effectiveness of the Mindfulness in Schools Programme: non-randomised controlled feasibility study. *British Journal of Psychiatry, 203*, 126-131. doi:10.1192/bjp.bp.113.126649

Lawlor, M. S., Schonert-Reichl, K., Gadermann, A., & Zumbo, B. (2014). A Validation Study of the Mindful Attention Awareness Scale Adapted for Children. *Mindfulness, 5*, 730–741. doi:10.1007/s12671-013-0228-4

Lovibond, S., & Lovibond, P. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Sydney: Psychology Foundation.

Luce, K., & Crowther, J. (1999). The reliability of the Eating Disorder Examination-Self-Report Questionnaire Version (EDE-Q). *International Journal of Eating Disorders, 25*(3), 349-351. doi:10.1002/(SICI)1098-108X(199904)25:3<349::AID-EAT15>3.0.CO;2-M

Luciana, M. (2010). Adolescent brain development: Current themes and future directions: Introduction to the special issue. *Brain and Cognition, 72*(1), 1-5. doi:10.1016/j.bandc.2009.11.002

Luna, B., Garver, K., EUrban, T., Lazar, N., & Sweeney, J. (2004). Maturation of Cognitive Processes From Late Childhood to Adulthood. *Child Development 75*(5), 1367-1372. doi:10.1111/j.1467-8624.2004.00745.x

Luna, B., & Sweeney, J. (2004). The emergence of collaborative brain function. *Annals of the New York Academy of Sciences, 1021*, 296-309. doi:10.1196/annals.1308.035

Malinowski, P. (2013). Flourishing through meditation and mindfulness. In S. David, I. Boniwell, & A. Conley Ayers (Eds.), *The Oxford Handbook of Happiness* (pp. 284-396). New York: Oxford University Press.

McEvoy, P., Watson, H., Watkins, E., & Nathan, P. (2013). The relationship between worry, rumination, and comorbidity: Evidence for repetitive negative thinking as a transdiagnostic construct. *Journal of Affective Disorders, 151*(1), 313-320. doi:10.1016/j.jad.2013.06.014

Meiklejohn, J., Phillips, C., Freedman, M., Griffin, M., Biegel, G., Roach, A., . . . Saltzman, A. (2012). Integrating mindfulness training into K-12 education: Fostering the resilience of teachers and students. *Mindfulness, 3*(4), 291-307. doi:10.1007/s12671-012-0094-5

Metz, S., Frank, J., Reibel, D., Cantrell, T., Sanders, R., & Broderick, P. (2013). The Effectiveness of the Learning to BREATHE program on Adolescent Emotion Regulation. *Research in Human Development, 10*(3), 252-272. doi:10.1080/15427609.2013.818488

Mewton, L., Kessler, R. C., Slade, T., Hobbs, M. J., Brownhill, L., Birrell, L., . . . Andrews, G. (2016). The Psychometric Properties of the Kessler Psychological Distress Scale (K6) in a General Population Sample of Adolescents. *Psychological Assessment, 28*(10), 1232-1242. doi:10.1037/pas0000239

Mond, J., Hay, P., Rodgers, B., Owen, C., & Beaumont, P. (2004). Validity of the Eating Disorder Examination Questionnaire (EDE-Q) in screening for eating disorders in community samples. *Behaviour Research and Therapy, 42*, 551-567. doi:10.1016/S0005-7967(03)00161-X

Nolen-Hoeksema, S., & Watkins, E. (2011). A heuristic for developing transdiagnostic models pf psychopathology: Explaining multifinality and divergent trajectories. *Perspectives on Psychological Science, 6*(6), 598 - 609. doi:10.1177/1745691611419672

O'Shea, A., Nehmy, T., Shafran, R., & Wade, T. (*in preparation*). Moving forwards with our understanding of the relationship between perfectionism and psychopathology.

Raes, F., Griffith, J., van der Gucht, K., & Williams, J. (2014). School-based prevention and Reduction of Depression in Adolescents: A Cluster-Randomized Trial of a Mindfulness Group Program. *Mindfulness 5*(5), 477-486. doi:10.1007/s12671-013-0202-1

Rodebaugh, T. L., Woods, C. M., & Heimberg, R. G. (2007). The Reverse of Social Anxiety Is Not Always the Opposite: The Reverse-Scored Items of the Social Interaction Anxiety Scale Do Not Belong. *Behavior Therapy, 38*(2), 192-206. doi: 10.1016/j.beth.2006.08.001

Roeser, R. W., & Pinela, C. (2014). Mindfulness and compassion training in adolescence: A developmental contemplative science perspective. *New Directions for Youth Development, 2014*(142), 9-30. doi:10.1002/yd.20094

Sanger, K. L., & Dorjee, D. (2015). Mindfulness training for adolescents: A neurodevelopmental perspective on investigating modifications in attention and emotion regulation using event-related brain potentials. *Cognitive, Affective, & Behavioral Neuroscience, 15*(3), 696-711. doi:10.3758/s13415-015-0354-7

Schreiber, J., Stage, F., King, J., Amaury, N., & Barlow, E. A. (2006). Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review. *The Journal of Educational Research, 99*(6), 323-337. doi:10.3200/JOER.99.6.323-338

Shapiro, S., Carlson, L., Astin, J., & Freedman, B. (2006). Mechanisms of Mindfulness. *Journal of Clinical Psychology, 62*(3), 373–386. doi:10.1002/jclp.20237

Sibinga, E., Perry-Parish, C., Chung, S., Johnson, S., Smith, M., & Ellen, J. (2013). School-based mindfulness instruction for urban male youth: A small randomized controlled trial. *Preventive Medicine, 57*, 799-801. doi:10.1016/j.ypmed.2013.08.027

Sijtsma, K. (2009). On the use, the misuse, and the very limited usefulness of the Cronbach's alpha. *Psychometrika, 74*(1), 107-120. doi:10.1007/S11336-008-9101-0

Stockings, E., Degenhardt, L., Mihalopoulos, C., Lui, A., Hobbs, M. J., & Patton, G. (2015). Symptom screening scales for detecting major depressive disorder in children and adolescents: A systematic review and meta-analysis of reliability, validity and diagnostic utility. *Journal of Affective Disorders, 174*, 447-463. doi:10.1016/j.jad.2014.11.061

Szabo, M. (2010). The short version of the Depression Anxiety Stress Scales (DASS-21): Factor structure in a young adolescent sample. *Journal of Adolescence, 33*, 1-8. doi:10.1016/j.adolescence.2009.05.014

Tan, L. B. (2016). A critical review of adolescent mindfulness-based programmes. *Clinical Child Psychology and Psychiatry, 21*(2), 193-207. doi:10.1177/1359104515577486

Tan, L., & Martin, G. (2014). Taming the adolescent mind: a randomised controlled trial examining clinical efficacy of an adolescent mindfulness-based group programme. *Child and Adolescent Mental Health*, *20*(1), 49-55. doi:10.1111/camh.12057

Teasdale, J. D., Segal, Z., & Williams, J. M. G. (1995). How does cognitive therapy prevent depressive relapse and why should attentional control (mindfulness) training help? *Behaviour Research and Therapy, 33*(1), 25-39. doi:10.1016/0005-7967(94)E0011-7

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., . . . Stewart-Brown, S. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. *Health and Quality of Life Outcomes, 5*(63), 1-13. doi:10.1186/1477-7525-5-63

Tsang, K. L. V., Wong, P. Y. H., & Lo, S. K. (2012). Assessing psychosocial well-being of adolescents: a systematic review of measuring instruments. *Child: Care, Health and Development, 38*(5), 629-646. doi:10.1111/j.1365-2214.2011.01355

Tully, P. J., Zajac, I. T., & Venning, A. J. (2009). The Structure of Anxiety and Depression in a Normative Sample of Younger and Older Australian Adolescents. *Journal of Abnormal Child Psychology, 37*(5), 717-726. doi:10.1007/s10802-009-9306-4

Vago, D. R., & Silbersweig, D. A. (2012). Self-awareness, self-regulation, and self-transcendence (S-ART): a framework for understanding the neurobiological mechanisms of mindfulness. *Front Hum Neurosci, 6*, 296. doi:10.3389/fnhum.2012.00296

van Beek, Y., Hessen, D. J., Hutteman, R., Verhulp, E. E., & van Leuven, M. (2012). Age and gender differences in depression across adolescence: real or 'bias'? *Journal of Child Psychology and Psychiatry, 53*(9), 973-985. doi:10.1111/j.1469-7610.2012.02553

Weinberg, A., & Klonsky, E. (2009). Measurement of Emotion Dysregulation in Adolescents. *Psychological Assessment, 21*(4), 616-621. doi:10.1037/a0016669

Willemsen, J., Markey, S., Declercq, F., & Vanheule, S. (2011). Negative emotionality in a large community sample of adolescents: the factor structure and measurement invariance of the short version of the depression anxiety stress scales (DASS-21). *Stress and Health, 27*(3), e120-e128. doi:10.1002/smi.1342

Williams, M. J., Dalgleish, T., Karl, A., & Kuyken, W. (2014). Examining the Factor Structures of the Five Facet Mindfulness Questionnaire and the Self-Compassion Scale. *Psychological Assessment, 26*(2), 407-418. doi:10.1037/a0035566

Zack, S., Saekow, J., Kelly, M., & Radke, A. (2014). Mindfulness Based Interventions for Youth. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*. doi:10.1007/s10942-014-0179-2

Ziegert, D. I., & Kistner, J. A. (2002). Response Styles Theory: Downward Extension to Children. *Journal of Clinical Child & Adolescent Psychology, 31*(3), 325-334. doi:10.1207/S15374424JCCP3103_04

Table 3.1 *Exploratory Factor Analyses - Model Fit Comparisons*

| Model | RMSEA | CFI | TLI | $\chi^2$* | *df* | *Models compared* | $\chi^2$* | *df* |
|---|---|---|---|---|---|---|---|---|
| 1-factor | .14 | .51 | .48 | 5901.55 | 629 | | | |
| 2-factor | .09 | .80 | .77 | 2754.42 | 593 | 1-factor against 2-factor | 1525.47 | 36 |
| 3-factor | .08 | .86 | .83 | 2111.54 | 558 | 2-factor against 3-factor | 584.13 | 35 |
| 4-factor | .07 | .89 | .86 | 1730.33 | 524 | 3-factor against 4-factor | 356.45 | 34 |
| 5-factor | .06 | .91 | .88 | 1427.44 | 491 | 4-factor against 5-factor | 303.29 | 33 |
| 6-factor | .06 | .93 | .90 | 1201.04 | 459 | 5-factor against 6-factor | 238.21 | 32 |
| 7-factor | .05 | .95 | .93 | 938.48 | 428 | 6-factor against 7-factor | 254.05 | 31 |
| 8-factor | .05 | .96 | .93 | 848.24 | 398 | 7-factor against 8-factor | 117.72 | 30 |

*Note.* RMSEA = root-mean-square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis index; * all $p<.001$.

Table 3.2 *Exploratory Factor Analysis: 8-Factor Model vs Original Adult CHIME Subscales with Item-Factor Loadings and Proportion of Variance Explained*

| | | EFA Factors from youth sample | | | | | | | | POVE |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | |
| **Original adult CHIME factors.** | | DecNR | AwareExt | AwareInt | AccNJ | Relativity | Insight | Openness | ActAware | |
| **Awareness of Internal Experience** | | | | | | | | | | |
| Item | | | | | | | | | | |
| 1 | When my mood changes, I notice it straight away | | | .58 | | | | | | .48 |
| 5 | I pay attention to how things feel against my skin (like clothes, or my feet on the ground) and feelings inside my body (like tingling or tightness) | | **.52** | | | | | | | .38 |
| 12 | When I talk to other people I notice what emotions I am feeling (for example, if I am angry or happy) | | | .42 | | | | | | .40 |
| 23 | I notice changes happening in my body (such as my breathing speeding up; or my tummy tensing) | | | | | | | | | .35 |
| 26 | I notice the emotions I am feeling as they are happening | | | .47 | | | | | | .53 |
| **Awareness of External Experience** | | | | | | | | | | |
| 8 | I notice details in nature (like the colour of the sky, or the shape of trees and clouds) | | .79 | | | | | | | .61 |
| 15 | When I travel in a car or bus, I pay attention to what is around me, such as buildings, people or the countryside | | .60 | | | | | | | .40 |
| 17 | I pay attention to the feeling of things like the wind in my hair or sunshine on my face | | .76 | | | | | | | .62 |
| 21 | I notice sounds in my environment, such as birds chirping or cars passing | | .74 | | | | | | | .61 |
| **Acting with Awareness** | | | | | | | | | | |
| 10 | It is easy for me to keep my attention on what I am doing | | | | | | | | .42 | .37 |
| 30R | I break or spill things because my thoughts are elsewhere | | | | | | | | .42 | .46 |
| 31R | I get distracted by memories or daydreams | | | | | | | | .82 | .68 |
| 34R | At school, when I walk from class to class my mind is elsewhere | | | | | | | | .59 | .46 |
| **Accepting and Nonjudgemental Orientation** | | | | | | | | | | |
| 2 | In the ups and downs of life, I am kind to myself | | | | .56 | | | | | .55 |
| 9 | I notice my mistakes without giving myself a hard time | | | | .69 | | | | | .70 |
| 25 | Even when I make a big mistake, I am kind and patient with myself | | | | .50 | | | | | .63 |
| 29R | I am hard on myself when I make a mistake | | | | .74 | | | | | .70 |
| 37R | I get angry with myself for my mistakes and weaknesses | | | | .72 | | | | | .73 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Decentering and Nonreactivity** | | | | | | | |
| 7 | After I have upsetting thoughts, I calm down quite quickly | .72 | | | | | .52 |
| 11 | When I have upsetting thoughts, I can notice them without reacting straight away | | | | | | .35 |
| 14 | In difficult situations, I can stop for a moment instead of reacting straight away | .46 | | | | | .48 |
| 16 | When I am tangled up in uncomfortable thoughts and feelings, I notice this quickly, and can "take a step back" | .71 | | | | | .67 |
| 20 | I am able to notice my thoughts and feelings without getting tangled up in them | .54 | | | | | .54 |
| 22 | I notice my thoughts and feelings, and can also "step back" and watch them from a distance | .57 | | | | | .58 |
| **Openness to Experience** | | | | | | | |
| 32R | I try to stay busy to keep certain thoughts or feelings out of my mind | | | | | .54 | .52 |
| 33R | When I feel difficult emotions, I try to do something to take my mind off them | | | | | .68 | .56 |
| 35R | I don't like it when I am angry or scared and try to get rid of these emotions | | | | | .73 | .54 |
| 36R | I try to avoid emotional pain as much as possible | | | | | .71 | .50 |
| **Relativity of Thoughts** | | | | | | | |
| 4 | I am aware that my thoughts about people or events could easily change | | | .41 | | | .29 |
| 18 | I realise my thoughts aren't always facts | | | .59 | | | .51 |
| 24 | I realise that my point of view is not always based on facts | | | .73 | | | .64 |
| 27 | I am aware that my point of view could change | | | .66 | | | .57 |
| **Insightful Understanding** | | | | | | | |
| 3 | I notice it when my negative attitude makes things difficult | | **.51** | | | | .34 |
| 6 | When I notice that I have made things more complicated than they really are, it makes me smile | | | | .59 | | .37 |
| 13 | When I have given myself a hard time without needing to, I can laugh about it | | | | .45 | | .51 |
| 19 | I am able to smile to myself when I notice I have made a big deal out of a small problem | | | | .78 | | .68 |
| 28 | I quickly notice if I have made things more difficult for myself than they need to be | | | | | | .42 |

*Note.* AwareInt = Awareness of Internal Experiences; AwareExt = Awareness of External Experiences; ActAware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental orientation; DecNR = Decentering and Nonreactivity; Openness = Openness to Experience; Relativity = Relativity of Thoughts; Insight = Insightful Understanding; POVE = proportion of variance explained. R = reverse scored item corrected before EFA. Item-factor loadings <.4 have been removed thus eliminating items 11, 23, 28; items in bold (3, 5) cross-load on different factor to adult CHIME and were removed in final model. All loadings significant $p < .01$

Table 3.3 *Exploratory Factor Analysis: Correlations between Factors for 8-Factor Model*

| Factor | AwareInt | AwareExt | ActAware | AccNJ | DecNR | Openness | Relativity | Insight |
|---|---|---|---|---|---|---|---|---|
| AwareInt | 1.00 | | | | | | | |
| AwareExt | .32* | 1.00 | | | | | | |
| ActAware | .31* | .34* | 1.00 | | | | | |
| AccNJ | .39* | .15* | .17* | 1.00 | | | | |
| DecNR | .51* | .41* | .40* | .20* | 1.00 | | | |
| Openness | .46* | .32* | .26* | .32* | .31* | 1.00 | | |
| Relativity | -.09 | -.17* | -.15* | .04 | -.08 | -.12* | 1.00 | |
| Insight | .35* | .07 | .08 | .35* | .04 | .13* | .38* | 1.00 |

*Note.* AwareInt = Awareness of Internal Experiences; AwareExt = Awareness of External Experiences; ActAware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental orientation; DecNR = Decentering and Nonreactivity; Openness = Openness to Experience; Relativity = Relativity of Thoughts; Insight = Insightful Understanding; * significant at $p < .05$.

Table 3.4 *Exploratory Factor Analysis: Pearson Correlations for Total Score with External Validity Variables, and Simultaneous Regression Analyses for Subscales showing Beta Weights and Variance Explained.*

| | | Mindfulness | Emotional Dysregulation | Perfectionism | Rumination |
|---|---|---|---|---|---|
| *CHIME-A total score* | | | | *r* | |
| | | .35** | -.61** | -.45** | .01 |
| *CHIME-A Factors* | Content of Factor | | | *β* | |
| AwareInt | Awareness of emotions | .07 | -.07 | .02 | .23** |
| AwareExt | Awareness of environment | -.04 | .07 | -.07 | .14** |
| ActAware | Awareness of present moment as opposed to being caught up in thinking about the past/future | .26** | -.28** | -.03 | -.12** |
| AccNJ | Self-kindness with mistakes and perceived weaknesses | .26** | -.31** | -.45** | -.20** |
| DecNR | Ability to step back from difficult thoughts and emotions, and not react immediately | .09 | -.33** | -.01 | -.06 |
| Openness | Capacity to allow presence of difficult emotions and thoughts | .34** | -.12** | -.04 | -.36** |
| Relativity | Recognition of thoughts as transient and subjective | .01 | .03 | -.07 | .004 |
| Insight | Recognition that subjective interpretation of situations can create or compound difficulty | -.11* | <.001 | -.08 | .08 |
| $R^2$ | | .39** | .54** | .29** | .41** |

*Note.* Mindfulness measured by CAMM: Child and Adolescent Mindfulness Measure; Perfectionism by 11 items from DAS = Dysfunctional Attitudes Scale; Emotional Dysregulation by 30-item version of DERS = Difficulties in Emotional Regulation Scale; Rumination by CRSS = Childrens' Response Style Scale; Significant correlations indicated by * $p < .05$;** $p < .01$

Table 3.5 *Confirmatory Factor Analyses – Model Fit and Internal Consistency Comparisons*

| Model | 1 | 1a | 2 | 2a | 3 | 3a | Model of choice (3) "CHIME-A" | |
|---|---|---|---|---|---|---|---|---|
| Description | EFA 8-factor model (*N* = 557) | Hierarchical higher order factor | Top 3 items per factor | Hierarchical higher order factor | Adding back one item to Factor 6 (Openness) | Hierarchical higher order factor | Males (*N* = 298) | Females (*N* = 259) |
| Items | 32 | 32 | 24 | 24 | 25 | 25 | 25 | 25 |
| Model Fit Indices | | | | | | | | |
| RMSEA | .07 | .09 | .06 | .10 | .06 | .097 | .06 | .07 |
| CFI | .98 | .96 | .99 | .99 | .99 | .97 | .99 | .99 |
| TLI | .98` | .96 | .99 | .96 | .99 | .96 | .98 | .98 |
| $\chi^2$ (*df*) | 1651.37 (*436*)* | 2531.79 (*456*)* | 714.64 (*224*)* | 1593.05 (*244*)* | 813.48 (*247*)* | 1675.47 (*267*)* | 22282.56 (*300*)* | 22052.79 (*300*)* |
| Internal consistency: Cronbach's alpha (item-total range) | | | | | | | | |
| Full scale | | .85 (-.06-.63); | | .81 (-.04-.59) | | .80 (-.04-.59) | | |
| Subscales | | | | | | | | |
| Aware-Int | .67(.45-.50) | | .67 (.45-.50) | | .67 (.45-.50) | | .69 (.48-.52) | .63 (.42-.45) |
| Aware-Ext | .75 (.46-.61) | | .74 (.55-.59) | | .74 (.55-.59) | | .70 (.50-.56) | .79 (.62-.64) |
| ActAware | .65 (.28-.57) | | .67 (.45-.55) | | .67 (.45-.55) | | .63 (.40-.50) | .72 (.50-.60) |
| AccNJ | .84 (.61-.68) | | .75 (.56-.60) | | .75 (.56-.60) | | .73 (.52-.57) | .78 (.60-.65) |
| DecNR | .79 (.52-.61) | | .73 (.49-.59) | | .73 (.49-.59) | | .72 (.48-.59) | .73 (.49-.59) |
| Openness | .65 (.39-.49) | | .55 (.28-.40) | | .65 (.39-.49) | | .66 (.41-.49) | .63 (.36- 49) |
| Relativity | .73 (.36-.60) | | .77 (.55-.63) | | .77 (.55-.63) | | .74 (.50-.61) | .80 (.60-.68) |
| Insight | .72 (.48-.57) | | .72 (.48-.57) | | .72 (.48-.57) | | .74 (.56-.58) | .69 (.37-.58) |

*Note.* RMSEA = root-mean-square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis index; Aware-Int = Awareness of Internal Experiences; Aware-Ext = Awareness of External Experiences; ActAware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental orientation; DecNR = Decentering and Nonreactivity; Openness = Openness to Experience; Relativity = Relativity of Thoughts; Insight = Insightful Understanding; CHIME-A = Comprehensive Inventory of Mindfulness Experiences – Adolescence; *significant at p <.01

Table 3.6 *Final CHIME-A Model: Invariance Testing for Model Fit across Gender, with Item Thresholds for the Metric Model*

| Invariance testing across gender | | | | |
|---|---|---|---|---|
| Model | No. parameters | Chi-square *(df)* | Models compared | Chi-square *(df)* |
| Configural | 306 | 974.65 *(494)*** | | |
| Metric | 289 | 981.234*(511)*** | Metric vs Configural | 13.78 *(17)* |
| Scalar | 222 | 1073.89 *(578)*** | Scalar vs Metric | 110.41 *(67)** |

| Item Thresholds for the Metric Model | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Threshold 1 *Never - rarely* | | Threshold 2 *Rarely - sometimes* | | Threshold 3 *Sometimes - often* | | Threshold 4 *Often - always* | |
| Item | Males | Females | Males | Females | Males | Females | Males | Females |
| 1 | -1.21 | -1.21 | -0.33 | -0.33 | 0.69 | 0.16 | 1.28 | 0.44 |
| 6 | -0.09 | -0.09 | 0.42 | 0.42 | 0.91 | 0.70 | 1.26 | 0.82 |
| 8 | -0.86 | -0.86 | -0.25 | -0.25 | 0.45 | 0.28 | 1.28 | 0.85 |
| 9 | -0.85 | -0.85 | 0.08 | 0.08 | 0.78 | 0.87 | 1.28 | 1.11 |
| 12 | -1.27 | -1.27 | -0.60 | -0.74 | 0.47 | -0.09 | 1.28 | 0.46 |
| 13 | -0.39 | -0.39 | 0.35 | 0.26 | 0.85 | 0.63 | 1.28 | 0.79 |
| 16 | -0.73 | -0.73 | 0.22 | 0.22 | 1.02 | 0.80 | 1.28 | 1.09 |
| 17 | -0.83 | -0.83 | -0.04 | -0.25 | 0.72 | 0.26 | 1.28 | 0.81 |
| 18 | -1.23 | -1.23 | -0.24 | -0.24 | 0.67 | 0.57 | 1.28 | 1.26 |
| 19 | -0.47 | -0.47 | 0.33 | 0.24 | 0.89 | 0.60 | 1.28 | 0.80 |
| 20 | -1.02 | -1.02 | 0.15 | 0.16 | 0.87 | 0.79 | 1.28 | 1.08 |
| 21 | -1.13 | -1.13 | -0.46 | -0.50 | 0.35 | 0.18 | 1.26 | 0.83 |
| 22 | -0.74 | -0.74 | 0.39 | 0.46 | 0.96 | 0.99 | 1.22 | 1.08 |
| 24 | -1.44 | -1.44 | -0.14 | -0.16 | 0.68 | 0.76 | 1.26 | 1.31 |
| 25 | -0.58 | -0.58 | 0.20 | 0.31 | 0.89 | 0.91 | 1.26 | 1.11 |
| 26 | -1.31 | -1.31 | -0.29 | -0.51 | 0.43 | 0.07 | 1.24 | 0.44 |
| 27 | -1.60 | -1.60 | -0.59 | -0.55 | 0.38 | 0.41 | 1.24 | 1.25 |
| 30 | -0.98 | -0.98 | -0.16 | -0.16 | 0.51 | 0.63 | 1.21 | 1.16 |
| 31 | -0.30 | -0.30 | 0.38 | 0.45 | 0.90 | 1.00 | 1.22 | 1.13 |
| 34 | -0.46 | -0.46 | 0.34 | 0.15 | 0.95 | 0.91 | 1.24 | 1.15 |
| 32 | -0.53 | -0.53 | 0.33 | 0.33 | 0.84 | 0.76 | 1.24 | 1.00 |
| 33 | -0.26 | -0.26 | 0.53 | 0.52 | 1.00 | 0.95 | 1.22 | 1.01 |
| 35 | -0.28 | -0.28 | 0.54 | 0.43 | 1.00 | 0.77 | 1.22 | 0.94 |
| 36 | -0.01 | -0.01 | 0.67 | 0.62 | 1.11 | 0.99 | 1.24 | 1.01 |
| 37 | -0.49 | -0.49 | 0.18 | 0.19 | 0.83 | 0.89 | 1.24 | 1.06 |

*Note.* *$p$<.05; **$p$<.01

Table 3.7 *Final CHIME-A Model: Descriptive Statistics*

| | Whole sample (*N* = 557) | | | Males (*N* = 298) | | | Females (*N* = 259) | | | Between gender ES |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean (*SD*) | Min | Max | Mean (*SD*) | Min | Max | Mean (*SD*) | Min | Max | |
| Factor | | | | | | | | | | |
| Aware-Int | 3.68 *(.72)* | 1.00 | 5.00 | 3.70 *(.77)* | 1.00 | 5.00 | 3.67 *(.66)* | 2.00 | 5.00 | 0.04 |
| Aware-Ext | 3.58 *(.89)* | 1.00 | 5.00 | 3.55 *(.87)* | 1.00 | 5.00 | 3.62 *(.91)* | 1.00 | 5.00 | 0.08 |
| ActAware | 3.02 *(.85)* | 1.00 | 5.00 | 3.06 *(.84)* | 1.00 | 5.00 | 2.98 *(.87)* | 1.00 | 5.00 | 0.09 |
| AccNJ | 3.02 *(.89)* | 1.00 | 5.00 | 3.10 *(.90)** | 1.00 | 5.00 | 2.93 *(.87)** | 1.00 | 5.00 | 0.19 |
| DecNR | 3.05 *(.77)* | 1.00 | 5.00 | 3.12 *(.77)** | 1.00 | 5.00 | 2.96 *(.76)* * | 1.00 | 5.00 | 0.21 |
| Openness | 2.64 *(.73)* | 1.00 | 5.00 | 2.69 *(.76)* | 1.00 | 5.00 | 2.59 *(.70)* | 1.00 | 4.50 | 0.14 |
| Relativity | 3.67 *(.77)* | 1.00 | 5.00 | 3.68 *(.73)* | 1.00 | 5.00 | 3.66 *(.80)* | 1.33 | 5.00 | 0.03 |
| Insight | 2.75 *(.92)* | 1.00 | 5.00 | 2.80 *(.97)* | 1.00 | 5.00 | 2.68 *(.85)* | 1.00 | 5.00 | 0.13 |

*Note.* Aware-Int = Awareness of Internal Experiences; Aware-Ext = Awareness of External Experiences; ActAware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental orientation; DecNR = Decentering and Nonreactivity; Openness = Openness to Experience; Relativity = Relativity of Thoughts; Insight = Insightful Understanding; * = significant difference between genders at p<.05; ES = Cohen's *d*.

Table 3.8 *Final CHIME-A Model: Standardised Factor Loadings and Squared Multiple Correlations*

| Factor | Item No. | Item Content | Item-Factor Loading | $R^2$ | | |
|---|---|---|---|---|---|---|
| | | | Whole Sample ($N$ = 557) | Whole Sample | Males ($N$ = 298) | Females ($N$ = 259) |
| Aware-Int | 1 | When my mood changes, I notice it straight away | .78 | .60 | .58 | .64 |
| | 12 | When I talk to other people I notice what emotions I am feeling (for example, if I am angry or happy) | .82 | .67 | .71 | .65 |
| | 26 | I notice the emotions I am feeling as they are happening | .84 | .70 | .72 | .67 |
| Aware-Ext | 8 | I notice details in nature (like the colour of the sky, or the shape of trees and clouds) | .83 | .70 | .66 | .73 |
| | 17 | I pay attention to the feeling of things like the wind in my hair or sunshine on my face | .84 | .70 | .68 | .75 |
| | 21 | I notice sounds in my environment, such as birds chirping or cars passing | .85 | .72 | .69 | .75 |
| ActAware | 30 | I break or spill things because my thoughts are elsewhere | .83 | .69 | .66 | .72 |
| | 31 | I get distracted by memories or daydreams | .82 | .68 | .64 | .72 |
| | 34 | At school, when I walk from class to class my mind is elsewhere | .82 | .66 | .63 | .73 |
| AccNJ | 9 | I notice my mistakes without giving myself a hard time | .86 | .73 | .71 | .77 |
| | 25 | Even when I make a big mistake, I am kind and patient with myself | .88 | .77 | .75 | .79 |
| | 37 | I get angry with myself for my mistakes and weaknesses | .83 | .68 | .64 | .73 |
| DecNR | 16 | When I am tangled up in uncomfortable thoughts and feelings, I notice this quickly, and can “take a step back” | .83 | .69 | .69 | .69 |
| | 20 | I am able to notice my thoughts and feelings without getting tangled up in them | .85 | .72 | .70 | .75 |
| | 22 | I notice my thoughts and feelings, and can also “step back” and watch them from a distance | .83 | .69 | .70 | .69 |
| Open | 32 | I try to stay busy to keep certain thoughts or feelings out of my mind | .85 | .73 | .69 | .76 |
| | 33 | When I feel difficult emotions, I try to do something to take my mind off them | .76 | .57 | .58 | .56 |
| | 35 | I don’t like it when I am angry or scared and try to get rid of these emotions | .79 | .62 | .61 | .64 |
| | 36 | I try to avoid emotional pain as much as possible | .80 | .63 | .63 | .64 |
| Relativity | 18 | I realise my thoughts aren’t always facts | .88 | .77 | .72 | .83 |
| | 24 | I realise that my point of view is not always based on facts | .87 | .75 | .74 | .76 |
| | 27 | I am aware that my point of view could change | .86 | .73 | .69 | .78 |
| Insight | 6 | When I notice that I have made things more complicated than they really are, it makes me smile | .78 | .61 | .65 | .58 |
| | 13 | When I have given myself a hard time without needing to, I can laugh about it | .88 | .78 | .77 | .81 |
| | 19 | I am able to smile to myself when I notice I have made a big deal out of a small problem | .85 | .72 | .71 | .74 |

*Note.* Aware-Int = Awareness of Internal Experiences; Aware-Ext = Awareness of External Experiences; ActAware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental orientation; DecNR = Decentering and Nonreactivity; Openness = Openness to Experience; Relativity = Relativity of Thoughts; Insight = Insightful Understanding; All correlations significant at $p < .01$

Table 3.9 *Final CHIME-A Model: Correlations between Factors for Males and Females*

| Factor | Aware-Int | Aware-Ext | ActAware | AccNJ | DecNR | Openness | Relativity | Insight |
|---|---|---|---|---|---|---|---|---|
| Aware-Int | - | .78 | .55 | .60 | .73 | .51 | .78 | .67 |
| Aware-Ext | .83 | - | .55 | .67 | .82 | .52 | .74 | .66 |
| ActAware | .63 | .51 | - | .85 | .79 | .79 | .64 | .68 |
| AccNJ | .69 | .65 | .78 | - | .95 | .70 | .74 | .80 |
| DecNR | .80 | .76 | .70 | .85 | - | .61 | .84 | .81 |
| Openness | .51 | .45 | .75 | .70 | .54 | - | .50 | .62 |
| Relativity | .78 | .74 | .62 | .75 | .83 | .47 | - | .72 |
| Insight | .68 | .65 | .58 | .81 | .82 | .54 | .69 | - |

*Note.* Females above diagonal, males below; Aware-Int = Awareness of Internal Experiences; Aware-Ext = Awareness of External Experiences; ActAware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental orientation; DecNR = Decentering and Nonreactivity; Openness = Openness to Experience; Relativity = Relativity of Thoughts; Insight = Insightful Understanding; All correlations significant at $p < .01$

Table 3.10 *Final CHIME-A Model : External Validity in Study 4 sample - Simultaneous Regression Analyses for Subscales showing Beta Weights and Variance Explained*

| | | Whole sample *N* = 557 | | | | | Males *N* = 298 | | | | | Females *N* = 259 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NA | Dep | Anx | WB | WSC | NA | Dep | Anx | WB | WSC | NA | Dep | Anx | WB | WSC |
| CHIME-A Factors | Content of Factor | β | | | | | | | | | | | | | | |
| Aware-Int | Awareness of emotions | .10** | .08* | .10* | -.02 | .05 | .12* | .10 | .11 | -.04 | .04 | .06 | .05 | .05 | .004 | .09 |
| Aware-Ext | Awareness of environment | .09* | .06 | .11* | .09* | -.01 | .08 | .04 | .10 | .09 | .01 | .09 | .08 | .12* | .12 | -.10 |
| ActAware | Awareness of present moment as opposed to being caught up in thinking about the past/future | -.32** | -.25** | -.34** | .11** | -.10* | -.30** | -.25** | -.31** | .16** | -.14* | -.36** | -.25** | -.35** | .04 | -.06 |
| AccNJ | Self-kindness with mistakes and perceived weaknesses | -.34** | -.33** | -.24** | .29** | -.33** | -.26** | -.26** | -.14* | .22** | -.26** | -.47** | -.43** | -.36** | .39** | -.44** |
| DecNR | Ability to step back from difficult thoughts and emotions, and not react immediately | -.18** | -.17** | -.09 | .19** | -.03 | -.23** | -.19** | -.05 | .20** | .08 | -.06 | -.11 | -.09 | .13 | -.08 |
| Openness | Capacity to allow presence of difficult emotions and thoughts | -.07* | -.07 | -.08* | -.02 | -.05 | -.10 | -.07 | -.11 | .01 | -.09 | -.06 | -.08 | -.06 | -.05 | .04 |
| Relativity | Recognition of thoughts as transient and subjective | -.03 | -.06 | -.02 | .07 | -.06 | -.08 | -.10 | -.10 | .11 | -.13 | .02 | -.03 | .07 | .03 | -.01 |
| Insight | Recognition that subjective interpretation of situations can create or compound difficulty | -.03 | -.06 | <.001 | .18** | -.01 | -.01 | -.07 | .01 | .18** | -.04 | -.04 | -.07 | -.03 | .21** | .01 |
| | | | | | | | | | $R^2$ | | | | | | | |
| | | .48** | .41** | .33** | .40** | .19** | .38** | .33** | .23** | .36** | .15** | .60** | .50** | .47** | .46** | .30** |

*Note.* NA = negative affect; Dep = depression; Anx = anxiety; WB = wellbeing; WSC = weight/shape concerns; Aware-Int = Awareness of Internal Experiences; Aware-Ext = Awareness of External Experiences; ActAware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental orientation; DecNR = Decentering and Nonreactivity; Openness = Openness to Experience; Relativity = Relativity of Thoughts; Insight = Insightful Understanding; *$p < .05$; **$p < .01$

Table 3.11 *Paired Samples T-test Results showing Test-retest Reliability over Seven Days (N = 120)*

| | Cronbach's alpha (item-total range) | Correlation | Between group ES |
|---|---|---|---|
| Subscales | | | |
| Aware INT | .64 (.40-.50) | .69** | ↓.24** |
| Aware EXT | .79 (.60-.68) | .72** | ↓.13 |
| Act Aware | .58 (.32-.43) | .63** | ↓.04 |
| Acceptance/Nonjudgement | .78 (.58-.70) | .79** | ↓.04 |
| Decentering/Nonreactivity | .79 (.60-.65) | .63** | ↓.08 |
| Openness | .63 (.34-.52) | .56** | ↑.10 |
| Relativity | .74 (.49-.65) | .71** | ↓.20** |
| Insight | .72 (.51-.57) | .75** | ↓.17* |

*Notes. ES = Cohen's d; *p < .05; **p < .01; arrows indicate an increase or decrease from Wave 1 to Wave 2*

# Chapter 4 :

# A randomised controlled evaluation of a secondary school mindfulness programme for early adolescents: do we have the recipe right yet?

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**Candidate's contribution:**
CJ designed the study, analysed data and prepared manuscript under supervision of Wade. Minor comments on interpretation by Burke and Brinkman.
Research design 90%; Data collection 100%; Analysis 90%; Writing and editing 90%.

## 4.1 Abstract

**Objective:** Mindfulness is being promoted in schools as a prevention programme despite a current small evidence base. The aim of this research was to conduct a rigorous evaluation of the *.b* ("Dot be") mindfulness curriculum, with or without parental involvement, compared to a control condition. **Method:** In a randomised controlled design, students ($M_{age}$ 13.44, *SD* .33; 45.4% female) across a broad range of socioeconomic indicators received the nine lesson curriculum delivered by an external facilitator with ($N$ = 191) or without ($N$ = 186) parental involvement, or were allocated to a usual curriculum control group ($N$ = 178). Self-report outcome measures were anxiety, depression, weight/shape concerns, wellbeing and mindfulness. **Results:** There were no differences in outcomes between any of the three groups at post-intervention, 6- or 12-month follow-up. Between-group effect sizes (Cohen's *d*) across the variables ranged from .002 - .37. A wide range of moderators were examined but none impacted outcome. **Conclusions:** Further research is required to identify the optimal age, content and length of mindfulness programmes for adolescents in universal prevention settings.

## 4.2 Introduction

Mindfulness presents as a promising transdiagnostic approach for mental health disorders, given its potential to counteract a number of shared risk factors for anxiety, depression and eating disorders (Johnson, Burke, Brinkman, & Wade, 2016a). Robust evidence exists in adults for the benefits of mindfulness-based interventions (MBIs) across this group of pathologies (Khoury et al., 2013). More recently, MBIs have been enthusiastically embraced in schools and are widely disseminated (Semple, Droutman, & Reid, 2017), but there are insufficient methodologically robust studies to make definitive conclusions about efficacy.

In mainstream secondary schools, only three large randomised controlled trials (RCTs) of MBIs have been conducted. Raes, Griffith, van der Gucht, and Williams, (2014) tested an 8-week MBCT-informed curriculum ($N = 408$, $M_{age}$ 15.4 years; mixed sex; external facilitator) finding improvements in depression at post-intervention and 6-month follow-up (Cohen's $d \geq .25$). Atkinson and Wade (2015) investigated a 3-session mindfulness intervention with a body image focus ($N = 347$, $M_{age}$ 15.7 years; female; external facilitator), with improvements across a range of eating disorder risk factors at 6 months ($d \geq .47$), but no improvements in negative affect. A third study evaluated the manualized *.b* ("Dot be") Mindfulness in Schools curriculum, which had previously shown promising results in a controlled study (Kuyken et al., 2013; $N = 522$, $M_{age}$ 14.8 years, mixed sex, class teacher delivery), demonstrating reductions at 3 months for depression, stress and wellbeing ($d \geq .25$). The replication RCT (Johnson et al., 2016a; $N = 308$, $M_{age}$ 13.6 years, mixed sex, external facilitator) showed no improvements across a wide range of outcomes at post-intervention or 3-month follow-up ($d < .28$).

Several hypotheses for the lack of replication of the *.b* curriculum exist. First, that the ideal dosage or active ingredients necessary to successfully translate adult MBIs for youth remain unknown. Second, although an early adolescent group was deliberately targeted, prior to the escalating stressors of mid-late adolescence (Kuyken et al., 2013), it may be that older adolescents respond better. Third, inadequate programme adherence in the replication trial may have impacted results i.e., the curriculum was shortened by one lesson, students were not supplied with a user friendly version of the home practice manual, and an external facilitator was used (Johnson et al., 2016a). Therefore, the main aim of the current study was to conduct a tighter replication of the *.b* curriculum in the first instance. A secondary aim was to test whether increased "dose" might be achieved by inviting parents to take part in the

intervention, to stimulate discussion of mindfulness at home together and remind students to do home practice. Three small controlled trials of MBIs (Bögels, Hoogstad, van Dun, de Schutter, & Restifo, 2008; Semple, Lee, Rosa, & Miller, 2010; van der Oord, Bögels, & Peijnenburg, 2012) have included parents in MBIs for children, evidencing medium to large effect size improvements in attention, behaviour problems and anxiety in these clinical samples. However, there have been no experimental comparisons that isolate the effect of parental involvement, nor has this been tested in community samples. We predicted that our outcome measures would show improvement at 12-month follow-up (the longest to date in a youth MBI study) in the mindfulness group with parental involvement compared to the mindfulness group without, due to higher levels of home practice compliance, and that both of these groups would show improvement compared to the control group.

## 4.3 Method

### 4.3.1 Participants

Four urban coeducational secondary schools (one private, three public) participated. The mean age of the 555 students who participated was 13.44 (*SD* = .33); 45.4% were female. Power analysis showed that to detect a Cohen's *d* effect size of .25 (Kuyken et al., 2013; Raes et al., 2014), with a power level of .80, 127 participants per group were required (Hedeker, Gibbons, & Waternaux, 1999).

### 4.3.2 Design

A cluster (class based) randomised controlled design was used, with assignment to mindfulness, mindfulness with parental involvement, or control using the randomisation function in Excel 2010, and performed by the principal investigator prior to any contact with participating teachers. Clustering at the class level within schools allowed for matching of demographic variables, with the risk of contamination within schools considered low due to class and home-based activities involving experiential practice. Outcome measures were administered on four occasions: 3-4 weeks pre-intervention, post-intervention and 6- and 12-month follow-up.

### 4.3.3 Procedure

Research approval was granted by each School Principal, the South Australian Department for Education and Child Development, and the Social and Behavioural Research Ethics Committee of Flinders University. Opt-out consent was approved. Testing was

performed in a classroom setting with the principal investigator and teacher present. It was not possible for students or the researcher to be blind to the allocated treatment group.

### 4.3.4 Intervention

**Mindfulness curriculum.** The *.b* ("Dot be") Mindfulness in Schools curriculum, based on adult mindfulness programmes but modified for 11-16 year olds (Kuyken et al., 2013), was used. The tightly manualized programme consists of nine weekly lessons (40-60 minutes in our study). Throughout the course, a range of mindfulness practices were taught to students: short unguided practices (breath counting, "*.b*": *stop, feel your feet, feel your breathing, and be present*, mindfulness of routine daily activities including walking, and watching thought traffic) and two 9-minute guided audio files ("FOFBOC: *Feet on floor and bum on chair*", a seated body scan and breath awareness; and "Beditation", a lying down body scan and relaxation practice). Guided by a homework manual, and with access to the two guided audiofiles, students were encouraged to practice at home daily.

All mindfulness lessons were conducted by the first author (CJ), a mindfulness practitioner with ten years of personal practice, who in addition to *.b* certification had undergone adult facilitator training, and had taught the *.b* curriculum 8 times previously. The control group undertook normal lessons (i.e., Pastoral care, Community projects, English, Science or History).

Greater adherence to the curriculum was promoted as follows. The introductory lesson was delivered in full, and each student received a colour, hard copy of the homework manual. A "team teaching" approach was adopted (van de Weijer-Bergsma, Langenberg, Brandsma, Oort, & Bögels, 2014), where classroom teachers were asked to take an active part in the lessons and remind students about their mindfulness home practice. Further, teachers were given a script for a short practice (*.b*) to run at the start of every lesson they had with this group of students, together with a choice of two meditation audiofiles to play once a week between formal mindfulness lessons.

The standard curriculum was also strengthened to maximise potency of the ideas, including a greater focus on motivation in the introductory lesson: emphasising the unique window to "immunise" their brain on the cusp of adolescence and its challenges; recording their individual motivations for retraining their brain on a home practice chart, and brainstorming obstacles and helpful ideas for remembering to do each week's exercises at home. Second, we added the *.b* practice at the start of every formal mindfulness lesson in order to facilitate its use as a very familiar "anchoring" technique in stormy situations. Third,

we added a quiz at the start of each lesson reviewing the previous lesson's key points (with small candy rewards). Fourth, we added more pages to the homework manual so that each week's activity could be easily recorded. Fifth, we gave each classroom two colourful A3 posters summarising the four steps of the *.b* practice and illustrating a series of key mindfulness ideas. Sixth, at the final lesson, students received a laminated colour copy of key ideas, and teachers received a handout describing how to reinforce mindfulness with their class into the future.

**Parental involvement.** For those students allocated to the *Mindfulness with parental involvement* arm of the trial, parents were also invited to be involved. The parental component was designed predominately in e-format to minimise the time burden and be easily accessible. Parents were invited to a one hour evening information session at their child's school before the programme commenced, with a presentation explaining mindfulness, the research, and the *.b* programme, followed by opportunity for questions. For those parents that could not attend, a link to a recording of this session was sent via email. Once a week, parents received a further email with a link to a 10-minute private YouTube clip which summarised the key points of the current lesson, took parents through an experiential exercise, explained the child's home practices for that week, and invited email feedback or questions.

### 4.3.5 Primary outcome measures

***Anxiety and Depression.*** In order to allow comparison with previous relevant studies (Raes et al., 2014; Nehmy and Wade, 2015), negative affect was measured using the Depression Anxiety Stress Scale – Short form (DASS-21; Lovibond & Lovibond, 1995). The anxiety and depression factors show good fit in non-clinical adolescents (Szabo, 2010; Tully, Zajac, & Venning, 2009; Willemsen, Markey, Declercq, & Vanheule, 2011), thus these two seven-item subscales were used in the current study. Each item is scored on a 4-point scale from 0 *"never"* to 3 *"almost always"*, with higher scores reflecting higher depression or anxiety over the past week. Cronbach's alpha in this study for depression was .90 (item-total correlations ranged from.52-.79) and anxiety was .80 (.26-.68).

***Weight and Shape Concerns.*** To allow direct comparison with Atkinson and Wade (2015), the weight and shape subscales of the Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 1994) were used, which correlate well with the interview format, which itself has excellent psychometric properties (Berg, Peterson, Frazier, & Crow, 2012; Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beaumont, 2004). These 12

items use a 7-point rating scale ranging from 0 *"not at all"* to 6 *"markedly"*. Questions relate to the last 28 days and higher scores indicate greater concerns. Internal consistency of the combined score in this study was α = .94 with item-total correlations ranging from .37-.79.

***Wellbeing.*** To allow direct comparison with a previous controlled trial of *.b* (Kuyken et al., 2013), we used the 14-item Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS), which has been validated in both university student and community adult populations (Tennant et al., 2007). This 14-item scale surveys the last two weeks; items are rated on a 5-point scale from 1 *"none of the time"* to 5 "*all of the time*", with higher scores signifying higher wellbeing. Internal consistency in the current study was α =.91 with item-total correlations ranging from .52-.85.

***Mindfulness.*** Mindfulness was measured using the Comprehensive Inventory of Mindfulness Experiences – Adolescents (CHIME-A). This 25-item scale has been validated for young adolescents (12-15 years; Johnson et al., 2016b) and supports eight individual factors but not an overall total score. The questionnaire uses a 5-point rating scale ranging from 1 *"never true"* to 5 *"always true"* to survey the last two weeks. For each factor, a higher score indicates greater mindfulness. Internal consistency across the eight factors in the current study was as follows: *Awareness of Internal Experiences* (Cronbach's alpha = .66; item total correlation range = .45 - .49); *Awareness of External Experiences* (.74; .55 - .59); *Acting with Awareness* (.66; .44 - .54), *Accepting and Nonjudgemental Orientation* (.75; .55 - .60); *Decentering and Nonreactivity* (.73; .49 - .59); *Openness* (.65; .40 - .49); *Relativity* (.77; .55 - .63), and *Insight* (.72; .48 - .57).

### 4.3.6 Secondary outcome measures

***Fidelity and competence.*** There was no consent for recording of student lessons, so the 10-minute YouTube clips for parents were used as an indirect measurement of the competence of the instructor and fidelity to the *.b* curriculum. The independent assessor (nominated by the *.b* organisation) had postgraduate qualifications in mindfulness (M. St. MBCT, Oxford), was an experienced school teacher and mindfulness facilitator, and was also a trainer with *.b* in Australia and the UK. Given there was no direct assessment of classroom delivery, we modified the adult Mindfulness Based Interventions Teaching Assessment Criteria (MBI-TAC, Crane et al., 2012) which assess a combination of adherence and competence, and included the following domains: Coverage, pacing and organisation; Embodiment of mindfulness; and Guiding mindfulness practices. Each domain was scored 1

(*Incompetent*) – 6 (*Advanced*) and averaged into an overall score for each lesson. This marking rubric was deemed appropriate by the *.b* organisation.

***Homework Practice.*** At the three post-intervention time points, questions surveyed amount of home practice. On completion students were asked "During the 9 week course, how often did you practice each of the following techniques outside of the lessons? Students were supplied with a list of techniques learnt during the course and asked to rate each as follows: 1 "never", 2 "once or twice in total", 3 "greater than twice in total but less than once a week", 4 "once or twice each week" to 5 "three times or more each week". At 6- and 12-month follow-up the question was reworded "Since the mindfulness course at school, how often have you used the following mindfulness techniques?"

***Student feedback.*** Participants in the mindfulness intervention groups undertook a survey in the last lesson of the course based on a measure supplied as part of the *.b* training materials and also used in part by Kuyken et al. (2013). Students were asked to rate the following four questions on a 0-10 point Likert scale with higher scores indicating greater satisfaction/likelihood: *"How would you rate the course in terms of being enjoyable and interesting?", "How much do you think you have learnt during the course?", "In the future, how likely are you to use any of the techniques you have learnt?" and "How would you rate the instructor?".* Students were then asked three open ended questions: "*What lessons/ideas did you find most helpful and why?", "What lessons/ideas did you find least helpful and why?" and "Was there anything you found hard to understand (we should explain more clearly)?*".

Given the difficulty engaging students in the lowest SES school and keeping them on task during the trial, a shortened version of the feedback questionnaire was given to this subsample after discussion with the school counsellor who was present for lessons. This group were asked to rate three questions on a 0-10 point Likert scale with higher scores indicating greater satisfaction/likelihood: *"How would you rate the course in terms of being enjoyable and interesting?", "How much do you think you have learnt during the course?", "In the future, how likely are you to use any of the techniques you have learnt?".* The question regarding instructor rating was omitted as it was felt to be less important. These students were then asked to classify (tick) seven themes as either helpful or not helpful: *Learning to anchor your attention in body sensations; Dealing with worry; Savouring pleasant experiences (like chocolate); Steadying yourself with unpleasant experiences (like chilli and stress ball); Noticing thought traffic; Doing everyday activities mindfully (like showering); and Understanding stress.*

***Teacher feedback.*** Teachers in the mindfulness intervention classes also undertook a survey in the last lesson of the course. Staff were asked to rate six questions on a 0-10 point Likert scale with higher scores indicating greater satisfaction/likelihood, as shown in **Table 4.7**.

***Parent feedback.*** After the last student lesson, parents in the *Mindfulness with parental involvement* arm of the trial were emailed a short anonymous feedback form, recording the school their child attended. Parents were asked whether they watched any of the weekly you-tube clips, and if so, which lessons (by selecting *watched*/*did not watch* options). Three questions inquired about interaction with their child during the mindfulness course, rating this on a 1-5 Likert scale with higher scores indicating greater involvement: *"My child and I talked about the mindfulness lessons", "We did meditation practices together"* and *"I reminded my child about their mindfulness homework".* Parents were then asked to rate the you-tube clips overall in terms of any benefit derived for themselves on a 1-5 Likert scale ranging from *Not at all helpful* to *Extremely helpful*.

### 4.3.7 Statistical analysis

All analyses were performed using IBM Statistical Package for the Social Sciences, Version 22. Logistic regressions were conducted for the post-intervention, 6- and 12-month follow-up data to test if any baseline variable predicted missing data. Data were not adjusted for the effect of clustering, given the same instructor delivered all mindfulness classes. Primary and secondary outcome analyses were conducted using Linear Mixed Modelling (LMM), enabling inclusion of cases with missing data via maximum likelihood estimation, with baseline measures entered as covariates. LMM was also used to investigate the following moderators: sex, depression, anxiety, weight/shape concerns, socioeconomic status (SES) and age. The amount of home practice was investigated as a moderator of outcome for the mindfulness group, using hierarchical multiple regression and controlling for baseline at Step 1, with the overall mean frequency of homework practices during the relevant period entered in Step 2.

## 4.4 Results

### 4.4.1 Description of participants

**Figure 4.1** shows the flow of participants through the study. Only five parents (0.9%) actively requested that their child's data not be used for this research project. Participating

schools represented a broad range of socioeconomic (SES) demographics as measured on the Index of Community Socio-Educational Advantage (ICSEA), whereby 1000 represents the mean, with a standard deviation of 100 (Australian Curriculum Assessment and Reporting Authority, 2012). Schools ranged from 959 to 1144 (*M* = 1061.50, *SD* =76.41) and were classified for this study as low SES (within one SD below mean, one government school), medium SES (within one SD above mean, two government schools), or high SES (greater than one SD above mean, one private school).

### 4.4.2 Preliminary analysis

Data for depression, anxiety, and weight/shape concerns were positively skewed and transformed to achieve acceptable parameters for normality. At post-intervention, those higher in the Awareness of Internal Experiences were more likely to be present at school for data collection (*OR* 1.39; *95% CI* 1.06 - 1.84). At the 6-month follow-up, those lower in anxiety were more likely to be in attendance (0.46; 0.25 - 0.84). At the final follow-up (12 months) those higher in Awareness of External Experiences were more likely to be available for participation 1.27 (1.01–1.59). Of the twelve outcome variables over three waves, only three variables showed an association, with none repeated in more than one wave, indicating that data could be accepted as missing at random.

### 4.4.3 Parental involvement

A total of 191 students/families were allocated to the *Mindfulness with parental involvement* arm of the intervention. Attendance at the pre-course information night for parents was low (8%) although this varied according to SES group (high, 29%; medium, 6% and low, 0%). Similarly, return rates of post course feedback forms were low (8%) with varying responses amongst SES brackets (high, 17%; medium, 7% and low, 4%).

Given the low numbers of feedback forms returned, precluding meaningful reporting of collated responses, we used an alternative measure of the parental uptake of the weekly information. We reviewed the number of hits on the private YouTube channel per individual weekly lesson, interpreting one hit as one family/parent logging on. For the first two lessons, involvement was relatively high (38 - 40%) although this dropped off to 9% by the end of the course and school term.

### 4.4.4 Fidelity and competence

A score out of six was given for each of the three domains assessed, together with an overall average score for each lesson (**Table 4.1**). The instructor averaged in the Proficient Band (5/6) across lessons and domains.

### 4.4.5 Repeated measures analyses

Descriptive statistics are shown in **Table 4.2**. **Table 4.3** presents results from the mixed models analyses. There were no interactions between time and group. Only one main effect of group across the twelve outcome variables tested was obtained, for *Acting with Awareness,* where both mindfulness groups were lower in this element of mindfulness compared to the control group. Between-group differences were only significant at post-intervention (Cohen's $d$ = .30 - .37). All other effect sizes were small (.002 to .23). There were three main effects of time, for depression, anxiety and mindfulness (*Acting with Awareness).*

### 4.4.6 Moderators

Since there were no differences between the mindfulness groups with and without parental involvement on any outcome variable, these groups were collapsed and compared to the control group for a broad range of moderator analyses. Potential moderators were dichotomised following recommendations by Kraemer et al. (2001). For weight/shape concerns, "high" was based on a mean total score ≥4 (Wilksch & Wade, 2009). Given that clinical cut-off scores for self-report scales can result in high false positive rates for depression in adolescents, especially in non-clinical samples such as schools (Stockings et al., 2015), we used a median split for depression and anxiety. However, in order to allow comparison with a previous school based mindfulness RCT (Raes et al., 2014) we also ran the moderator analyses for these variables using the adult DASS-21 clinical cut-off scores for depression and anxiety (≥ 7 or ≥ 6, respectively). A median split was used for age (13.45 years). SES was primarily classified at the school level based on ICSEA ratings (high, medium, low) as described earlier, given that decisions regarding implementation of interventions are generally made at this level. The SES moderator analysis was also performed at a finer grained level using the Socioeconomic Index for Areas (SEIFA; Australian Bureau of Statistics, 2011). This allowed classification at the student level by postcode into SES deciles and was available for a subsample (three government schools, $N$ = 479).

There were no moderator-group-time interactions for any of the moderator analyses (**Table 4.4**). We note that our sample consisted of a narrow range for age as a moderator: minimum 12.08, maximum 14.9; range 2.82 years. Mean depression scores were higher at baseline in our low SES group ($M$ = .95; $SD$ = .83) than the medium ($M$ = .72; $SD$ = .69) and high ($M$ = .71; $SD$ = .58) SES schools, with this group difference not quite reaching significance: $F(2,486) = 2.87$, $p = .06$. However, neither SES nor baseline levels of depression (using either criteria described above) were a significant moderator of effect.

### 4.4.7 Home practice

Mean frequency for each type of home practice during the course are shown in **Table 4.5**. Averaged across practices and students, home practice occurred less than once a week. Independent $t$-tests demonstrated that mean frequency of homework did not differ between the mindfulness groups with and without parental involvement at any time point: post-intervention: $t(286) = -0.28$, $p = .78$, $d = .03$; 6-month follow-up: $t(253) = -0.34$, $p = .73$, $d = .05$; or 12-month follow-up: $t(222) = 0.54$, $p = .59$, $d = .07$.

**Table 4.5** also shows percentages of students doing home practice once a week or more, showing modest involvement, ranging from 24.4% during the course to 7% by the 12-month follow-up. These figures are comparable to our earlier trial (26.3%; Johnson et al., 2016a). Shorter home practices were undertaken more frequently during the current course (for example, breath counting or *.b* compared to Beditation and FOFBOC). The amount of homework did not explain any variance in anxiety or depression as outcome variables (**Table 4.6**) but explained a modest variance (5.0 – 9.0%) for several mindfulness facets across one or more time points in a positive direction: *Awareness of Internal Experiences; Awareness of External Experiences; Decentering and non-reactivity, Relativity, and Insight.* A negative relationship occurred for weight/shape concerns at 6-month follow up and for two mindfulness facets (*Acting with Awareness* at 12 months and *Openness* at both 6- and 12-month follow-ups) i.e., more homework was associated with worse outcomes, with less than 3% of variance explained.

### 4.4.8 Student feedback

Anonymous feedback was received from 235 students in the medium-high SES sample and a shortened version of the feedback questionnaire was received from 35 students in the low SES sample. Not all students answered all questions, so response numbers are indicated in each section below.

***Course acceptability.*** Both groups ($N = 264$) rated the course in terms of enjoyment/interest and amount learnt. Mean scores (higher indicating more of each quality) were as follows: enjoyment and interest 6.92 (median 7; range 0-10) and amount learnt 6.84 (median 7; range 0-10). These scores are comparable to those reported in earlier trials of the *.b* curriculum (Johnson et al., 2016a; Kuyken et al., 2013). Mean rating for the instructor (sampled in medium-high SES schools only; $N = 229$) was 8.79 (median 9, range 5-10).

***Most and least helpful lessons and ideas.*** Responses for the medium-high and low SES schools are presented separately (**Figure 4.2**) as they represent slightly different questions. In the medium-high SES group, 35% found all lessons helpful, reporting that they learnt something new each time with techniques that could be used in different situations. Lessons on stress and learning to deal with the unpleasant were cited by 34% of students as the most helpful ideas. These students widely commented on the benefit of gaining an increased understanding of what causes stress, fear and other emotions, how they manifest in the body, that it is OK to be present with and sense these feelings, and that techniques such as breathing or using a *.b* helped. This pattern was mirrored in the low SES school, where learning to deal with stress and the unpleasant had the highest helpful: non-helpful ratio (HNR; 6:1).

Mindful walking was the only category with a reverse HNR in the medium-high SES group (1:4.3); students reported that they did not understand the point of this practice or found it wasn't helpful with stress, concentration or dealing with thoughts. Although mindful walking was not offered as a separate rating theme for the low SES school, the broader category of everyday activities also had a low HNR (1.2:1). In the low SES sample, Stepping back from thoughts had the lowest HNR (1:1) in this group, which was in contrast to the medium-high SES sample (3.75:1).

Short meditations were more popular than longer versions in the medium-high SES sample, especially the *.b* technique which was rated as helpful by 35% of this sample with a very high HNR (17.5:1). Students found this technique quick, easy and effective plus useful in many situations. Of the two longer meditations, FOFBOC was less popular than Beditation (HNR 1.9:1 and 5.7:1, respectively). Beditation reportedly helped many students fall asleep more rapidly, while FOFBOC was reported as being too long without obvious practical applications.

***Difficulty in understanding lessons/ideas.*** In the longer version of the feedback form, the medium-high SES group were asked if there was anything they found hard to understand. Of the 235 that did surveys in this group, 179 answered this question; 77.7% ($N = 139$)

reported that there were no issues with understanding the material and 7.3% ($N$ = 13) found the concept of stepping back from thoughts hard to understand.

***Likelihood of future use of mindfulness techniques.*** Across all SES groups, at the conclusion of the programme, the mean reported likelihood of using mindfulness practices in the future on a Likert scale 0-10 was 6.1 (median 6; range 0-10). This contrasts to the modest reported usage when questioned six and twelve months later (10.6% and 8.4%, respectively).

### 4.4.9 Classroom Teacher feedback

Twelve of fourteen teachers (85.7%) returned anonymous feedback, summarised in **Table 4.7**. Ratings were uniformly high. There were some challenges with running teacher-led practices between formal classes, with most teachers citing time as an issue. However, several teachers commented that the brief *.b* practice was easy to incorporate, and valuable at the start of lessons. Preference for an external facilitator versus an embedded school teacher as programme facilitator was mixed. Comments regarding the unique value of an external facilitator included increased student engagement, with mindfulness seen as something "special" and creating a shift in classroom dynamics, as well as bringing greater mindfulness expertise (which was also seen to be perceived by students). However, even in this format, class teacher presence in the room for support was considered paramount. Benefits of training school teachers as facilitators were cited as greater reinforcement of concepts during and beyond the programme, easier scheduling of lessons, and better knowledge of/relationship with students for more sensitive discussion points. Two participants noted that teachers would need to be properly trained for the programme to work, and that not all teachers would engage. The majority of teachers felt that Year 8 (or earlier) was appropriate for this course but three teachers felt that students of this age lacked maturity to appreciate the programme in this format.

## 4.5 Discussion

This study retested the 9-week *.b* mindfulness programme in young adolescents with tighter adherence than a previous RCT which obtained null results (Johnson et al., 2016a). We found no differences in outcomes between any of the groups at any time point. The one main effect of group, where levels of *Acting with Awareness* were lower in both mindfulness groups compared to the control group, did not translate into any improvements in psychological functioning. In addition, examination of a range of moderators (gender, socioeconomic status, age, plus baseline levels of anxiety, depression and weight/shape

concerns) did not reveal any improvement in subgroups. Given the lack of effect, we were not able to undertake planned mediational analyses.

Considering the potential for floor effects in universal studies, we compared our mean baseline scores for depression to two secondary school studies that also used the DASS-21. Nehmy and Wade's (2015) CBT intervention detected improvement despite lower baseline levels ($M$ =. 58, $SD$ = .53) than the current study ($M$ =.75, $SD$ = .70). Using adult DASS-21 clinical cut-offs, 29.9% of our sample showed moderate or high levels of depression compared to 20% in the mindfulness study by Raes et al. (2014) which was able to detect reductions in depression. We also found no emergence of a prevention effect during our 12-month follow-up, where concerns regarding low baseline pathology do not apply. Taken together, there is no indication that the presence of floor effects adequately explains our null findings.

One suggestion for our lack of effect is that most of the controlled trials to date have been delivered at least in part by programme developers (Atkinson & Wade, 2015; Kuyken et al., 2013; Raes et al., 2014; Sibinga et al., 2013) whereas our study was delivered by an experienced but independent mindfulness researcher. This may represent an attenuation of effects under real world conditions, which is of concern when disseminating school based prevention programmes at scale as intended (Brunwasser, Gillham, & Kim, 2009).

Although we examined age as a moderator, finding no effect, we note a narrow range in our sample given that we targeted only the first year of secondary school in South Australia, Year 8 ($M_{age}$ = 13.44), as we did in our first trial ($M_{age}$ = 13.63 years, Johnson et al., 2016a). Three previous controlled or randomised controlled trials on MBIs in youth that did show significant improvements across stress, wellbeing, depression and eating disorder risk factors involved slightly older students (Kuyken et al., 2013; $M_{age}$ = 14.8 years; Raes et al., 2014; $M_{age}$ = 15.4; Atkinson and Wade, 2015; $M_{age}$ = 15.74), which may indicate important differences in neurocognitive maturity within even relatively narrow bands of adolescence that impact the effectiveness of these curricula. This is consistent with opinions of three classroom teachers in our current trial who felt that Year 8 students might be too "emotionally immature" for the programme. Currently, it remains unknown how trait mindfulness emerges developmentally and at what ages it might be most fertile to intervene during the period of rapid cognitive change from childhood through adolescence (Chadwick & Gelbar, 2016; Felver & Jennings, 2016; Schonert-Reichl & Roeser, 2016, pp. 12-13). There is preliminary evidence that primary school children respond positively to MBIs, cultivating some key mindfulness skills such as improved attention and emotional regulation

(Crane et al., 2017; Felver, Celis-de Hoyos, Tezanos, & Singh 2016). We had proposed that Year 8 might further capitalise on the emergence of abstract thought, to enable the development of the full range of more sophisticated mindfulness capabilities such as metacognition and insight into habitual reactivity, before the escalating stresses of mid-late adolescence. Perhaps, though, primary aged children are more receptive with their natural "beginner's minds" (O'Brien, Larson and Murrell, 2008), and more "cynical" early adolescents require at least some grist for the mill before the relevance of socioemotional tools becomes evident. Moving forward, it will be important to compare programmes across a range of age bands to guide insertion into curricula. Including mediational analysis will also inform whether particular elements of MBIs are important throughout development, or differentially absorbed at certain ages, and therefore worthy of amplification.

Young people may also need greater scaffolding than adults to make connections between seemingly abstract tools and real life, especially if they are currently not distressed. This idea was used effectively in a school-based MBI targeting eating disorder risk factors (Atkinson & Wade, 2015). Students applied mindfulness practices to body image triggers (pictures of models), resulting in sustained improvement across multiple eating disorder risk variables. Making mindfulness concepts relevant to specific aspects of teen life through practical exercises is recommended.

The ideal dosage of mindfulness for young people is also unknown (Felver & Jennings, 2016). Given that lessons are shorter to provide a more digestible experience for youth, moving beyond the classical 8-week adult format may be indicated. Further, a spiral learning curriculum of modules specific to the stage of neurocognitive development might be necessary. Input between formal weekly lessons may be helpful to increase dosage, hence classroom teacher delivery of school-based MBIs has been proposed. However, we had a range of engagement from school teachers, and in real-world settings it is likely to fall to a core group of interested teachers to deliver classes, where regular contact with students between lessons may still not occur. In our trial with an external facilitator, classroom teachers were encouraged to implement practices with their classes between weekly lessons, however, frequency of uptake was relatively low (e.g., an average of once a week for the short *.b* practice that had been recommended for daily use). This suggests that methods to improve ease and compliance should be considered, such as better engaging homeroom teachers in the value of regular practices, and perhaps supplying a range of short, pre-recorded audiofiles that could be adopted according to the daily mood of the class.

Offering parents brief, weekly information on the programme in e-format did not improve home practice compliance rates nor psychological outcomes for students. Although parental participation was greater in our highest versus lowest SES school (e.g., 29% vs 0% attendance at information night), SES did not moderate programme effect. While it remains unclear whether greater parental uptake would impact outcomes, parental participation in our study was low despite clear explanations of the potential for mental health benefit, weekly reminders, low time burden, and ease of access, reflecting how time demands can outweigh perceived relevance in a non-clinical population. It appears unlikely that including parental involvement to improve dosage in universal MBIs is a good use of resources.

Similarly, the implemented changes in school delivery to encourage homework participation failed to result in increased compliance rates compared to the previous trial (Johnson et al., 2016a). Across both trials, rates of students undertaking home practice once a week or more during the course averaged 24.4%. However, our rates contrast to 70% reported with an earlier version of the *.b* curriculum delivered by UK classroom teachers to 14-15 year old students (Huppert & Johnson, 2010), and 49% in a Finnish RCT, where the *.b* curriculum was delivered by external facilitators to 12-15 year old students (Volanen et al., 2015). The UK rates might be partly explained by classroom teachers delivering the programme with the potential for regular homework reminders, together with their slightly older age group, or the higher rates in both trials might reflect different school cultures. Invitational home practice appears to be an unreliable way to achieve a planned dosage of mindfulness with conscript audiences, and making home practice assessable to improve compliance is worthy of further investigation.

In adults, there is a small association between home practice and positive outcomes in both clinical and non-clinical populations (Parsons et al., 2017). In universal interventions for youth, there is conflicting evidence for its importance (Huppert and Johnson, 2010; Johnson et al., 2016a; Kuyken et al., 2013; Quach et al., 2017). In our sample, amount of home practice did not explain any sizable variance in our outcomes, reflecting either the low percentage of students undertaking regular home practice or that unguided home practice does not impact non-clinical adolescents. Future research might test whether greater at-school exposure to guided meditation together with expanded inquiry (teacher facilitated interpretation of experience, considered an essential ingredient in adult MBIs; Crane et al 2017) increases effectiveness with adolescents. We note that student predictions of using mindfulness practices after the course were high compared to the self-reported rates of continuing use at follow-up, which suggests that booster sessions might also be necessary to

remind students how and when to apply these newly developed tools. This is another area to include in future investigations.

It was interesting to note that the high levels of support from the student feedback survey in the last lesson of the course (with over a third of students commenting on the considerable benefits of gaining an increased understanding of stress and strong emotions) were in contrast to the lack of measurable changes on formal surveys of psychological functioning. This duplicates a lack of correlation between subjective student ratings of programmes and their outcomes found previously (Atkinson & Wade, 2015), perhaps suggesting we need to maintain a balance between simply delivering engaging mindfulness-based activities versus repetition of key messages.

This study has a number of strengths: use of an RCT design with a large sample based on *a priori* power calculations, a broad range of socioeconomic demographics, and the longest follow-up to date in a school-based MBI. The use of the same facilitator for all lessons is a strength (consistency) as well as a limitation (generalisability of findings). Other limitations include our indirect measure of fidelity and competence which did not allow assessment of the facilitator in the group learning environment, and reliance on self-report measures. Cronbach's alpha was below .7 for two of the CHIME-A subscales, however all subscales had acceptable item-total correlations >.44.

## 4.6 Conclusion

In a second randomised controlled design evaluating the impact of a school-based mindfulness programme in early adolescents, with tighter adherence to the curriculum and additional measures to increase student dosage between lessons via parents and class teachers, we again found no improvements on any outcome measure at post-intervention or during a 12-month follow-up. Further research is required to identify the optimal age, content and length of programmes delivering mindfulness to adolescents.

References

Australian Bureau of Statistics (2011). *SEIFA Basics.* Retrieved from http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/2033.0.55.001~2011~Main%20Features~SEIFA%20Basics~3

Atkinson, M., & Wade, T. (2015). Mindfulness-based prevention for eating disorders: A school-based cluster randomised controlled pilot study. *International Journal of Eating Disorders, 48*, 1024-1037. doi:10.1002/eat.22416

Australian Curriculum Assessment and Reporting Authority. (*2012). Guide to understanding ICSEA.* Retrieved from http://www.acara.edu.au/verve/_resources/Guide_to_understanding_2012_ICSEA_values.pdf.

Berg, K., Peterson, C., Frazier, P., & Crow, S. (2012). Psychometric evaluation of the eating disorder examination and eating disorder examination-questionnaire: A systematic review of the literature. *International Journal of Eating Disorders, 45*, 428-438. doi:10.1002/eat.20931

Bögels, S., Hoogstad, B., van Dun, L., de Schutter, S., & Restifo, K. (2008). Mindfulness Training for Adolescents with Externalizing Disorders and their Parents. *Behavioural and Cognitive Psychotherapy, 36*(02), 193-209. doi:10.1017/S1352465808004190

Brunwasser, S. M., Gillham, J. E., & Kim, E. S. (2009). A Meta-Analytic Review of the Penn Resiliency Program's Effect on Depressive Symptoms. *Journal of Consulting & Clinical Psychology, 77*(6), 1042-1054. doi:10.1037/a0017671

Chadwick, J., & Gelbar, N. (2016). Mindfulness for children in public schools: Current research and developmental issues to consider. *International Journal of School and Educational Psychology, 4*(2), 106-112. doi:10.1080/21683603.2015.1130583

Crane, R., Brewer, J. A., Feldman, C., Kabat-Zinn, J., Santorelli, S. F., Williams, J., & Kuyken, W. (2017). What defines mindfulness-based programs? The warp and the weft. *Psychological Medicine, 47*(6), 1-10. doi:10.1017/S0033291716003317

Crane, R., Soulsby, J., Kuyken, W., Williams, J., Eames, C., Bartley, T., . . . Silverton, S. (2012). *The Bangor, Exeter and Oxford Mindfulness-Based Interventions Teaching Assessment Criteria*. Bangor: Bangor University.

Fairburn, C., & Beglin, S. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders, 16*, 363-370. doi:10.1002/1098-108X(199412)16:4<363::AID-EAT2260160405>3.0.CO;2-#

Felver, J. C., Celis-de Hoyos, C. E., Tezanos, K., & Singh, N. N. (2016). A Systematic Review of Mindfulness-Based Interventions for Youth in School Settings. *Mindfulness, 7*(1), 34-45. doi:10.1007/s12671-015-0389-4

Felver, J. C., & Jennings, P. A. (2016). Applications of Mindfulness-Based Interventions in School Settings: An Introduction. *Mindfulness, 7*(1), 1-4. doi:10.1007/s12671-015-0478-4

Hedeker, D., Gibbons, R., & Waternaux, C. (1999). Sample Size Estimation for Longitudinal Design With Attrition: Comparing Time-related Contrasts Between Two Groups. *Journal of Educational and Behavioral Statistics, 24*(1), 70-93. doi:10.3102/10769986024001070

Huppert, F. A., & Johnson, D. M. (2010). A controlled trial of mindfulness training in schools: The importance of practice for an impact on well-being. *The Journal of Positive Psychology, 5*(4), 264-274. doi:10.1080/17439761003794148

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2016a). Effectiveness of a school-based mindfulness program for transdiagnostic prevention in young adolescents. *Behaviour Research and Therapy, 81*, 1-11. doi:10.1016/j.brat.2016.03.002

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2016b). Development and Validation of a Multifactor Mindfulness Scale in Youth: The Comprehensive Inventory of Mindfulness Experiences-Adolescents (CHIME-A). *Psychological Assessment, Advance online publication.* doi:10.1037/pas0000342

Khoury, B., Lecomte, T., Fortin, G., Masse, M., Therien, P., Bouchard, V., . . . Hofmann, S. G. (2013). Mindfulness-based therapy: a comprehensive meta-analysis. *Clinical Psychology Review, 33*(6), 763-771. doi:10.1016/j.cpr.2013.05.005

Kraemer, H., Stice, E., Kazdin, A., Offord, D., & Kupfer, D. (2001). How do risk factors work together? Mediators, moderators, and independent, overlapping, and proxy risk factors. *The American Journal of Psychiatry, 158*(6), 848-856. doi:10.1176/appi.ajp.158.6.848

Kuyken, W., Weare, K., Ukoumunne, O., Vicary, R., Motton, N., Burnett, R., . . . Huppert, F. (2013). Effectiveness of the Mindfulness in Schools Programme: non-randomised controlled feasibility study. *British Journal of Psychiatry, 203*, 126-131. doi:10.1192/bjp.bp.113.126649

Lovibond, S., & Lovibond, P. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Sydney: Psychology Foundation.

Luce, K. H., & Crowther, J. H. (1999). The reliability of the eating disorder examination—Self-report questionnaire version (EDE-Q). *International Journal of Eating Disorders, 25*(3), 349-351. doi:10.1002/(SICI)1098-108X(199904)25:3<349::AID-EAT15>3.0.CO;2-M

Mond, J., Hay, P., Rodgers, B., Owen, C., & Beaumont, P. (2004). Validity of the Eating Disorder Examination Questionnaire (EDE-Q) in screening for eating disorders in community samples. *Behaviour Research and Therapy, 42*, 551-567. doi:10.1016/S0005-7967(03)00161-X

Nehmy, T. J., & Wade, T. D. (2015). Reducing the onset of negative affect in adolescents: Evaluation of a perfectionism program in a universal prevention setting. *Behaviour Research and Therapy, 67*, 55-63. doi:10.1016/j.brat.2015.02.007

O'Brien KM, Larson, C., & Murrell, A. (2008). Third-wave behavior therapies for children and adolescents: Progress, challenges, and future directions. In L. Greco & S. Hayes (Eds.), *Acceptance & Mindfulness Treatments for Children & Adolescents*. Oakland, CA: New Harbinger.

Parsons, C., Crane, C., Parsons, L., Fjorback, L. O., & Kuyken, W. (2017). Home practice in Mindfulness-Based Cognitive Therapy and Mindfulness-Based Stress Reduction: A systematic review and metaanalysis of participants' mindfulness practice and its association with outcomes. *Behaviour Research and Therapy, 95*, 29-41. doi:10.1016/j.brat.2017.05.004

Quach, D., Gibler, R. C., & Jastrowski Mano, K. E. (2017). Does Home Practice Compliance Make a Difference in the Effectiveness of Mindfulness Interventions for Adolescents? *Mindfulness*, *8*(2), 495-504. doi:10.1007/s12671-016-0624-7

Raes, F., Griffith, J., van der Gucht, K., & Williams, J. (2014). School-based prevention and Reduction of Depression in Adolescents: A Cluster-Randomized Trial of a Mindfulness Group Program. *Mindfulness, 5*(5), 477-486. doi:10.1007/s12671-013-0202-1

Schonert-Reichl, K., & Roeser, R. (2016). Mindfulness in Education: Introduction and Overview. In K. Schonert-Reichl & R. Roeser (Eds.), *Handbook of Mindfulness in Education. Integrating Theory and Research into Practice*. New York: Springer.

Semple, R. J., Droutman, V., & Reid, B. A. (2017). Mindfulness Goes To School: Things Learned (So Far) From Research And Real-World Experiences. *Psychology in the Schools, 54*(1), 29-52. doi:10.1002/pits.21981

Semple, R., Lee, J., Rosa, D. P., & Miller, L. (2010). A Randomized Trial of Mindfulness-Based Cognitive Therapy for Children: Promoting Mindful Attention to Enhance Social-Emotional Resiliency in Children. *Journal of Child and Family Studies, 19*, 218–229. doi:10.1007/s10826-009-9301-y

Sibinga, E., Perry-Parish, C., Chung, S., Johnson, S., Smith, M., & Ellen, J. (2013). School-based mindfulness instruction for urban male youth: A small randomized controlled trial. *Preventive Medicine, 57*, 799-801. doi:10.1016/j.ypmed.2013.08.027

Stockings, E., Degenhardt, L., Mihalopoulos, C., Lui, A., Hobbs, M. J., & Patton, G. (2015). Symptom screening scales for detecting major depressive disorder in children and adolescents: A systematic review and meta-analysis of reliability, validity and diagnostic utility. *Journal of Affective Disorders, 174*, 447-463. doi:10.1016/j.jad.2014.11.061

Szabo, M. (2010). The short version of the Depression Anxiety Stress Scales (DASS-21): Factor structure in a young adolescent sample. *Journal of Adolescence, 33*, 1-8. doi:10.1016/j.adolescence.2009.05.014

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., . . . Stewart-Brown, S. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. *Health and Quality of Life Outcomes, 5*(63), 1-13. doi:10.1186/1477-7525-5-63

Tully, P. J., Zajac, I. T., & Venning, A. J. (2009). The Structure of Anxiety and Depression in a Normative Sample of Younger and Older Australian Adolescents. *Journal of Abnormal Child Psychology, 37*(5), 717-726. doi:10.1007/s10802-009-9306-4

van de Weijer-Bergsma, E., Langenberg, G., Brandsma, R., Oort, F., & Bögels, S. (2014). The Effectiveness of a School-Based Mindfulness Training as a program to Prevent Stress in Elementary School Children. *Mindfulness, 5*(3), 238-248. doi:10.1007/s12671-012-0171-9

van der Oord, S., Bögels, S. M., & Peijnenburg, D. (2012). The Effectiveness of Mindfulness Training for Children with ADHD and Mindful Parenting for their Parents. *Journal of Child and Family Studies, 21*(1), 139-147. doi:10.1007/s10826-011-9457-0

Volanen, S., Hankonen, N., Knittle, K., Beattie, M., Salo, G., & Suominen, S. (2015). Building resilience among adolescents: First Results of a school-based mindfulness intervention. *European Journal of Public Health, 25*(S3), 54. doi:10.1093/eurpub/ckv168.056

Wilksch, S. M., & Wade, T. D. (2009). Reduction of Shape and Weight Concern in Young Adolescents: A 30-Month Controlled Evaluation of a Media Literacy Program. *Journal of the American Academy of Child & Adolescent Psychiatry, 48*(6), 652-661. doi:10.1097/CHI.0b013e3181a1f559

Willemsen, J., Markey, S., Declercq, F., & Vanheule, S. (2011). Negative emotionality in a large community sample of adolescents: the factor structure and measurement invariance of the short version of the depression anxiety stress scales (DASS-21). *Stress and Health, 27*(3), e120-e128. doi:10.1002/smi.1342

*Figure 4.1* Flow of participants through study

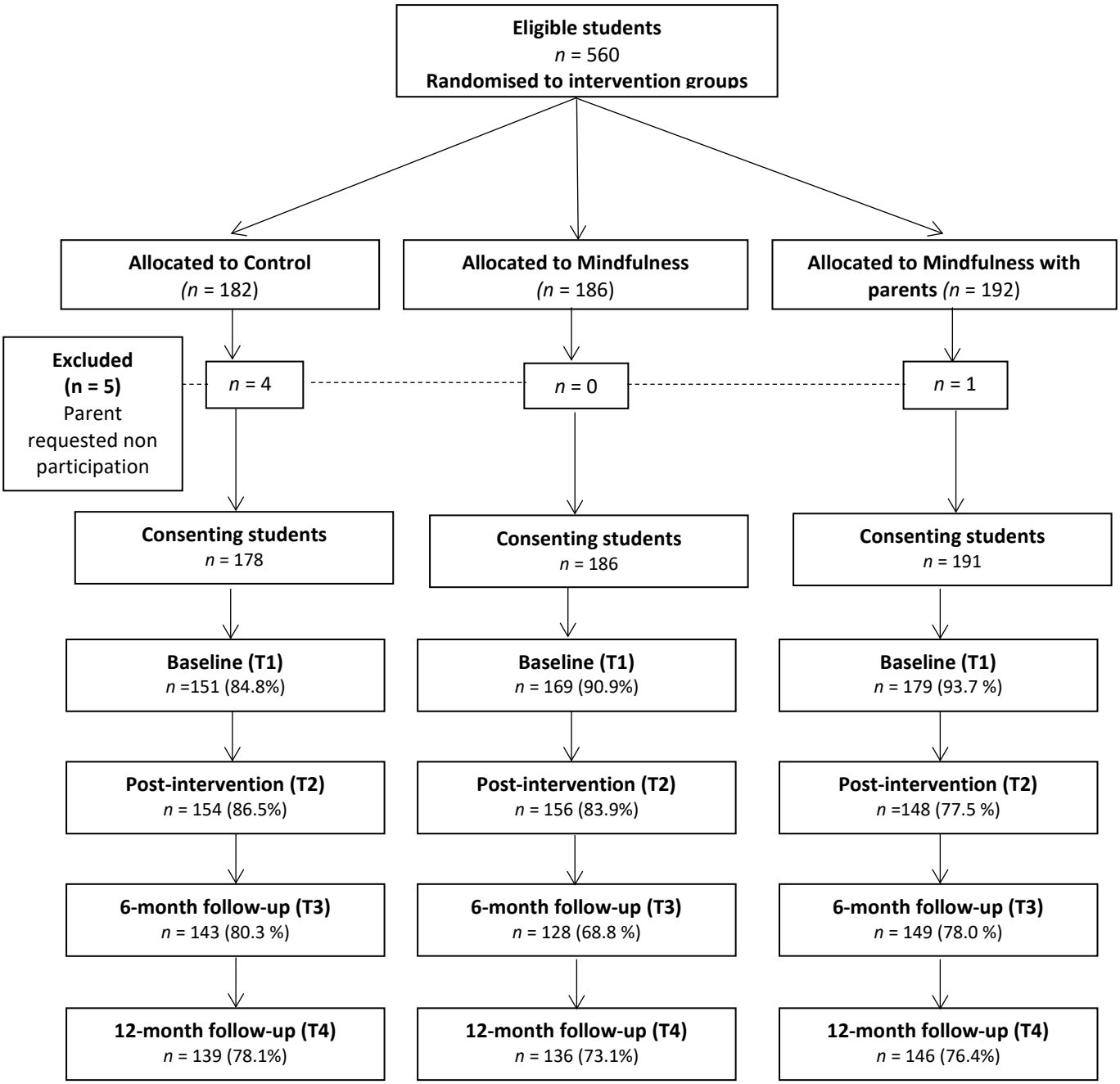
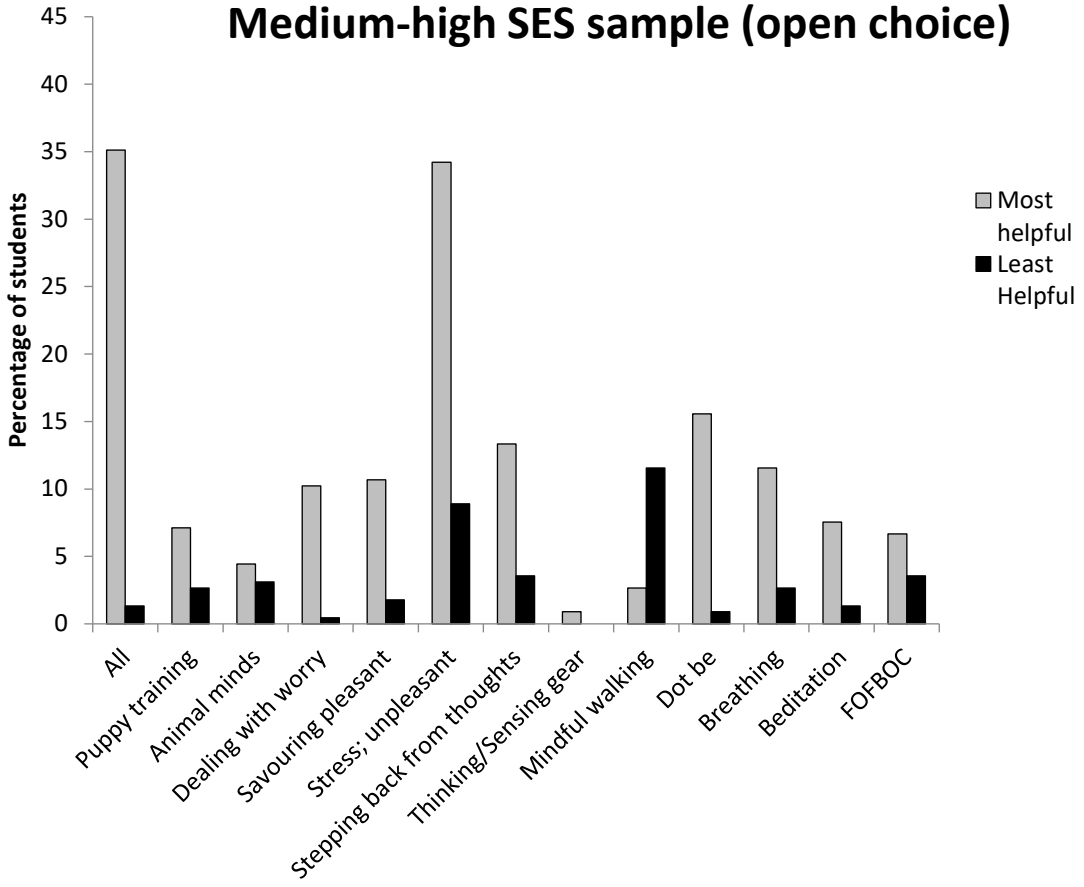


*Figure 4.2* Rating of Course Themes as Helpful or Unhelpful in Low SES Sample (N = 235) and Medium-high SES Sample (N = 35)



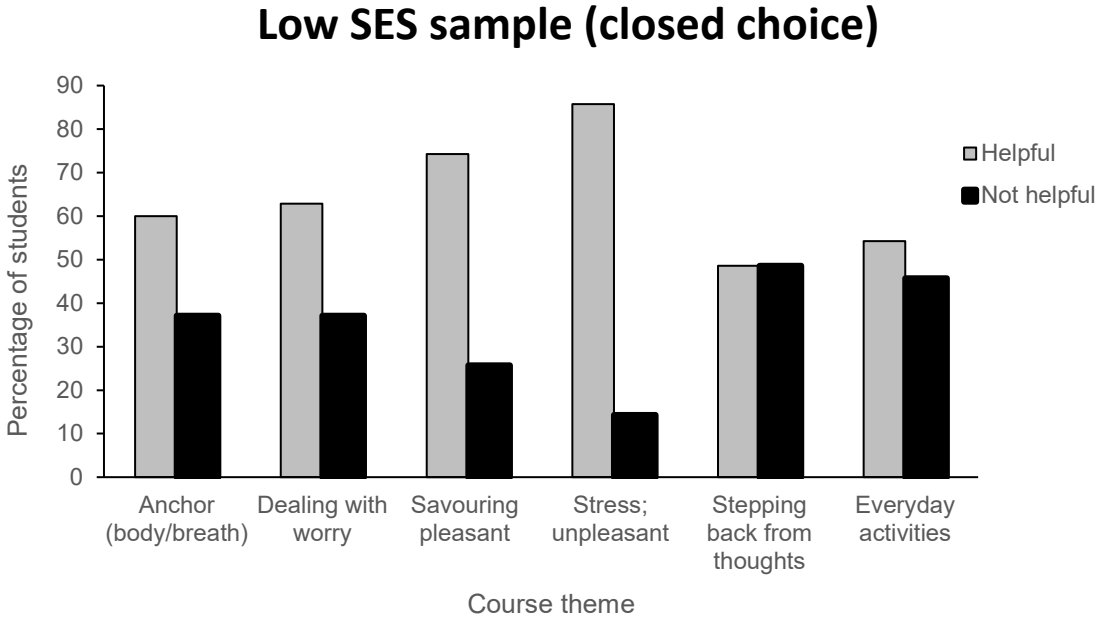



Table 4.1 *Fidelity and Competence Check: Proficiency Scores across Domains for each Mindfulness Lesson*

| Lesson | Score | | | |
|---|---|---|---|---|
| | Domain 1 | Domain 3 | Domain 4 | Lesson Average |
| Introduction | 5 | 5 | N/A | 5 |
| Lesson 1 | 4 | 5 | 6 | 5 |
| Lesson 2 | 4 | 5 | 5 | 4.6 |
| Lesson 3 | 5 | 5 | 5 | 5 |
| Lesson 4 | 5 | 5 | 5 | 5 |
| Lesson 5 | 5 | 5 | 5 | 5 |
| Lesson 6 | 5 | 5 | 5 | 5 |
| Lesson 7 | 6 | 5 | 5 | 5.5 |
| Lesson 8 | 5 | 5 | N/A | 5 |
| Domain Average | 4.89 | 5.00 | 5.14 | 5.01 |

*Note:* Domains relate to modified MBI-TAC guidelines as described in text where Domain 1 = Coverage, pacing and organisation; Domain 3 = Embodiment of mindfulness; Domain 4 = Guiding mindfulness practices; Score competencies 1= Incompetent, 2 = Beginner, 3 = Advanced Beginner, 4 = Competent, 5 = Proficient, 6 = Advanced.

Table 4.2 *Descriptive statistics for mindfulness and control groups at baseline (T1), post-intervention (T2), six month (T3) and twelve month (T4) follow-up*

| | | **MF-Parents** | | **MF** | | **Control** | |
|---|---|---|---|---|---|---|---|
| | | Mean | *SD* | Mean | *SD* | Mean | *SD* |
| Depression | T1 | .77 | *.65* | .74 | *.75* | .74 | *.71* |
| | T2 | .84 | *.70* | .73 | *.69* | .70 | *.69* |
| | T3 | .81 | *.73* | .71 | *.75* | .74 | *.71* |
| | T4 | .81 | *.70* | .75 | *.71* | .86 | *.77* |
| Anxiety | T1 | .87 | *.57* | .82 | *.63* | .86 | *.63* |
| | T2 | .91 | *.59* | .86 | *.58* | .81 | *.61* |
| | T3 | .83 | *.56* | .80 | *.69* | .82 | *.61* |
| | T4 | .85 | *.55* | .84 | *.64* | .90 | *.67* |
| Weight/Shape | T1 | 1.68 | *1.27* | 1.72 | *1.39* | 1.63 | *1.43* |
| Concerns | T2 | 1.72 | *1.39* | 1.74 | *1.35* | 1.79 | *1.49* |
| | T3 | 1.78 | *1.44* | 1.78 | *1.43* | 1.86 | *1.53* |
| | T4 | 1.87 | *1.47* | 1.70 | *1.39* | 1.90 | *1.54* |
| Wellbeing | T1 | 3.46 | *.66* | 3.47 | *0.73* | 3.53 | *.70* |
| | T2 | 3.37 | *.71* | 3.46 | *0.75* | 3.50 | *.67* |
| | T3 | 3.37 | *.69* | 3.41 | *.76* | 3.48 | *.75* |
| | T4 | 3.36 | *.73* | 3.49 | *.78* | 3.44 | *.75* |
| Mindfulness | | | | | | | |
| Aware INT | T1 | 3.66 | *.75* | 3.69 | *.73* | 3.71 | *.68* |
| | T2 | 3.59 | *.70* | 3.64 | *.76* | 3.73 | *.62* |
| | T3 | 3.63 | *.70* | 3.46 | *.75* | 3.63 | *.71* |
| | T4 | 3.69 | *.71* | 3.52 | *.77* | 3.67 | *.64* |
| Aware EXT | T1 | 3.56 | *.88* | 3.61 | *.86* | 3.58 | *.94* |
| | T2 | 3.48 | *.85* | 3.47 | *.89* | 3.42 | *.88* |
| | T3 | 3.43 | *.82* | 3.41 | *.90* | 3.45 | *.92* |
| | T4 | 3.48 | *.82* | 3.41 | *.95* | 3.44 | *.81* |
| ACT Aware | T1 | 2.99 | *.82* | 3.06 | *.81* | 3.02 | *.92* |
| | T2 | 2.82 | *.76* | 2.86 | *.82* | 3.07 | *.84* |
| | T3 | 2.95 | *.85* | 2.94 | *.83* | 3.08 | *.84* |
| | T4 | 2.98 | *.80* | 2.95 | *.81* | 3.02 | *.85* |
| AccNJ | T1 | 2.98 | *.84* | 3.03 | *.85* | 3.06 | *.97* |
| | T2 | 3.03 | *.79* | 3.07 | *.78* | 3.02 | *.83* |
| | T3 | 3.09 | *.90* | 2.99 | *.81* | 3.04 | *.86* |
| | T4 | 3.11 | *.84* | 3.01 | *.85* | 2.99 | *.87* |
| DecNR | T1 | 3.00 | *.82* | 3.07 | *.77* | 3.08 | *.70* |
| | T2 | 3.02 | *.73* | 3.09 | *.77* | 3.05 | *.70* |
| | T3 | 3.05 | *.77* | 2.92 | *.75* | 3.09 | *.73* |
| | T4 | 3.09 | *.80* | 3.04 | *.81* | 3.03 | *.71* |
| Openness | T1 | 2.70 | *.70* | 2.60 | *.71* | 2.62 | *.79* |
| | T2 | 2.78 | *.77* | 2.64 | *.76* | 2.65 | *.75* |
| | T3 | 2.79 | *.78* | 2.73 | *.82* | 2.57 | *.77* |
| | T4 | 2.73 | *.74* | 2.69 | *.86* | 2.63 | *.73* |
| Relativity | T1 | 3.62 | *.83* | 3.73 | *.73* | 3.66 | *.72* |
| | T2 | 3.50 | *.75* | 3.62 | *.79* | 3.63 | *.67* |
| | T3 | 3.54 | *.74* | 3.48 | *.75* | 3.62 | *.75* |
| | T4 | 3.59 | *.76* | 3.59 | *.80* | 3.64 | *.64* |
| Insight | T1 | 2.73 | *.98* | 2.74 | *.90* | 2.77 | *.87* |
| | T2 | 2.76 | *.86* | 2.83 | *.84* | 2.81 | *.88* |
| | T3 | 2.81 | *.91* | 2.73 | *.83* | 2.68 | *.92* |
| | T4 | 2.83 | *1.01* | 2.79 | *.93* | 2.72 | *.93* |

*Note.* Measures: Depression/Anxiety = DASS-21; Weight/shape concerns = Weight/shape subscales of the Eating Disorder Examination-Questionnaire; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale; Mindfulness = Comprehensive Inventory of Mindfulness Experiences -Adolescents (CHIME-A); where abbreviated: Aware INT = Awareness of Internal Experiences; Aware EXT = Awareness of External Experiences; Act Aware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental Orientation; DecNR = Decentering and Nonreactivity.

Table 4.3 *Mixed Model Analyses with Between-group Effect Sizes (N = 555)*

| | Treatment Group | Time | Treatment Group x time | | Post-intervention (T2) | | | 6-month follow-up (T3) | | | 12-month follow-up (T4) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Outcome measures | | | | | Adjusted mean difference *(95% CI)* | | ES | Adjusted mean difference *(95% CI)* | | ES | Adjusted mean difference *(95% CI)* | | ES |
| Depression | *F*(446.59) = 1.04 | *F*(375.45) =4.24* | *F*(393.77) =1.02 | MF-P v MF | -.02 | *(-.07-.03)* | .12 | -.03 | *(-.09-.03)* | .14 | -.02 | *(-.08-.04)* | .08 |
| | | | | MF-P v C | -.04 | *(-.09-.01)* | .18 | -.01 | *(-.06-.05)* | .03 | .01 | *(-.05-.07)* | .03 |
| | | | | MF v C | -.01 | *(-.06-.04)* | .07 | .03 | *(-.03-.08)* | .11 | .03 | *(-.03-.09)* | .11 |
| Anxiety | *F*(448.50) =0.60 | *F*(383.76) =5.90** | *F*(386.29) =1.68 | MF-P v MF | -.01 | *(-.09-.07)* | .02 | .05 | *(-.05-.14)* | .12 | .01 | *(-.09-.10)* | .02 |
| | | | | MF-P v C | .07 | *(-.02-.15)* | .20 | .01 | *(-.08-.11)* | .03 | .01 | *(-.09-.11)* | .03 |
| | | | | MF v C | .08 | *(-.01-.16)* | .23 | -.04 | *(-.13-.06)* | .09 | .01 | *(-.09-.11)* | .02 |
| WSC | *F*(439.16) =1.43 | *F*(360.79) =0.69 | *F*(360.89) =0.64 | MF-P v MF | -.01 | *(-.12-.10)* | .02 | .001 | *(-.13-.13)* | .002 | .08 | *(-.07-.23)* | .13 |
| | | | | MF-P v C | -.06 | *(-.17-.06)* | .13 | -.05 | *(-.18-.08)* | .10 | -.04 | *(-.19-.11)* | .07 |
| | | | | MF v C | -.05 | *(-.16-.07)* | .10 | -.05 | *(-.18-.08)* | .10 | -.12 | *(-.28-.03)* | .20 |
| Wellbeing | *F*(423.44) =2.66 | *F*(372.91) =0.39 | *F*(375.16) =0.23 | MF-P v MF | -.10 | *(-.25-.05)* | .16 | -.11 | *(-.29-.07)* | .15 | -.17 | *(-.35-.02)* | .22 |
| | | | | MF-P v C | -.08 | *(-.23-.07)* | .13 | -.07 | *(-.25-.11)* | .10 | -.08 | *(-.27-.11)* | .11 |
| | | | | MF v C | .02 | *(-.14-.17)* | .02 | .04 | *(-.15-.22)* | .05 | .08 | *(-.11-.28)* | .11 |
| Mindfulness | | | | | | | | | | | | | |
| Aware INT | *F*(439.86) =.745 | *F*(386.63) =1.53 | *F*(388.48) =1.69 | MF-P v MF | -.08 | *(-.26-.09)* | .12 | .11 | *(-.08-.30)* | .14 | .10 | *(-.10-.29)* | .12 |
| | | | | MF-P v C | -.13 | *(-.31-.05)* | .19 | .02 | *(-.17-.21)* | .03 | .02 | *(-.18-.21)* | .02 |
| | | | | MF v C | -.05 | *(-.22-.13)* | .07 | -.09 | *(-.28-.11)* | .11 | -.08 | *(-.28-.12 )* | .10 |
| Aware EXT | *F*(427.54) =0.13 | *F*(383.21) =1.36 | *F*(392.57) =0.32 | MF-P v MF | .002 | *(-.20-.20)* | .003 | .04 | *(-.19-.27)* | .04 | -.04 | *(-.27-.19)* | .04 |
| | | | | MF-P v C | .08 | *(-.13-.28)* | .09 | .03 | *(-.20-.25)* | .03 | -.01 | *(-.24-.23)* | .01 |
| | | | | MF v C | .07 | *(-.13-.28)* | .09 | -.01 | *(-.25-.22)* | .01 | .03 | *(-.21-.27)* | .04 |
| Act Aware | *F*(422.54) =4.78** | *F*(374.82) =5.46** | *F*(376.65) =0.72 | MF-P v MF | -.06 | *(-.23-.12)* | .08 | -.03 | *(-.24-.18)* | .03 | .02 | *(-.20-.25)* | .03 |
| | | | | MF-P v C | -.27** | *(-.45--.09)* | .37 | -.17 | *(-.38-.04)* | .20 | -.10 | *(-.32-.13)* | .11 |
| | | | | MF v C | -.21* | *(-.40--.03)* | .30 | -.14 | *(-.36-.08)* | .17 | -.12 | *(-.35-.11)* | .14 |
| AccNJ | *F*(455.78) =1.29 | *F*(384.27) =0.08 | *F*(385.37) =0.87 | MF-P v MF | -.06 | *(-.23-.12)* | .08 | .03 | *(-.18-.23)* | .03 | .11 | *(-.10-.32)* | .13 |
| | | | | MF-P v C | .04 | *(-.14-.22)* | .06 | .11 | *(-10-.31)* | .13 | .16 | *(-.05-.37)* | .19 |
| | | | | MF v C | .10 | *(-.08-.28)* | .14 | .08 | *(-.13-.29)* | .10 | .05 | *(-.17-.27)* | .06 |
| DecNR | *F*(437.50) =0.17 | *F*(387.05) =0.56 | *F*(390.02) =1.37 | MF-P v MF | -.10 | *(-.27-.07)* | .14 | .07 | *(-.13-.27)* | .09 | .004 | *(-.21-.22)* | .01 |
| | | | | MF-P v C | .02 | *(-.16-.19)* | .02 | .004 | *(-.19-.20)* | .01 | .06 | *(-.16-.28)* | .07 |
| | | | | MF v C | .12 | *(-.06-.29)* | .17 | -.07 | *(-.27-.14)* | .08 | .06 | *(-.16-.28)* | .06 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Openness | *F*(442.19) =1.07 | *F*(382.71) =0.16 | *F*(387.77) =0.84 | MF-P v MF | .05 | *(-.15-.24)* | .06 | -.003 | *(-.22-.21)* | .004 | .02 | *(-.20-.23)* | .02 |
| | | | | MF-P v C | .04 | *(-.16-.23)* | .04 | .16 | *(-.06-.37)* | .19 | .08 | *(-.14-.29)* | .09 |
| | | | | MF v C | -.01 | *(-.21-.18)* | .02 | .16 | *(-.06-.39)* | .18 | .06 | *(-.16-.28)* | .07 |
| Relativity | *F*(441.34) =1.61 | *F*(395.12) =1.01 | *F*(407.86) =1.18 | MF-P v MF | -.12 | *(-.29-.05)* | .17 | .06 | *(-.15-.26)* | .07 | -.08 | (-.28-.12) | .10 |
| | | | | MF-P v C | -.16 | *(-.34-.02)* | .22 | -.08 | *(-.28-.12)* | .10 | -.07 | *(-.27-.13)* | .09 |
| | | | | MF v C | -.04 | *(-.21-.14)* | .05 | -.14 | *(-.35-.07)* | .17 | .01 | *(-.20-.22)* | .01 |
| Insight | *F*(442.35) =1.10 | *F*(384.52) =1.44 | *F*(386.58) =2.12 | MF-P v MF | -.12 | *(-.31-.07)* | .15 | .10 | *(-.13-.33)* | .11 | -.02 | *(-.26-.22)* | .02 |
| | | | | MF-P v C | -.06 | *(-.25-.14)* | .07 | .21 | *(-.02-.43)* | .23 | .10 | *(-.14-.35)* | .11 |
| | | | | MF v C | .06 | *(-.13-.25)* | .08 | .11 | *(-.13-.34)* | .12 | .13 | *(-.13-.38)* | .13 |

*Note.* ES = Between-group Effect Size (Cohen's *d)*; * $p < .05$ ** $p < .01$; MF-P = Mindfulness intervention with parental involvement; group; MF = Mindfulness intervention; C = Control group; Measures: Depression/Anxiety = DASS-21; Weight/shape concerns = Weight/shape subscales of the Eating Disorder Examination-Questionnaire; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale; Mindfulness = Comprehensive Inventory of Mindfulness Experiences -Adolescents (CHIME-A). CHIME-A facets where abbreviated: Aware INT = Awareness of Internal Experiences; Aware EXT = Awareness of External Experiences; Act Aware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental Orientation; DecNR = Decentering and Nonreactivity.

Table 4.4 *Mixed Model Analyses for Moderation: Estimated Marginal Means for Moderator (6) by Treatment Group (2) by Time (3)*

| Moderator | Outcome variable (moderator* group*time) | Post-intervention *M (SE)* | | | | 6-month follow-up *M (SE)* | | | | 12-month follow-up *M (SE)* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Male | | Female | | Male | | Female | | Male | | Female | |
| | | MF ($N$ = 169) | C ($N$ = 85) | MF ($N$ = 135) | C ($N$ = 69) | MF | C | MF | C | MF | C | MF | C |
| Gender | Depression $F(365.88) = 1.26$ | .65 (.01) | .68 (.02) | .63 (.02) | .64 (.02) | .68 (.02) | .70 (.02) | .65 (.02) | .61 (.03) | .65 (.02) | .64 (.02) | .62 (.02) | .60 (.03) |
| | Anxiety $F(375.32) = 0.72$ | .87 (.02) | 79 (.03) | .90 (.03) | .84 (.04) | .76 (.03) | .78 (.04) | .87 (.03) | .86 (.04) | .81 (.03) | .84 (.04) | .93 (.03) | .88 (.04) |
| | WSC $F(354.22) = 0.34$ | 1.05 (.03) | 1.09 (.05) | 1.26 (.03) | 1.31 (.05) | 1.05 (.04) | 1.06 (.05) | 1.27 (.04) | 1.34 (.06) | 1.06 (.04) | 1.14 (.06) | 1.30 (.05) | 1.36 (.06) |
| | Wellbeing $F(363.48) = 0.47$ | 3.48 (.04) | 3.58 (.06) | 3.41 (.05) | 3.37 (.07) | 3.48 (.05) | 3.54 (.08) | 3.38 (.06) | 3.37 (.08) | 3.52 (.05) | 3.53 (.08) | 3.30 (.06) | 3.32 (.08) |
| | Aware INT $F(378.59) = 0.21$ | 3.57 (.05) | 3.68 (.07) | 3.68 (.05) | 3.74 (.08) | 3.48 (.05) | 3.57 (.08) | 3.71 (.06) | 3.65 (.08) | 3.57 (.06) | 3.62 (.08) | 3.69 (.06) | 3.69 (.09) |
| | Aware EXT $F(375.16) = 1.45$ | 3.42 (.06) | 3.39 (.08) | 3.61 (.06) | 3.48 (.09) | 3.40 (.06) | 3.37 (.10) | 3.43 (.07) | 3.46 (.10) | 3.46 (.06) | 3.34 (.10) | 3.46 (.07) | 3.57 (.10) |
| | Act Aware $F(365.30) = 0.92$ | 2.89 (.05) | 3.14 (.07) | 2.74 (.06) | 2.97 9.08) | 3.14 (.06) | 3.24 (.09) | 2.76 (.06) | 3.01 (.09) | 3.02 (.06) | 3.16 (.09) | 2.87 (.07) | 2.95 (.10) |
| | ANJ $F(376.14) = 0.08$ | 3.10 (.05) | 3.01 (.07) | 3.01 (.05) | 2.97 (.08) | 3.15 (.06) | 3.07 (.09) | 2.95 (.06) | 2.85 (.09) | 3.10 (.06) | 2.98 (.09) | 3.01 (.07) | 2.91 (.09) |
| | DNR $F(379.10) = 0.43$ | 3.15 (.05) | 3.08 (.07) | 3.00 (.05) | 2.94 (.08) | 3.08 (.06) | 3.08 (.08) | 2.93 (.06) | 2.99 (.09) | 3.13 (.06) | 2.99 (.09) | 2.96 (.07) | 2.99 (.10) |
| | Openness $F(372.92) = 0.44$ | 2.75 (.06) | 2.73 (.08) | 2.59 (.06) | 2.59 (.09) | 2.88 (.06) | 2.78 (.09) | 2.57 (.07) | 2.35 (.09) | 2.78 (.06) | 2.69 (.09) | 2.58 (.07) | 2.53 (.09) |
| | Relativity $F(385.64) = 1.83$ | 3.52 (.05) | 3.72 (.07) | 3.61 (.05) | 3.59 (.08) | 3.56 (.06) | 3.62 (.08) | 3.48 (.06) | 3.64 (.09) | 3.57 (.06) | 3.60 (.09) | 3.65 (.06) | 3.67 (.09) |
| | Insight $F(377.74) = 0.88$ | 2.84 (.05) | 2.80 (.08) | 2.72 (.06) | 2.77 (.09) | 2.91 (.06) | 2.81 (.09) | 2.62 (.07) | 2.39 (.10) | 2.90 (.07) | 2.82 (.10) | 2.69 (.07) | 2.54 (.11) |

| | | Low Depression | | High Depression | | Low Depression | | High Depression | | Low Depression | | High Depression | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MF ($N$ =161) | C ($N$ =70) | MF ($N$ =187) | C ($N$ =81) | MF | C | MF | C | MF | C | MF | C |
| Depression | Anxiety $F(374.90) = 1.41$ | .87 (.03) | .77 (.04) | .90 (.02) | .86 (.04) | .74 (.03) | .78 (.04) | .86 (.03) | .85 (.04) | .86(.03) | .86 (.04) | .88 (.03) | .86 (.04) |
| | WSC $F(354.42) = 0.26$ | 1.11 (.03) | 1.18 (.05) | 1.18 (.03) | 1.21 (.05) | 1.09 (.04) | 1.17 (.06) | 1.20 (.04) | 1.12 (.05) | 1.18 (.05) | 1.25 (.07) | 1.15 (.04) | 1.23 (.06) |
| | Wellbeing $F(365.11) = 0.47$ | 3.59 (.05) | 3.53 (.07) | 3.31 (.05) | 3.44 (.06) | 3.55 (.06) | 3.55 (.08) | 3.32 (.05) | 3.38 (.07) | 3.53 (.06) | 3.47 (.08) | 3.33 (.05) | 3.38 (.08) |
| | Aware INT $F(379.98) = 1.32$ | 3.74 (.05) | 3.77 (.08) | 3.51 (.05) | 3.65 (.07) | 3.63 (.06) | 3.73 (.09) | 3.53 (.05) | 3.50 (.08) | 3.76 (.06) | 3.74 (.09) | 3.51 (.06) | 3.58 (.08) |
| | Aware EXT $F(375.94) = 0.98$ | 3.55 (.06) | 3.39 (.09) | 3.48 (.06) | 3.47 (.09) | 3.42 (.07) | 3.44 (.10) | 3.41 (.06) | 3.38 (.10) | 3.56 (.07) | 3.48 (.10) | 3.38 (.07) | 3.43 (.10) |
| | Act Aware $F(366.13) = 0.15$ | 2.91 (.05) | 3.21 (.08) | 2.74 (.05) | 2.93 (.08) | 3.11 (.07) | 3.28 (.09) | 2.85 (.06) | 3.00 (.09) | 3.04 (.07) | 3.18 (.10) | 2.87 (.06) | 2.95 (.09) |
| | ANJ $F(376.24) = 0.29$ | 3.25 (.05) | 3.09 (.08) | 2.89 (.05) | 2.90 (.07) | 3.19 (.06) | 3.07 (.09) | 2.94 (.06) | 2.88 (.08) | 3.12 (.07) | 2.98 (.09) | 2.99 (.06) | 2.92 (.09) |
| | DNR $F(381.14) = 0.50$ | 3.22 (.05) | 3.08 (.08) | 2.96 (.05) | 2.95 (.07) | 3.13 (.06) | 3.15 (.09) | 2.91 (.06) | 2.95 (.08) | 3.19 (.07) | 3.04 (.09) | 2.93 (.06) | 2.95 (.09) |
| | Openness $F(374.60) = 2.14$ | 2.69 (.06) | 2.66 (.09) | 2.66 (.06) | 2.67 (.08) | 2.91 (.07) | 2.58 (.09) | 2.61 (.06) | 2.58 (.09) | 2.72 (.07) | 2.67 (.09) | 2.66 (.06) | 2.56 (.09) |
| | Relativity $F(387.07) = 0.09$ | 3.65 (.05) | 3.71 (.08) | 3.49 (.05) | 3.61 (.07) | 3.57 (.06) | 3.66 (.09) | 3.48 (.06) | 3.60 (.08) | 3.69 (.06) | 3.66 (.09) | 3.53 (.06) | 3.61 (.09) |
| | Insight $F(377.85) = 1.68$ | 2.92 (.06) | 2.78 (.08) | 2.67 (.05) | 2.79 (.08) | 2.85 (.07) | 2.72 (.10) | 2.71 (.06) | 2.52 (.09) | 2.93 (.07) | 2.77 (.11) | 2.69 (.07) | 2.61 (.10) |

| | | Low Anxiety | | High Anxiety | | Low Anxiety | | High Anxiety | | Low Anxiety | | High Anxiety | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MF ($N$ =151) | C ($N$ =66) | MF ($N$ =197) | C ($N$ =85) | MF | C | MF | C | MF | C | MF | C |
| Anxiety | Depression $F(368.06) = 0.16$ | .67 (.02) | .69 (.02) | .61 (.01) | .64 (.02) | .70 (.02) | .68 (.03) | .64 (.02) | .64 (.02) | .66 (.02) | .63 (.03) | .62 (.02) | .62 (.02) |
| | WSC $F(354.03) = 0.02$ | 1.11 (.03) | 1.11 (.05) | 1.17 (.03) | 1.26 (.05) | 1.13 (.04) | 1.14 (.06) | 1.16 (.04) | 1.25 (.05) | 1.18 (.05) | 1.20 (.07) | 1.15 (.04) | 1.28 (.06) |
| | Wellbeing $F(366.04) = 0.11$ | 3.55 (.05) | 3.53 (.07) | 3.36 (.05) | 3.44 (.06) | 3.53 (.06) | 3.50 (.08) | 3.35 (.05) | 3.42 (.07) | 3.52 (.06) | 3.44 (.09) | 3.34 (.05) | 3.42 (.08) |
| | Aware INT $F(380.53) = 0.37$ | 3.69 (.05) | 3.75 (.08) | 3.56 (.05) | 3.68 (.07) | 3.64 (.06) | 3.75 (.09) | 3.54 (.05) | 3.51 (.08) | 3.72 (.06) | 3.72 (.09) | 3.55 (.06) | 3.60 (.08) |
| | Aware EXT $F(376.22) = 0.80$ | 3.47 (.06) | 3.36 (.10) | 3.53 (.06) | 3.48 (.08) | 3.36 (.07) | 3.44 (.11) | 3.46 (.06) | 3.39 (.09) | 3.48 (.07) | 3.47 (.11) | 3.44 (.07) | 3.43 (.10) |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Act Aware $F(368.39) = 1.28$ | 2.91 (.06) | 3.23 (.08) | 2.74 (.05) | 2.94 (.07) | 3.14 (.07) | 3.26 (.10) | 2.83 (.06) | 3.04 (.08) | 3.04 (.07) | 3.06 (.10) | 2.88 (.06) | 3.06 (.09) |
| | ANJ $F(378.79) = 0.12$ | 3.23 (.05) | 3.16 (.08) | 2.92 (.05) | 2.87 (.07) | 3.20 (.06) | 3.09 (.10) | 2.94 (.06) | 2.88 (.08) | 3.14 (.07) | 2.98 (.09) | 2.99 (.06) | 2.93 (.09) |
| | DNR $F(381.18) = 0.32$ | 3.22 (.05) | 3.09 (.08) | 2.96 (.05) | 2.96 (.07) | 3.05 (.06) | 3.07 (.09) | 2.98 (.06) | 3.02 (.08) | 3.13 (.07) | 3.00 (.10) | 2.99 (.06) | 2.99 (.09) |
| | Openness $F(376.03) = 1.21$ | 2.75 (.06) | 2.73 (.09) | 2.62 (.06) | 2.62 (.08) | 2.92 (.07) | 2.64 (.10) | 2.60 (.06) | 2.54 (.08) | 2.74 (.07) | 2.70 (.10) | 2.64 (.06) | 2.55 (.09) |
| | Relativity $F(387.69) = 0.10$ | 3.61 (.05) | 3.76 (.08) | 3.52 (.05) | 3.58 (.07) | 3.55 (.06) | 3.75 (.10) | 3.50 (.06) | 3.54 (.08) | 3.64 (.06) | 3.73 (.10) | 3.57 (.06) | 3.56 (.08) |
| | Insight $F(379.79) = 0.50$ | 2.91 (.06) | 2.73 (.09) | 2.68 (.05) | 2.82 (.08) | 2.85 (.07) | 2.60 (.11) | 2.71 (.06) | 2.62 (.09) | 2.94 (.08) | 2.73 (.11) | 2.69 (.07) | 3.65 (.10) |

| | | Low WSC | | High WSC | | Low WSC | | High WSC | | Low WSC | | High WSC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MF ($N = 324$) | C ($N = 135$) | MF ($N = 24$) | C ($N = 16$) | MF | C | MF | C | MF | C | MF | C |
| WSC | Depression $F(384.07) = 2.30$ | .64 (.01) | .68 (.02) | .60 (.04) | .55 (.05) | .67 (.01) | .66 (.02) | .60 (.05) | .66 (.05) | .64 (.01) | .63 (.02) | .55 (.06) | .58 (.06) |
| | Anxiety $F(391.05) = 1.21$ | .89 (.02) | .80 (.03) | .87 (.07) | .97 (.08) | .81 (.02) | .81 (.03) | .79 (.09) | .84 (.09) | .86 (.02) | .86 (.03) | .92 (.10) | .85 (.11) |
| | Wellbeing $F(385.32) = 2.66$ | 3.46 (.03) | 3.51 (.05) | 3.22 (.13) | 3.22 (.15) | 3.45 (.04) | 3.45 (.06) | 3.11 (.17) | 3.48 (.17) | 3.46 (.04) | 3.43 (.06) | 2.79 (.18) | 3.38 (.21) |
| | Aware INT $F(398.26) = 2.19$ | 3.65 (.04) | 3.67 (.06) | 3.20 (.14) | 4.02 (.16) | 3.60 (.04) | 3.61 (.06) | 3.32 (.17) | 3.54 (.18) | 3.65 (.04) | 3.65 (.06) | 3.14 (.19) | 3.69 (.22) |
| | Aware EXT $F(392.72) = 0.86$ | 3.50 (.04) | 3.43 (.07) | 3.56 (.17) | 3.45 (.19) | 3.43 (.05) | 3.41 (.07) | 3.22 (.21) | 3.42 (.22) | 3.47 (.05) | 3.43 (.07) | 3.29 (.23) | 3.71 (.25) |
| | Act Aware $F(383.79) = 0.63$ | 2.85 (.04) | 3.09 (.06) | 2.44 (.15) | 2.78 (.17) | 2.98 (.05) | 3.17 (.07) | 2.80 (.19) | 2.79 (.20) | 2.97 (.05) | 3.08 (.07) | 2.59 (.22) | 2.85 (.24) |
| | ANJ $F(389.25) = 0.14$ | 3.03 (.04) | 3.00 (.06) | 2.68 (.15) | 2.88 (.17) | 3.08 (.04) | 2.97 (.07) | 2.74 (.18) | 2.98 (.20) | 3.08 (.04) | 2.95 (.07) | 2.62 (.21) | 2.94 (.23) |
| | DNR $F(396.50) = 0.25$ | 3.10 (.04) | 3.04 (.06) | 2.75 (.14) | 2.82 (.17) | 3.04 (.04) | 3.05 (.06) | 2.61 (.18) | 2.94 (.19) | 3.07 (.05) | 3.00 (.07) | 2.65 (.21) | 2.91 (.23) |
| | Openness $F(391.21) = 0.58$ | 2.69 (.04) | 2.66 (.06) | 2.48 (.16) | 2.75 (.19) | 2.76 (.05) | 2.62 (.07) | 2.43 (.19) | 2.25 (.20) | 2.69 (.05) | 2.62 (.07) | 2.58 (.21) | 2.61 (.23) |
| | Relativity $F(406.74) = 0.01$ | 3.57 (.04) | 3.67 (.06) | 3.40 (.14) | 3.54 (.17) | 3.53 (.04) | 3.63 (.07) | 3.45 (.19) | 3.64 (.20) | 3.61 (.04) | 3.63 (.06) | 3.56 (.20) | 3.67 (.22) |
| | Insight $F(389.92) = 0.46$ | 2.81 (.04) | 2.79 (.06) | 2.40 (.16) | 2.77 (.18) | 2.79 (.05) | 2.63 (.07) | 2.50 (.21) | 2.42 (.22) | 2.83 (.05) | 2.71 (.08) | 2.24 (.24) | 2.42 (.27) |

| | | Younger | | Older | | Younger | | Older | | Younger | | Older | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MF ($N$ = 146) | C ($N$ = 77) | MF ($N$ = 158) | C ($N$ = 77) | MF | C | MF | C | MF | C | MF | C |
| Age | Depression $F(364.92) = 1.27$ | .63 (.02) | .67 (.02) | .64 (.01) | .66 (.02) | .68 (.02) | .65 (.02) | .65 (.02) | .67 (.02) | .64 (.02) | .63 (.02) | .64 (.02) | .61 (.03) |
| | Anxiety $F(373.71) = 0.36$ | .88 (.02) | .83 (.03) | .89 (.02) | .80 (.04) | .82 (.03) | .82 (.04) | .79 (.03) | .81 (.04) | .86 (.03) | .85 (.04) | .88 (.03) | .87 (.04) |
| | WSC $F(353.23) = 2.44$ | 1.15 (.03) | 1.17 (.05) | 1.13 (.03) | 1.22 (.05) | 1.12 (.04) | 1.23 (.05) | 1.17 (.04) | 1.17 (.06) | 1.17 (.05) | 1.23 (.06) | 1.16 (.04) | 1.26 (.07) |
| | Wellbeing $F(362.85) = 0.07$ | 3.48 (.05) | 3.47 (.06) | 3.42 (.04) | 3.48 (.07) | 3.46 (.05) | 3.47 (.08) | 3.41 (.05) | 3.44 (.08) | 3.45 (.06) | 3.43 (.08) | 3.40 (.05) | 3.42 (.09) |
| | Aware INT $F(377.85) = 0.19$ | 3.64 (.05) | 3.72 (.07) | 3.60 (.05) | 3.69 (.08) | 3.63 (.06) | 3.60 (.08) | 3.54 (.06) | 3.61 (.08) | 3.66 (.06) | 3.63 (.08) | 3.59 (.06) | 3.68 (.09) |
| | Aware EXT $F(374.83) = 1.69$ | 3.53 (.06) | 3.40 (.09) | 3.48 (.06) | 3.46 (.09) | 3.43 (.07) | 3.49 (.10) | 3.40 (.07) | 3.33 (.10) | 3.51 (.07) | 3.41 (.10) | 3.42 (.07) | 3.49 (.10) |
| | Act Aware $F(364.85) = 0.89$ | 2.84 (.05) | 3.08 (.08) | 2.80 (.05) | 3.04 (.08) | 2.95 (.06) | 3.22 (.09) | 2.99 (.06) | 3.04 (.09) | 2.95 (.07) | 3.08 (.09) | 2.95 (.06) | 3.04 (.10) |
| | ANJ $F(376.16) = 0.30$ | 3.09 (.05) | 2.94 (.08) | 3.03 (.05) | 3.04 (.08) | 3.14 (.06) | 2.91 (.09) | 3.00 (.06) | 3.02 (.09) | 3.10 (.06) | 2.92 (.09) | 3.01 (.06) | 2.98 (.09) |
| | DNR $F(378.25) = 0.01$ | 3.07 (.05) | 2.94 (.08) | 3.09 (.05) | 3.09 (.08) | 3.07 (.06) | 3.04 (.09) | 2.96 (.06) | 3.04 (.08) | 3.08 (.06) | 2.95 (.09) | 3.03 (.06) | 3.04 (.10) |
| | Openness $F(372.31) = 0.97$ | 2.65 (.06) | 2.64 (.08) | 2.70 (.06) | 2.70 (.09) | 2.65 (.06) | 2.55 (.09) | 2.82 (.06) | 2.61 (.09) | 2.70 (.06) | 2.56 (.09) | 2.67 (.06) | 2.69 (.10) |
| | Relativity $F(384.23) = 0.03$ | 3.52 (.05) | 3.61 (.08) | 3.60 (.05) | 3.70 (.08) | 3.53 (.06) | 3.65 (.09) | 3.52 (.06) | 3.61 (.09) | 3.69 (.06) | 3.71 (.08) | 3.52 (.06) | 3.54 (.09) |
| | Insight $F(376.07) = 1.20$ | 2.81 (.06) | 2.68 (.08) | 2.77 (.05) | 2.89 (.08) | 2.78 (.07) | 2.51 (.10) | 2.77 (.07) | 2.72 (.10) | 2.89 (.07) | 2.54 (.10) | 2.71 (.07) | 2.85 (.11) |

| | | Low | | Medium | | High | | Low | | Medium | | High | | Low | | Medium | | High | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MF $N$:34 | C $N$:19 | MF $N$:227 | C $N$:115 | MF $N$:43 | C $N$:20 | MF | C | MF | C | MF | C | MF | C | MF | C | MF | C |
| SES | Depression $F(380.67) = 0.56$ | .61 (.04) | .57 (.04) | .64 (.01) | .68 (.02) | .67 (.03) | .67 (.04) | .60 (.04) | .57 (.05) | .67 (.01) | .67 (.02) | .67 (.03) | .67 (.04) | .58 (.04) | .59 (.06) | .64 (.01) | .62 (.02) | .66 (.03) | .63 (.04) |
| | Anxiety $F(386.38) = 0.25$ | .92 (.06) | .99 (.07) | .88 (.02) | .78 (.03) | .90 (.04) | .84 (.06) | .89 (.06) | .96 (.09) | .80 (.02) | .80 (.03) | .78 (.05) | .78 (.07) | .85 (.06) | .96 (.09) | .88 (.02) | .84 (.04) | .82 (.05) | .87 (.07) |
| | WSC $F(368.26) = 1.69$ | 1.12 (.08) | 1.39 (.10) | 1.15 (.03) | 1.18 (.04) | 1.12 (.06) | 1.15 (.09) | 1.09 (.08) | 1.19 (.12) | 1.16 (.03) | 1.23 (.05) | 1.11 (.07) | 1.06 (.10) | 1.17 (.09) | 1.29 (.14) | 1.20 (.04) | 1.24 (.05) | 1.00 (.08) | 1.24 (.11) |
| | Wellbeing $F(386.87) = 0.90$ | 3.04 (.11) | 3.31 (.14) | 3.48 (.04) | 3.50 (.05) | 3.50 (.08) | 3.51 (.12) | 3.18 (.12) | 3.09 (.17) | 3.45 (.04) | 3.47 (.06) | 3.55 (.09) | 3.60 (.13) | 3.08 (.12) | 3.34 (.18) | 3.45 (.05) | 3.43 (.07) | 3.54 (.10) | 3.47 (.14) |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aware INT | 3.10 | 3.39 | 3.67 | 3.77 | 3.70 | 3.63 | 3.37 | 3.50 | 3.62 | 3.61 | 3.57 | 3.69 | 3.27 | 3.82 | 3.67 | 3.63 | 3.70 | 3.67 |
| $F(390.58) = 1.26$ | (.12) | (.16) | (.04) | (.06) | (.09) | (.13) | (.12) | (.18) | (.05) | (.07) | (.10) | (.15) | (.11) | (.19) | (.05) | (.07) | (.10) | (.14) |
| Aware EXT | 2.97 | 3.24 | 3.56 | 3.45 | 3.55 | 3.44 | 3.26 | 3.36 | 3.44 | 3.37 | 3.45 | 3.64 | 3.26 | 3.41 | 3.49 | 3.45 | 3.46 | 3.46 |
| $F(384.40) = 0.51$ | (.14) | (.19) | (.05) | (.07) | (.11) | (.16) | (.14) | (.22) | (.06) | (.08) | (.12) | (.17) | (.14) | (.22) | (.06) | (.08) | (.12) | (.17) |
| Act Aware | 3.00 | 2.74 | 2.82 | 3.10 | 2.70 | 3.10 | 3.04 | 3.06 | 2.98 | 3.15 | 2.86 | 3.10 | 2.93 | 3.00 | 2.94 | 3.06 | 2.98 | 3.10 |
| $F(378.84) = 0.90$ | (.13) | (.16) | (.04) | (.06) | (.10) | (.14) | (.13) | (.20) | (.05) | (.08) | (.11) | (.16) | (.14) | (.21) | (.05) | (.08) | (.12) | (.16) |
| ANJ | 2.88 | 3.04 | 3.08 | 2.96 | 3.06 | 3.10 | 2.96 | 3.05 | 3.10 | 3.00 | 2.97 | 2.75 | 2.85 | 3.02 | 3.07 | 2.98 | 3.17 | 2.76 |
| $F(387.82) = 1.29$ | (.12) | (.16) | (.04) | (.06) | (.10) | (.14) | (.12) | (.19) | (.05) | (.07) | (.11) | (.16) | (.12) | (.20) | (.05) | (.08) | (.11) | (.15) |
| DNR | 2.72 | 2.95 | 3.12 | 3.05 | 3.12 | 2.87 | 3.00 | 2.96 | 3.01 | 3.10 | 3.05 | 2.81 | 2.68 | 2.98 | 3.08 | 3.03 | 3.22 | 2.83 |
| $F(392.97) = 1.12$ | (.12) | (.16) | (.04) | (.06) | (.10) | (.14 ) | (.12) | (.19) | (.05) | (.07) | (.11) | (.15) | (.13) | (.20) | (.05) | (.08) | (.11) | (.15) |
| Openness | 2.90 | 2.62 | 2.67 | 2.67 | 2.57 | 2.66 | 2.65 | 2.75 | 2.74 | 2.56 | 2.78 | 2.54 | 2.80 | 2.73 | 2.69 | 2.61 | 2.59 | 2.57 |
| $F(387.05) = 1.12$ | (.14) | (.18) | (.05) | (.07) | (.11) | (.15) | (.13) | (.20) | (.05) | (.08) | (.11) | (.16) | (.13) | (.21 ) | (.05) | (.08) | (.12) | (.15) |
| Relativity | 3.21 | 3.56 | 3.61 | 3.67 | 3.54 | 3.70 | 3.53 | 3.41 | 3.53 | 3.66 | 3.51 | 3.65 | 3.32 | 3.70 | 3.65 | 3.67 | 3.60 | 3.48 |
| $F(398.29) = 1.78$ | (.12) | (.16) | (.04) | (.06) | (.10) | (.14) | (.12) | (.19) | (.05) | (.07) | (.11) | (.15) | (.12) | (.19) | (.05) | (.07) | (.11) | (.14) |
| Insight | 2.60 | 2.92 | 2.80 | 2.80 | 2.84 | 2.60 | 2.60 | 2.92 | 2.78 | 2.59 | 2.88 | 2.52 | 2.43 | 3.04 | 2.85 | 2.68 | 2.89 | 2.51 |
| $F(390.23) = 0.57$ | (.13) | (.18) | (.05) | (.07) | (.10) | (.15) | (.14) | (.22) | (.06) | (.08) | (.12) | (.17) | (.14) | (.23) | (.06) | (.09) | (.13) | (.18) |

*Note.* ** $p < .01$ * $p < .05$. *M* = adjusted mean after controlling for baseline value of dependent variable; *SE* = standard error; MF = Mindfulness intervention group (collapsed with/without parental intervention); C = Control group; Depression/Anxiety = DASS-21; WSC = Weight/shape concern subscales of the Eating Disorder Examination-Questionnaire; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale; Mindfulness = Comprehensive Inventory of Mindfulness Experiences -Adolescents (CHIME-A). CHIME-A facets where abbreviated: Aware INT = Awareness of Internal Experiences; Aware EXT = Awareness of External Experiences; Act Aware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental Orientation; DecNR = Decentering and Nonreactivity; Age: Younger = ≤ 13.45; Older = > 13.45; SES = socioeconomic status as measured by Index of Community Socio-Educational Advantage: Low = within one *SD* below mean; Medium = within one *SD* above mean; High = greater than one *SD* above mean. There were no differences in results between the SES analysis in the subsample with SEIFA indicators compared to the full sample using school based ICSEA ratings, so detailed results are only reported for the latter. There were no differences in results for Depression and Anxiety as moderators using median splits or adult clinical indicators so detailed results are only reported for the former.

Table 4.5 *Frequency of Home Practice Compliance and Percentage of High Compliance in Mindfulness Intervention Groups*

| | During course (at post-intervention) | | | | Since course (at 6-month follow-up) | | | | Since course (at 12-month follow-up) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MF-P (*N* = 148) | | MF (*N* = 156) | | MF-P (*N* = 149) | | MF (*N* = 128) | | MF-P (*N* = 146) | | MF (*N* = 136) | |
| | Mean *(SD)* | Percentage with high frequency[1] | Mean *(SD)* | Percentage with high frequency[1] | Mean *(SD)* | Percentage with high frequency[1] | Mean *(SD)* | Percentage with high frequency[1] | Mean *(SD)* | Percentage with high frequency[1] | Mean *(SD)* | Percentage with high frequency[1] |
| Mindfulness Practice | | | | | | | | | | | | |
| Breath counting | 2.80 *(1.27)* | 33.6 | 2.69 *(1.13)* | 27.6 | 2.06 *(1.02)* | 9.6 | 2.07 *(1.07)* | 12.6 | 2.03 *(1.12)* | 9.6 | 1.90 *(1.15)* | 9.2 |
| .b[2] | 2.85 *(1.32)* | 37.8 | 2.95 *(1.34)* | 35.9 | 2.02 *(1.04)* | 9.5 | 2.02 *(1.07)* | 10.9 | 1.83 *(.98)* | 4.3 | 1.83 *(1.15)* | 11.0 |
| Beditation[3] | 2.10 *(1.15)* | 13.3 | 2.06 *(1.09)* | 11.7 | 1.72 *(.99)* | 7.3 | 1.81 *(1.11)* | 10.9 | 1.71 *(1.01)* | 5.2 | 1.61 *(1.01)* | 5.5 |
| FOFBOC[3] | 2.09 *(1.16)* | 17.5 | 2.09 *(1.15)* | 15.9 | 1.57 *(.93)* | 7.3 | 1.55 *(.84)* | 3.3 | 1.57 *(.88)* | 3.5 | 1.46 *(.94)* | 4.6 |
| Everyday activities | 2.61 *(1.32)* | 26.6 | 2.70 *(1.28)* | 27.6 | 2.10 *(1.22)* | 15.4 | 2.19 *(1.29)* | 18.5 | 1.99 *(1.12)* | 11.3 | 2.04 *(1.39)* | 19.3 |
| Thought Traffic | 2.23 *(1.28)* | 17.5 | 2.38 *(1.17)* | 18.6 | 1.83 *(1.08)* | 11.0 | 1.88 *(1.09)* | 11.0 | 1.77 *(1.06)* | 7.8 | 1.71 *(1.13)* | 9.2 |
| Overall | 2.45 *(.91)* | 24.4 | 2.48 *(.89)* | 22.9 | 1.88 *(.83)* | 10.0 | 1.92 *(.80)* | 11.2 | 1.82 *(.79)* | 7.0 | 1.76 *(.90)* | 9.8 |

*Note.* [1]undertook homework once a week or more [2]Stop and be present - brief meditation [3]Nine minute audio file guided body scan mediation; MF-P = Mindfulness intervention with parental involvement; group; MF = Mindfulness intervention

Table 4.6 *Regression Analysis Showing the Extent to which Frequency of Home Practice Predicted Change on the Outcome Measures at Post-Intervention, Six- and Twelve-month Follow-up*

| | | Post-Intervention (*N* = 304) | | | 6-Month Follow-up (*N* = 277) | | | 12-Month Follow-up (*N* = 282) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Model 1 | Model 2 | | Model 1 | Model 2 | | Model 1 | Model 2 | |
| | | Baseline DV[1] | Baseline DV | Home Practice[2] | Baseline DV | Baseline DV | Home Practice | Baseline DV | Baseline DV | Home Practice |
| Depression | $R^2$ | .42** | | | .36** | | | .26** | | |
| | $R^2\Delta$ | | | .004 | | | .000 | | | .00 |
| | $\beta$ | .65** | .64** | .07 | .60** | .60** | .01 | .51** | .51** | -.003 |
| Anxiety | $R^2$ | .46** | | | .40** | | | .25** | | |
| | $R^2\Delta$ | | | .00 | | | .01 | | | .002 |
| | $\beta$ | .68** | .68** | -.01 | .63** | .62** | .09 | .50** | .50** | .05 |
| Weight/Shape concerns | $R^2$ | .60** | | | .58** | | | .42** | | |
| | $R^2\Delta$ | | | .002 | | | .01* | | | .00 |
| | $\beta$ | .77** | .77** | .05 | .76** | .76** | .10* | .65** | .65** | .01 |
| Wellbeing | $R^2$ | .45** | | | .36** | | | .36** | | |
| | $R^2\Delta$ | | | .02** | | | .004 | | | .01 |
| | $\beta$ | .67** | .66** | .16** | .60** | .60** | .07 | .60** | .60** | .10 |
| Mindfulness | | | | | | | | | | |
| Aw INT | $R^2$ | .22** | | | .16** | | | .11** | | |
| | $R^2\Delta$ | | | .06** | | | .05** | | | .01 |
| | $\beta$ | .47** | .42** | .25** | .40** | .40** | .22** | .32** | .31** | .11 |
| Aw EXT | $R^2$ | .27** | | | .21** | | | .17** | | |
| | $R^2\Delta$ | | | .06** | | | .06** | | | .02* |
| | $\beta$ | .52** | .48** | .24** | .46** | .43** | .26** | .41** | .39** | .13* |
| Act Aw | $R^2$ | .34** | | | .29** | | | .22** | | |
| | $R^2\Delta$ | | | .01 | | | .00 | | | .02* |
| | $\beta$ | .59** | .59** | .07 | .54** | .54** | .01 | .46** | .46** | -.15* |
| AccNJ | $R^2$ | .40** | | | .32** | | | .20** | | |
| | $R^2\Delta$ | | | .004 | | | .02* | | | .01 |
| | $\beta$ | .64** | .63** | .06 | .57** | .56** | .14* | .45** | .44** | .12 |
| DecNR | $R^2$ | .27** | | | .14** | | | .11** | | |
| | $R^2\Delta$ | | | .04** | | | .09** | | | .05** |
| | $\beta$ | .52** | .46** | .20** | .38** | .35** | .31** | .34** | .32** | .22** |
| Openness | $R^2$ | .15** | | | .13** | | | .10** | | |
| | $R^2\Delta$ | | | .01 | | | .02* | | | .03* |
| | $\beta$ | .39** | .39** | -.08 | .35** | .35** | -.15* | .32** | .30** | -.16* |
| Relativity | $R^2$ | .32** | | | .19** | | | .14** | | |
| | $R^2\Delta$ | | | .04** | | | .06** | | | .02* |
| | $\beta$ | .57** | .53** | .21** | .43** | .42** | .25** | .37** | .36** | .14* |
| Insight | $R^2$ | .38** | | | .25** | | | .27** | | |
| | $R^2\Delta$ | | | .03** | | | .07** | | | .03** |
| | $\beta$ | .62** | .60** | .18** | .50** | .46** | .26** | .52** | .50** | .18** |

Note: [1]Model 1 contains baseline measure of each outcome measure; [2] Mean frequency of home practice; Depression/Anxiety = DASS-21; Weight/shape concerns = Weight/shape subscales of the Eating Disorder Examination-Questionnaire; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale; Mindfulness = Comprehensive Inventory of Mindfulness Experiences -Adolescents (CHIME-A). CHIME-A facets where abbreviated: Aware INT = Awareness of Internal Experiences; Aware EXT = Awareness of External Experiences; Act Aware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental Orientation; DecNR = Decentering and Nonreactivity.

Table 4.7 *Classroom Teacher Feedback*

| | Mean | Median | Range |
|---|---|---|---|
| Acceptability and value of programme *(0-10 Likert scale*) | | | |
| Enjoyable and interesting for students | 9.60 | 10.00 | 8-10 |
| Enjoyable and interesting for you | 9.58 | 10.00 | 8-10 |
| How much do you think students learnt? | 8.55 | 9.00 | 5-10 |
| How much did you learn? | 9.00 | 9.50 | 7-10 |
| Likely to use techniques yourself in future? | 9.46 | 10.00 | 7-10 |
| Between lesson, teacher-led practices | | | |
| Ease of implementing teacher-led practices *(0-10 Likert scale*) | 6.64 | 7.00 | 2-10 |
| How often did you lead your class in a *.b*[1] practice? *(Choice of five options*[2]*)* | About once a week | More than once a week | More than twice in total – more than once a week |
| How often did you play FOFBOC[3] audiofile to class? *(times in total)* | 2.22 | 2.00 | 1-7 |
| How often did you play Beditation[4] audiofile to class? *(times in total)* | 1.33 | 0.00 | 0-9 |

| | Frequency | Percentage |
|---|---|---|
| Preferred facilitator | | |
| External instructor | 5 | 45.5 |
| School teacher | 1 | 9.1 |
| Either | 5 | 45.5 |
| Year 8 appropriate age group for programme | | |
| Yes | 7 | 70 |
| No | 3 | 30 |

Note. [1].*b* = Stop and be present – brief meditation; [2] Five point Likert scale anchors = *Never – Once or twice in total – Less than once a week but more than twice in total - About once a week – More than once a week*; [3] FOFBOC = 9 minute sitting meditation; [4]Beditation = 9 minute lying meditation.

# Chapter 5 :

# Brief report. School teacher feedback on perceived level of personal mindfulness training necessary to teach mindfulness in schools

## 5.1 Introduction

Preliminary results of two moderately large randomised controlled trials (RCTs) we conducted in secondary schools (Johnson et al., 2016; Johnson et al., 2017) indicated that a one-off 8-week mindfulness programme, delivered by an external facilitator, may be insufficient in dosage to create a change in students' wellbeing in this setting. An alternative delivery format, which also facilitates disseminability at scale, is to train teachers themselves to deliver the mindfulness intervention to students. This may increase the "dose" of mindfulness to students by a variety of means including modelling of behaviour, drip feeding of ideas, and the capacity for short regular classroom practices.

It has been suggested that a mindfulness training programme for school teachers incorporate three steps: first, training teachers in an adult course themselves, second, teachers spending 3-6 months consolidating their own mindfulness practice and third, being trained in a specific curriculum to teach to students (e.g., http://www.mindfulnessinschools.org; http://www.mindfulschools.org). However, given the demands on teachers' time, it has also been proposed that the first step might be adequately covered by a condensed 6-week, one hour per week course rather than the classic 8-week, 2.5 hour per week Mindfulness Based Stress Reduction (MBSR) curriculum. A large scale experimental trial (My Resilience in Adolescence; MYRIAD) is currently being conducted by Oxford University to investigate the best way to deliver mindfulness programmes to students, and how best to train teachers to do this (http://myriadproject.org/what-is-myriad/). The MYRIAD trial is testing online versus face to face delivery together with variable length of curriculum training. Seeking the opinions of a group of teachers who had undertaken the full 8-week MBSR course as the baseline component of training was adds an important qualitative component to this area of research. As an extension of our series of studies we therefore proceeded to sample teachers' opinions on the best pathway for training them to teach mindfulness to students.

## 5.2 Method

### 5.2.1 Participants

Ethics approval was granted for this additional survey and its analysis by the Social and Behavioural Sciences Research Ethics Committee at Flinders University. Following the end of year data collection in our second RCT, as a thank you to four secondary schools who took part in the trial, a number of free places were offered to interested teachers in a standard 8-week MBSR course conducted by the researcher (CJ). Two other local primary schools

who had expressed interest in mindfulness were also offered places for volunteer staff in this course.

### 5.2.2 Intervention

The MBSR course follows a standardised 8-week format (Kabat-Zinn, 1990; McCown, Reibel & Micozzi, 2010 pp. 139-142). This consists of weekly face to face meetings of 2.5 hours duration structured with didactic presentations of mindfulness concepts, meditation, small and large group discussion, and facilitator guided interpretation of experience (inquiry). Further, there is a full day silent retreat between sessions six and seven, and an expectation of 45 minutes meditation home practice, six days per week, for the duration of the course. A summary of each session is shown in Table 5.1.

### 5.2.3 Outcome measure

Data was collected in an anonymous pen and paper survey during the final session of the MBSR course. Participants were asked the following six questions, with space provided to expand on their answers if desired: *1. "Doing this mindfulness course online would offer more flexibility for teachers. Do you think this format would have been equally beneficial for you? Conversely, did you think there were unique benefits to a face to face group format?"; 2. "Do you think a condensed format of this course (eg, one hour per week for 6-8 weeks, without the full day retreat) would yield the same benefits for you personally?"; 3. "Most high quality school-based mindfulness curricula require teachers to participate in their own mindfulness course prior to doing curriculum training for students. Do you think a condensed format of this course (eg, one hour per week for 6-8 weeks without the full day retreat) would be an adequate grounding as the first step in this process?";* 4. "*If the course were delivered in a shortened format, what did you find most valuable (ie, should be retained) and least valuable (ie, could be excluded or modified)? Comments may include structure (length of small/large group discussions, length of guided practices in class, length of home practices, experiential exercises in class) and also specific content of sessions"; 5. "Would you recommend retaining the all day silent retreat in a condensed course? Why or why not?"; 6. "Would you recommend this course to other teachers and schools? Why or why not?"*

## 5.3 Results

### 5.3.1 Description of participants

Across the four secondary schools involved in our intervention trial, and two local primary schools, a cohort of 19 teachers volunteered to take part in the MBSR programme. One female participant was absent for the last class when the feedback survey was administered. Of the 18 teachers who completed the survey, 14 (77.8%) were female,

however no other demographic data was collected. No more than two participant responses were missing per question.

### 5.3.2 Online versus face-to-face delivery

Teachers were first asked whether they felt that the more flexible delivery option of doing training online would be equally beneficial to the group format they had experienced, and 100% of these teachers nominated a face-to-face format as their preference. The most frequent theme related to the value of hearing the experiences of others, both for reassurance regarding shared difficulties and for the immediacy of discussion and exploration of everyday challenges with the facilitator, with whom a trusting relationship could be developed. A large number of participants felt it was a stronger commitment to come to a weekly class, and that it would be easier to opt out with an online programme, or not complete the practices, which were *"essential for the intensive new learning and rewiring of the brain"* according to as one participant.

### 5.3.3 Condensed format

First, teachers were asked whether a condensed version of the course (e.g., six weekly one-hour sessions without the all-day silent retreat) would have yielded the same benefits for them *personally*. One participant (5.6%) felt that a condensed course would work *"as long as you do the home practices between sessions. These are critical"*. Fifteen teachers (83.3%) preferred the full MBSR structure. Typical responses cited the need to do lots of practice to understand the benefits, work through obstacles, and consolidate new neural pathways. As one participant stated, "*You need to fully practice in order to see the benefit, no short cuts. You need to spend a good amount of time learning by doing".* Of these participants, four felt that the weekly sessions could be shortened slightly to 2 hours. Two participants (11.1%) felt that it could work either way. However, as one of these teachers stated *"One might understand the concepts in a shortened version, but the extended time has enabled deeper learning (embedded)".*

Teachers were then asked whether they felt a condensed version of the course would be adequate grounding as a first step in *training to teach students.* Ten teachers (58.8 %) felt the full version was preferable, citing reasons such as the depth of grounding in the mindfulness philosophy, and needing to experience all aspects of the practices to truly understand the challenges and benefits before sharing these ideas with others in an authentic way. Seven teachers (41.2%) felt the condensed version might be adequate, with five

qualifying this choice in one of two ways: only if intending to share just the basics of mindfulness and introduce some simple practices to students, or if supplemented by solid home practice by the teacher.

Teachers were also asked as an open question to nominate the most helpful elements to retain if a condensed version were developed. Most frequently reported were guided practices, poems/analogies/imagery, underlying science/mindfulness theory, and group discussion. Of the eight participants who nominated components of least benefit (44.4%), the most common theme was the amount/length of home practices.

### 5.3.4 Value of silent all-day retreat

The majority of respondents (82.4%) voiced strongly that this component be kept, with the remaining participants suggesting a half day version. Numerous participants cited the retreat as a highlight; that it helped consolidate practices, "stretched" or "pushed" them, allowed them to learn a lot about themselves and their thoughts, and led them to deeper learning. Many felt accomplished as a participant in managing to practice in silence for this length of time, and one teacher reported that this was their *"first experience of a peaceful day*".

### 5.3.5 Recommending MBSR course for other schools and teachers

Teachers were asked whether and why they would recommend this course to fellow professionals and institutions. Most (77.8%) agreed that they would. Participants commented on the stress levels of teaching with few opportunities to stop, take time for oneself, switch out of thinking mode, and live in the moment. The course reportedly gave many participants practical tools and life skills, and led to reported increases in wellbeing and happiness, and reduced stress and anxiety. A few participants (22.2%) cautioned about mandated involvement, suggesting that it would be unlikely to yield many benefits, or as one participant put it, could even be too intense for teachers not interested in learning about this area.

### 5.3.6 Other feedback

Finally, teachers were given the opportunity for any additional comments. Responses were uniformly positive, and several that capture key themes are presented here:

"*A huge thank you for teaching me how simple it can be to make some significant changes to the way in which I deal with situations for better outcomes. I have enjoyed the*

*programme, even though at times I struggled with either sitting still or staying awake. I have learnt so much about me. I am confident that I can use some of these practices with my own family and with the students I see every day".*

*"After the 8 weeks, I understand my anxiety and that it is simply a thought. I know how to deal with the stress through all the practices taught. I feel that this was extremely beneficial".*

*"This course has been one of the better things I have done for myself and I highly recommend it".*

## 5.4 Limitations

We note that this was a small sample, composed of volunteer rather than mandated trainees, and predominantly female, although the latter may be representative of teaching demographics.

## 5.5 Concluding comments

In a small group of classroom teachers who had completed a standard 8-week MBSR course (2.5 hours per week), the majority perceived a unique benefit to face to face sessions (rather than online), and to undertaking the full length course (rather than one hour lessons for six weeks) including the day-long silent retreat. These qualitative comments may assist in informing the structure of condensed courses, for example, the value of a face to face group format and the strong support for a silent retreat day component. Further, these comments may be of value to share with teachers considering the training pathway in terms of reinforcing the benefit of a more rigorous programme and the need for practice. Schools may also be interested in the self-reported benefits of mindfulness to staff. Moving forward, large scale quantitative research continues regarding the best method of training school staff to deliver mindfulness (Oxford University; http://myriadproject.org/what-is-myriad/) with whom these preliminary comments have been shared.

References

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2016). Effectiveness of a school-based mindfulness program for transdiagnostic prevention in young adolescents. *Behaviour Research and Therapy, 81*, 1-11. doi:10.1016/j.brat.2016.03.002

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2017). A randomized controlled evaluation of a secondary school mindfulness program for early adolescents: Do we have the recipe right yet? *Behaviour Research and Therapy, 99*, 37-46. doi:10.1016/j.brat.2017.09.001

Kabat-Zinn, J. (1990). *Full Catastrophe Living*. New York: Dell.

McCown, D., Reibel, D., & Micozzi, M. (2010). *Teaching mindfulness: A practical guide for clinicians and educators*. New York: Springer.

Table 5.1 *MBSR Session Example Outline*

| Session | Theme | Overview | Practices |
|---|---|---|---|
| 1 | **Recognising the Present Moment** | What is mindfulness?<br>There is more right with you than wrong with you<br>Autopilot and body sensations as an anchor to the present | Raisin exercise (eating mindfully)<br>Bodyscan (awareness of body sensations while static) |
| 2 | **Perception** | Our minds are a filter<br>Awareness of breathing as an anchor to the present<br>Awareness of pleasant events and your reaction to them | Bodyscan<br>Sitting practice – Awareness of breathing<br>3 minute breathing space (brief anchoring practice)<br>Mindfulness of everyday activities, eg shower, walk |
| 3 | **Attitudinal Foundations** | Aspects of mindfulness (e.g., nonstriving, nonjudging, beginner's mind)<br>Awareness of unpleasant events and your reaction to them | Sitting practice<br>Movement practice: Lying down (awareness of body sensations while moving) |
| 4 | **Investigating Stress** | Stress – physiological reaction; being stuck in reactivity; avoidance rather than acceptance; effective alternatives for responding | Sitting practice<br>Movement practice: Standing up |
| 5 | **Finding another Place to Stand** | Exploration of thoughts; thoughts as passing events, not necessarily facts | Bodyscan<br>Sitting practice – exploring thoughts |
| 6 | **Interpersonal Mindfulness** | Exploration of a difficult communication; skilful patterns of relating and holding your centre | Movement practice: Standing up<br>Sitting practice – open awareness to all sensory experiences |
| All day retreat | **Going Deeper** | Guided practices during silent retreat. Cultivating mindfulness over an extended period of time (6 hours) | Mix of all practices; self-kindness; deep relaxation |
| 7 | **Living on Purpose** | How do you spend your time?<br>Nourishing and Draining activities<br>Making choices | Choice of self-guided practice<br>Sitting practice – contemplation of life |
| 8 | **The Eighth Week is the Rest of your Life** | Reflections. What do I want my future self to remember? | Sitting practice, largely unguided<br>Bodyscan |

Goddard, 2014; McCown, Reibel & Micozzi, 2010

# Chapter 6 :

# Which aspects of mindfulness are important to include in adolescent interventions?

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**Candidate's contribution:**
CJ and TW designed the study, CJ collected data; CJ analysed data and prepared manuscript under supervision of Wade.
Research design 50%; Data collection 100%; Analysis 90%; Writing and editing 90%.

## 6.1 Abstract

**Aim:** Despite widespread enthusiasm to adopt universal mindfulness based interventions (MBIs) for youth, high quality evidence is still lacking. It remains unknown how best to modify the successful adult curricula to render them accessible for young people but still effective. Specifically, it is unclear whether particular elements of mindfulness are key ingredients. The aim of this research was to identify the relation between aspects of baseline mindfulness and longitudinal trajectories related to well-being in adolescence.
**Method:** We examined associations between eight aspects of mindfulness at baseline and longitudinal trajectories of depression, anxiety, well-being, weight concern and shape concern over a 12-month period in early adolescents ($N$ = 499; 46% female; $M_{age}$ at baseline 13.45 years; $SD$ = .33).
**Results:** We found a transdiagnostic protective effect for those high in *Accepting and Nonjudgemental Orientation*, *Decentering and Nonreactivity*, and *Acting with Awareness*, with effect sizes across the variables ranging from small to large (Cohen's $d$ = .29 – 1.26) although this benefit reduced over time, especially for weight and shape concerns in girls.
**Conclusion:** This natural but waning protective effect strengthens the case for MBIs in youth. Isolation of three key elements is an important preliminary step in identifying ways to improve effectiveness of current adolescent curricula. Of the three, the current study suggests that teaching young adolescents to respond to their mistakes with kindness and non-judgement should be a prime focus.

## 6.2 Introduction

Despite widespread enthusiasm for school-based mindfulness programmes, there is a relative paucity of high level evidence for their effectiveness (Britton et al., 2014; Zenner, Herrnleben-Kurz, & Walach, 2014; Zoogman, Goldberg, Hoyt, & Miller, 2015), together with independent randomised controlled trials (RCTs) failing to replicate promising early results in secondary schools (Johnson, Burke, Brinkman, & Wade, 2016). One critical issue relates to a lack of understanding of how to adapt the robustly successful adult mindfulness based interventions (MBIs) for youth (Britton et al., 2014; Chadwick & Gelbar, 2016; Felver & Jennings, 2016). It is unknown whether mechanisms of change are different for young people (Alsubaie et al., 2017; van der Gucht, Takano, Raes, & Kuppens, 2017), or indeed, even within adolescence: although the capacity for abstract thinking emerges around puberty, refinement of cognition and emotional regulation continues into the mid-twenties (Denham, Wyatt, Bassett, Echeverria, & Knox, 2009; Riediger & Klipker, 2014, pp. 187-202; Schaffer & Kipp, 2010; Shapiro et al., 2015).

Despite MBI outcome research spanning more than thirty years in adults, high quality mechanistic research lags behind even in this population. Recent reviews (Alsubaie et al., 2017; van der Velden et al., 2015) and a meta-analysis (Gu, Strauss, Bond, & Cavanagh, 2015) show the most consistent support for global mindfulness as a mediator in adults, with preliminary support for particular aspects of mindfulness (attention regulation; cognitive and emotional reactivity) and related constructs (rumination, self-compassion and psychological flexibility). Only one youth MBI using the 8-week framework has undertaken mediation analysis; using data from an earlier RCT (Raes, Griffith, van der Gucht, & Williams, 2014; $M_{age}$ = 15.40), van der Gucht et al. (2017) found that improvements in cognitive reactivity and self-coldness (but not self-kindness) mediated the relationship between the mindfulness intervention and reductions in anxiety, depression and stress. Self-compassion is viewed as a construct with two independently operating dimensions (self-coldness/self-criticism vs self-compassion; López et al., 2015; Muris, Otgaar, & Petrocchi, 2016) that have different neural substrates (Longe et al., 2010) and affective systems (Gilbert, McEwan, Matos, & Rivis, 2011). The negatively valenced factor (self-criticism) has stronger links to pathology (Gilbert et al., 2011; López et al., 2015; Muris & Petrocchi, 2017), and the positively valenced factor (extending nurturing qualities to the self) is met in some individuals with resistance and a sense of threat (Gilbert et al., 2011). Thus van der Gucht et al. (2017) hypothesised that self-kindness may take more training and time to internalise. Further to this, two naturalistic

longitudinal studies have been undertaken in adolescence, following participants for four (Royuela-Colomer & Calvete, 2016; $M_{age}$ =16.11) and 12 months (Ciarrochi, Kashdan, Leeson, Heaven, & Jordan, 2011; $M_{age}$ =15.40). Results found evidence for cognitive/emotional awareness and reactivity, together with present moment awareness, as predictors of psychological health. However these studies did not use validated youth mindfulness measures.

Given that a primary aim of mediational research is to identify active therapeutic ingredients that can be intensified or discarded to improve effectiveness (Kraemer, Wilson, Fairburn, & Agras, 2002), there is a need for age appropriate mindfulness measures that allow tracking of individual elements of mindfulness – namely, skills that are taught in MBIs. The recent development and validation of a multifactor mindfulness measure for adolescents from 13 years, the Comprehensive Inventory of Mindfulness Experiences - Adolescents (CHIME-A; Johnson, Burke, Brinkman, & Wade, 2017), opens the way for finer-grained mediational and developmental investigations in youth. As shown in **Table 1**, the CHIME-A contains the same 8-factor structure as the adult scale (CHIME) on which it was based (for a full review of the conceptual development of the adult subscales, the reader is referred to Bergomi, Tschacher, & Kupper, 2013, 2014). During validation of the CHIME-A in young adolescents (Johnson et al., 2017; $M_{age}$ 13.44), a number of cross sectional relationships were explored between its eight facets and measures of psychological health: depression, anxiety, weight/shape concerns, and wellbeing. Results showed the strongest relationships were between *Accepting and Nonjudgemental Orientation* followed by *Acting with Awareness* and *Decentering and Nonreactivity*. These relationships suggest a range of aspects of mindfulness which might need to be emphasised in MBIs developed for adolescents to maximise effect.

Therefore, this study aimed to contribute to the emerging literature by investigating these relationships longitudinally, to examine how a broad range of dispositional mindfulness facets at baseline influence transdiagnostic psychological trajectories (depression, anxiety, well-being, weight concern, and shape concern) in young adolescents over a 12-month period. Combining previous results in adolescents (Johnson et al., 2017; van der Gucht et al., 2017), we hypothesised that *Accepting and Nonjudgemental Orientation* would be the strongest predictor of positive growth in these outcomes.

## 6.3 Method

### 6.3.1 Participants

This study was nested within a trial assessing the effectiveness of a 9-week mindfulness intervention in schools, in which no effects of the intervention were found on any outcome measure. Therefore, all participants were combined for this analysis. Four urban coeducational secondary schools (one private, three public) agreed to the participation of their Year 8 students. **Figure 6.1** shows the flow of participants. Those absent at baseline (10%) were excluded from this analysis as no data was available to categorise participants on initial levels of mindfulness. Participating schools represented a broad range of socioeconomic (SES) demographics as measured on the Index of Community Socio-Educational Advantage (ICSEA), whereby 1000 represents the mean, with a standard deviation of 100 (Australian Curriculum Assessment and Reporting Authority, 2012). Schools in our sample ranged from 959 to 1144 ($M$ = 1061.50, $SD$ =76.41). Of the 499 students who participated, the mean age was 13.45 ($SD$ = .33) with 46.1% female.

### 6.3.2 Procedure

Research approval was granted by each School Principal, the South Australian Department for Education and Child Development, and the Social and Behavioural Research Ethics Committee, Flinders University. Ethics approval was given for an opt-out consent procedure such that consent forms only needed to be returned if participation was not desired by parents/guardians or students. Participants filled out questionnaires either online or on paper. Testing was performed in a classroom with the principal investigator and teacher present to answer questions.

### 6.3.3 Predictor measure

***Mindfulness.*** Mindfulness was measured using the Comprehensive Inventory of Mindfulness Experiences – Adolescents (CHIME-A). This 25-item scale has been validated for young adolescents from 13 years (Johnson et al., 2017) and supports eight individual factors (as shown in **Table 6.1**, together with internal consistency for this study**)** but not an overall total score. The questionnaire uses a 5-point rating scale ranging from 1 *"never true"* to 5 *"always true"* to survey the last two weeks. For each factor, a higher score indicates greater mindfulness.

### 6.3.4 Outcome measures

***Anxiety and Depression.*** Negative affect was measured using the Depression Anxiety Stress Scale – Short form (DASS-21; Lovibond & Lovibond, 1995) The anxiety and depression factors show good fit in non-clinical adolescents (Szabo, 2010; Tully, Zajac, & Venning, 2009; Willemsen, Markey, Declercq, & Vanheule, 2011), thus these two 7-item subscales were used in the current study. Each item is scored on a 4-point scale from 0*"never"* to 3*"almost always"*, with higher scores reflecting higher depression or anxiety over the past week. Cronbach's alpha in this study for depression was .90 (item-total correlations ranged from .52-.79) and for anxiety was .80 (.26-.68).

***Weight and Shape Concerns.*** The weight and shape subscales form two of the four subscales assessed by the Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 1994), and are considered to best represent the broad construct of weight concerns that has been found to be one of the strongest risk factors for disordered eating in adolescents (Jacobi & Fittig, 2010; Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004). This questionnaire correlates well with the interview format, and which has excellent psychometric properties (Berg, Peterson, Frazier, & Crow, 2012; Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beaumont, 2004). The shape subscale (8 items) and the weight subscale (5 items) use a 7-point rating scale ranging from 0*"not at all"* to 6*"markedly"*. Questions relate to the last 28 days and higher scores indicate greater concerns. Cronbach's alpha in this study for shape concerns was .89 (item-total correlations ranged from .54-.81) and for weight concerns was .90 (.61-.82)

***Wellbeing.*** The 14-item Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) has been validated in both university student and community adult populations (Tennant et al., 2007) and has been used previously in adolescents (Kuyken et al., 2013). This 14-item scale surveys the last two weeks; items are rated on a 5-point scale from 1 *"none of the time"* to 5 "*all of the time*", with higher scores signifying higher wellbeing. Internal consistency in the current study was α =.91 with item-total correlations ranging from .36-.79.

### 6.3.5 Statistical analysis

Using IBM Statistical Package for the Social Sciences Version 22 (IBM SPSS), all analyses were conducted using Linear Mixed Modelling (LMM), enabling inclusion of cases with missing data via maximum likelihood estimation. The following sequence of models were used to investigate mindfulness, depression, anxiety, wellbeing, weight and shape

concerns over time, retaining variables showing significance at each step: Model A, unconditional means modelling to assess whether significance variance was present; Model B1, unconditional growth modelling to assess whether this variance changed significantly over time; Model C, adding sex as a predictor to the model, and where this showed an interaction between time and sex, Model B was repeated for the sample split by sex (Model B2) to assess which group showed variability over time. We then investigated whether certain aspects of mindfulness predicted variability in the outcome measures over time (Model D), using dichotomised (high, low as indicated by the median value) baseline levels of the eight facets measured by CHIME-A.

## 6.4 Results

### 6.4.1 Preliminary Analysis

Data for depression, anxiety, and weight/shape concerns were positively skewed. Following inverse (depression), square root (anxiety) and logarithmic transformations (weight and shape concerns), these variables improved to acceptable parameters for normality. Baseline (T1) outcome measures were examined as predictors of missingness at 3, 6 and 12 months (T2-4). At T2, those higher in the *Awareness of Internal Experiences* (CHIME-A facet) were more likely to be present at school for data collection (*OR* 1.39; *95% CI* 1.06 - 1.84). At T3, those lower in anxiety were more likely to be in attendance (0.46; 0.25 - 0.84). At T4 those higher in *Awareness of External Experiences* (CHIME-A facet) were more likely to be available for participation 1.27 (1.01–1.59). Of the twelve outcome variables (including eight facets of mindfulness) over three waves, only three variables showed an association ($\alpha = .08$), and none of these measures repeated in more than one wave; therefore data were accepted as missing at random.

### 6.4.2 Linear Mixed Models Analysis

***Mindfulness.*** All mindfulness facets showed significant variance (Model A, **Table 6.2**), and three of these showed that this variance was partially explained by time (Model B, **Table 6.2**): *Awareness of External Experiences, Acting with Awareness*, and *Relativity of Thoughts*. Three mindfulness facets showed a significant interaction of sex and time (Model C): *Acting with Awareness*, *Openness to Experience*, and *Insightful Understanding*. Thus, variability over time was retested for these three facets split by sex (Model B2). This revealed significant variance over time for *Insightful Understanding* in females only. *Acting with*

*Awareness* showed variance over time in both sexes, while *Openness to Experience* showed variance over time only in males.

**Table 6.3** shows descriptive statistics and effect sizes for those mindfulness facets that showed variance over time, either for the whole sample (*Awareness of External Experiences* and *Relativity of Thoughts*) or by sex (*Acting with Awareness*, *Openness to Experience* and *Insightful Understanding*). Only *Awareness of External Experiences* showed a significant difference (reduction) from T1-T4 (Cohen's $d$ = .14), but there was some variability between T1-4 for all five of these mindfulness facets. The lack of consistent directional change and small effect sizes (<.25) suggests some noise in the measure for these facets (e.g., measurement error) rather than developmental progression.

***Association between baseline mindfulness and trajectories of psychological health.*** The same progressive series of models was tested for the psychological outcome measures (depression, anxiety, wellbeing, weight concerns and shape concerns). All outcome measures showed variance (Model A, **Table 6.2**), and depression, anxiety and weight concerns showing significant change over time (Model B, **Table 6.2**). Shape and weight concerns showing an interaction of sex and time. Thus, variability over time was retested for shape and weight concerns split by sex (Model B2), which revealed significant variability over time for females only.

Mindfulness (eight facets) at baseline was then examined as a predictor for those psychological outcomes that had shown variability over time for either the whole sample (anxiety and depression) or by sex (weight and shape concerns, in females). Results are shown in **Table 6.4** together with the between-group effect sizes in **Table 6.5**. Being high in certain aspects of mindfulness was beneficial across pathologies. The pattern of all interactions was such that those low in mindfulness had high but stable pathology over time while those high in mindfulness increased in pathology over time, that is, the protective effect of mindfulness reduced. However, despite this difference in trajectories, the benefit did not disappear at 12 months for anxiety and depression as it did for some aspects of mindfulness (*Decentering and Nonreactivity* and *Insightful Understanding)* across weight and shape concerns respectively. Given that the main effects of group as well as the interactions are of interest, these results are combined and described together below.

For anxiety and depression (both sexes) and for weight and shape concerns (girls), the strongest and most consistent protective factor was to be high in *Accepting and Nonjudgemental Orientation* at baseline. Although the difference between groups decreased

over time, at 12 months those high in this quality remained significant less depressed, less anxious, and with lower weight and shape concerns (Cohen's *d* at T1 =.89-1.26; T4 .37-.55). Being high in *Acting with Awareness* at baseline also conferred a protective effect, which was stronger in magnitude and still present at 12 months for anxiety and depression (T1 .85-.89; T4 .38-.44) compared to weight and shape concerns (T1 .39-.44; T4 .10-.14 *n/s*). *Decentering and Nonreactivity* also had a protective effect across all four outcome factors (T1 .42-.71; T4 .29-.40) but the effect disappeared for weight concerns at T4 (.22 *n/s*). High baseline levels of the *Insightful Understanding*, *Openness to Experience* and *Awareness of External Experiences* had beneficial effects only for single outcomes (depression, anxiety and shape concerns respectively); these were smaller in magnitude but followed the same pattern of decreasing, although not disappearing, over time (T1 .22-.50; T4 .26-.28). Despite some natural fluctuations in the measurement of *Acting with Awareness*, significant between-group effect sizes were larger (*d* = .39 -.89) than within-group movement (*d* = .18-.22). However, the benefits of *Insightful Understanding*, *Openness to Experience* and *Awareness of External Experiences* should be interpreted with more caution, given the small effect sizes for both between-group variance and within-group fluctuations.

## 6.5 Discussion

This study tracked a large sample of early adolescents at four time-points over a 12-month period to investigate the impact of different aspects of baseline mindfulness on psychological health. There was a significant difference in levels of anxiety and depression (for boys and girls) and for weight and shape concerns (girls) between those high and low in certain aspects of mindfulness at baseline (small to large Cohen's *d*). The strongest and most consistent protective factor across all pathologies was to be high in *Accepting and Nonjudgemental Orientation* at baseline, consistent with earlier research (Johnson et al., 2017; van der Gucht et al., 2017) and as predicted by our hypothesis. The magnitude of effect decreased over time but a significant between-group advantage remained at 12 months. Having high levels of *Acting with Awareness*, and *Decentering and Nonreactivity* also conferred a protective effect, although this disappeared at 12 months for *Acting with Awareness* (weight and shape concerns) and *Decentering and Nonreactivity* (shape concerns only). High levels of *Insightful Understanding*, *Openness to Experience* and *Awareness of External Experiences* had lasting but smaller beneficial effects only for single outcomes (depression, anxiety and shape concerns, respectively).

The key protective factor in the CHIME-A scale for young adolescents, *Accepting and Nonjudgemental Orientation*, focuses on both non-judgement and self-kindness towards one's mistakes. We note these items are very specific in targeting mistakes, similar to those used in measures of unhealthy, self-critical perfectionism, a transdiagnostic risk factor (Egan, Wade, & Shafran, 2011). However, van der Gucht et al. (2017) found support for broader non-judgement (personal flaws, inadequacies and disliked aspects of personality) as a mediator. Although their sample was in older adolescents, it may be that it is the broader quality of non-judgement rather than any particular focus that is important to foster in interventions. Consistent with previous research showing resistance to self-compassion in individuals high in self-criticism (Gilbert et al., 2011), van der Gucht and colleagues found that their MBI reduced self-criticism but did not increase self-kindness, despite explicitly teaching this in their programme. Previous research has shown that the combination of low self-compassion and high fear of self-compassion predicted significantly poorer treatment response in patients with eating disorders (Kelly, Carter, Zuroff, & Borairi, 2013), suggesting that fear of self-compassion may also need to be addressed for good outcomes. Given the strong predictive value of the relatively brief *Accepting and Nonjudgemental Orientation* we used, and the complex nature of constructs related to self-judgement/self-kindness, it may be informative to explore these positive and negative aspects separately in future research, and also include measures of resistance to self-compassion (Gilbert et al., 2011). This will further develop our understanding of how we might amplify this important component in youth based MBIs.

The benefits of the three strongest protective factors (*Accepting and Nonjudgemental Orientation, Acting with Awareness*, and *Decentering and Nonreactivity*) decreased over the 12 months of the study. This general lessening of effect was not due to a systematic reduction in the mindfulness facets over this period, so it is likely that external stressors were increasing in potency (e.g., puberty, social and academic pressures). This provides further support for the implementation of youth MBIs that can foster and amplify these skills to maintain protection during adolescence. While some benefit of high baseline *Accepting and Nonjudgemental Orientation* remained for all pathologies at 12 months, the benefits of *Acting with Awareness* and *Decentering and Nonreactivity* disappeared for weight and/or shape concerns. One possible explanation is that there is a weaker relationship between mindfulness and eating disorder pathology. However, while considerably less research has been conducted for MBIs in the field of eating disorders (Wanden-Berghe, Sanz-Valero, & Wanden-Berghe, 2011) compared to anxiety and depression (Gotink et al., 2015; Goyal et al., 2014), robust

evidence exists for the positive effects of mindfulness on binge and emotional eating in adults (Godfrey, Gallo, & Afari, 2015; Katterman, Kleinman, Hood, Nackers, & Corsica, 2014) and one schools-based RCT using a brief eating disorder focused MBI found benefits across a wide range of eating disorder risk factors that emerged at 6 months (Atkinson & Wade, 2015, $M_{age}$ 15.7 years). A second possibility for the decreasing impact on weight and shape concerns might be escalating peer pressure that is particularly related to body image at this age (e.g., critical comments or peer teasing about weight, shape and eating), outweighing the weaker protective effect of *Acting with Awareness* and *Decentering and Nonreactivity* compared to *Accepting and Nonjudgemental Orientation.*

Our current findings may also offer an explanation for the null effects we found in a replication study of one schools-based 8-week curriculum (Johnson et al., 2016). In this programme, inquiry (group discussion facilitated by the instructor after the practices) is deliberately brief in scope as a safety measure, given the universal classroom based setting. However, perhaps this eliminated a key benefit of the successful adult MBIs: the continuous, implicit teaching of non-judgement in the more extensive inquiry inherent in these curricula. Further, although all three of the key protective factors were introduced in the curriculum we tested, ideas were generally presented once rather than being interwoven and revisited in a spiral learning fashion. Again, perhaps we have lessons to learn from the original extended format of the adult MBIs where this reinforcement and synergy does occur.

A limitation of this study is the fluctuations over time in some facets of the CHIME-A, especially for three of the weaker predictors of psychopathology (*Openness to Experience*, *Insightful Understanding*, and *Relativity of Thoughts*). This may reflect the variability of adolescent compared to adult measures generally (Stockings et al., 2015; Tsang, Wong, & Lo, 2012) or it may reflect the complexity of the mindfulness construct for early adolescents with some resultant noise in these measures. However, it should be noted that all fluctuations within facets were small (Cohen's $d$ = < .25) and for the facet of most impact that showed variability (*Acting with Awareness*), between-group effect sizes were larger (Cohen's $d$ = 39 - .89) than within-group movement ($d$ = .13-.22). We were unable to comment on the association between mindfulness and wellbeing (both sexes), and weight and shape concerns (boys), due to lack of variation over time to be explained in these variables.

## 6.6 Conclusion

We found a transdiagnostic protective effect in early adolescence for three components of trait mindfulness (*Accepting and Nonjudgemental Orientation*, *Decentering and Nonreactivity*, and *Acting with Awareness*) which strengthens the case for using MBIs as prevention programmes in youth. Isolation of three key elements is an important preliminary step in identifying which active ingredients might be amplified to improve the effectiveness of current adolescent versions of MBIs. Of the three, *Accepting and Nonjudgemental Orientation* should be a prime focus.

References

Alsubaie, M., Abbott, R., Dunn, B., Dickens, C., Keil, T. F., Henley, W., & Kuyken, W. (2017). Mechanisms of action in mindfulness-based cognitive therapy (MBCT) and mindfulness-based stress reduction (MBSR) in people with physical and/or psychological conditions: A systematic review. *Clinical Psychology Review, 55*, 74-91. doi:10.1016/j.cpr.2017.04.008

Atkinson, M., & Wade, T. (2015). Mindfulness-based prevention for eating disorders: A school-based cluster randomised controlled pilot study. *International Journal of Eating Disorders, 48*, 1024-1037. doi:10.1002/eat.22416

Australian Curriculum Assessment and Reporting Authority. (2012). *Guide to understanding ICSEA.* Retrieved from http://www.acara.edu.au/verve/_resources/Guide_to_understanding_2012_ICSEA_values.pdf.

Berg, K., Peterson, C., Frazier, P., & Crow, S. (2012). Psychometric evaluation of the eating disorder examination and eating disorder examination-questionnaire: A systematic review of the literature. *International Journal of Eating Disorders, 45*, 428-438. doi:10.1002/eat.20931

Bergomi, C., Tschacher, W., & Kupper, Z. (2013). Measuring Mindfulness: First Steps Towards the Development of a Comprehensive Mindfulness Scale. *Mindfulness, 4*(1), 18-32. doi:10.1007/s12671-012-0102-9

Bergomi, C., Tschacher, W., & Kupper, Z. (2014). Konstruktion und erste Validierung eines Fragebogens zur umfassenden Erfassung von Achtsamkeit: Das Comprehensive Inventory of Mindfulness Experiences. *Diagnostica, 60*(3), 111-125. doi:10.1026/0012-1924/a000109

Britton, W., Lepp, N., Niles, H., Rocha, T., Fisher, N., & Gold, J. (2014). A randomized controlled pilot trial of classroom-based mindfulness meditation compared to an active control condition in sixth-grade children. *Journal of School Psychology, 52*, 263-278. doi:10.1016/j.jsp.2014.03.002

Chadwick, J., & Gelbar, N. (2016). Mindfulness for children in public schools: Current research and developmental issues to consider. *International Journal of School and Educational Psychology, 4*(2), 106-112. doi:10.1080/21683603.2015.1130583

Ciarrochi, J., Kashdan, T. B., Leeson, P., Heaven, P., & Jordan, C. (2011). On being aware and accepting: A one-year longitudinal study into adolescent well-being. *Journal of Adolescence, 34*(4), 695-703. doi:10.1016/j.adolescence.2010.09.003

Denham, S. A., Wyatt, T. M., Bassett, H. H., Echeverria, D., & Knox, S. S. (2009). Assessing social-emotional development in children from a longitudinal perspective. *Journal of Epidemiology and Community Health, 63*(Suppl 1), i37-i52. doi:10.1136/jech.2007.070797

Egan, S., Wade, T., & Shafran, R. (2011). Perfectionism as a transdiagnostic process: A clinical review. *Clinical Psychology Review, 31*(2), 203-212. doi:10.1016/j.cpr.2010.04.009

Fairburn, C., & Beglin, S. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders, 16*, 363-370. doi:10.1002/1098-108X(199412)16:4<363::AID-EAT2260160405>3.0.CO;2-#

Felver, J. C., & Jennings, P. A. (2016). Applications of Mindfulness-Based Interventions in School Settings: an Introduction. *Mindfulness, 7*(1), 1-4. doi:10.1007/s12671-015-0478-4

Gilbert, P., McEwan, K., Matos, M., & Rivis, A. (2011). Fears of compassion: Development of three self-report measures. *Psychology and Psychotherapy: Theory, Research and Practice, 84*, 239-255. doi:10.1348/147608310X526511

Godfrey, K. M., Gallo, L. C., & Afari, N. (2015). Mindfulness-based interventions for binge eating: a systematic review and meta-analysis. *Journal of Behavioral Medicine, 38*(2), 348-362. doi:10.1007/s10865-014-9610-5

Gotink, R., Chu, P., Busschbach, J., Benson, H., Fricchione, G., & Hunink, M. (2015). Standardised Mindfulness-Based Interventions in Healthcare: An Overview of Systematic Reviews and Meta-Analyses of RCTs. *PLoS One, 10*(4), e0124644. doi:10.1371/journal.pone.0124344

Goyal, M., Singh, S., Sibinga, E., Gould, N., Rowland-Seymour, A., Sharma, R., . . . Haythornthwaite, J. (2014). Meditation Programs for Psychological Stress and Well-being. A Systematic Review and Meta-analysis. *Journal of the American Medical Association: Internal Medicine, 174*(3), 357-368. doi:10.1001/jamainternmed.2013.13018

Gu, J., Strauss, C., Bond, R., & Cavanagh, K. (2015). How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation studies. *Clinical Psychology Review, 37*, 1-12. doi:10.1016/j.cpr.2015.01.006

Jacobi, C., & Fittig, E. (2010). Psychosocial risk factors for eating disorders. In W. Agras (Ed.), *The Oxford Handbook of Eating Disorders* (pp. 123-136). New York: Oxford University Press.

Jacobi, C., Hayward, C., de Zwaan, M., Kraemer, H., & Agras, W. (2004). Coming to Terms With Risk Factors for Eating Disorders: Application of Risk Terminology and Suggestions for a General Taxonomy. *Psychological Bulletin, 130*(1), 19-65. doi:10.1037/0033-2909.130.1.19

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2016). Effectiveness of a school-based mindfulness program for transdiagnostic prevention in young adolescents. *Behaviour Research and Therapy, 81*, 1-11. doi:10.1016/j.brat.2016.03.002

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2017). Development and Validation of a Multifactor Mindfulness Scale in Youth: The Comprehensive Inventory of Mindfulness Experiences-Adolescents (CHIME-A). *Psychological Assessment, 29*(3), 264-281. doi:10.1037/pas0000342

Katterman, S. N., Kleinman, B. M., Hood, M. M., Nackers, L. M., & Corsica, J. A. (2014). Mindfulness meditation as an intervention for binge eating, emotional eating, and weight loss: A systematic review. *Eating Behaviors, 15*(2), 197-204. doi:10.1016/j.eatbeh.2014.01.005

Kelly, A., Carter, J., Zuroff, D., & Borairi, S. (2013). Self-compassion and fear of self-compassion interact to predict response to eating disorders treatment: A preliminary investigation. *Psychotherapy Research, 23*(3), 252-264. doi:10.1080/10503307.2012.717310

Kraemer, H., Wilson, G., Fairburn, C., & Agras, W. (2002). Mediators and moderators of treatment effects in randomized controlled trials. *Archives of General Psychiatry, 59*, 877-883. doi:10.1001/archpsyc.59.10.877

Kuyken, W., Weare, K., Ukoumunne, O., Vicary, R., Motton, N., Burnett, R., . . . Huppert, F. (2013). Effectiveness of the Mindfulness in Schools Programme: non-randomised controlled feasibility study. *British Journal of Psychiatry, 203*, 126-131. doi:10.1192/bjp.bp.113.126649

Longe, O., Maratos, F. A., Gilbert, P., Evans, G., Volker, F., Rockliff, H., & Rippon, G. (2010). Having a word with yourself: Neural correlates of self-criticism and self-reassurance. *NeuroImage, 49*(2), 1849-1856. doi:10.1016/j.neuroimage.2009.09.019

López, A., Sanderman, R., Smink, A., Zhang, Y., van Sonderen, E., Ranchor, A., & Schroevers, M. J. (2015). A Reconsideration of the Self-Compassion Scale's Total

Score: Self-Compassion versus Self-Criticism. *PLoS One, 10*(7), e0132940. doi:10.1371/journal.pone.0132940

Lovibond, S., & Lovibond, P. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Sydney: Psychology Foundation.

Luce, K. H., & Crowther, J. H. (1999). The reliability of the eating disorder examination—Self-report questionnaire version (EDE-Q). *International Journal of Eating Disorders, 25*(3), 349-351. doi:10.1002/(SICI)1098-108X(199904)25:3<349::AID-EAT15>3.0.CO;2-M

Mond, J., Hay, P., Rodgers, B., Owen, C., & Beaumont, P. (2004). Validity of the Eating Disorder Examination Questionnaire (EDE-Q) in screening for eating disorders in community samples. *Behaviour Research and Therapy, 42*, 551-567. doi:10.1016/S0005-7967(03)00161-X

Muris, P., Otgaar, H., & Petrocchi, N. (2016). Protection as the Mirror Image of Psychopathology: Further Critical Notes on the Self-Compassion Scale. *Mindfulness, 7*(3), 787-790. doi:10.1007/s12671-016-0509-9

Muris, P., & Petrocchi, N. (2017). Protection or Vulnerability? A Meta-Analysis of the Relations Between the Positive and Negative Components of Self-Compassion and Psychopathology. *Clinical Psychology & Psychotherapy, 24*(2), 373-383. doi:10.1002/cpp.2005

Raes, F., Griffith, J., van der Gucht, K., & Williams, J. (2014). School-based prevention and Reduction of Depression in Adolescents: A Cluster-Randomized Trial of a Mindfulness Group Program. *Mindfulness, 5*(5), 477-486. doi:10.1007/s12671-013-0202-1

Riediger, M., & Klipker, K. (2014). Emotion Regulation in Adolescence. In J. J. Gross (Ed.), *Handbook of Emotion Regulation* (2nd ed.). New York: Guilford Press.

Royuela-Colomer, E., & Calvete, E. (2016). Mindfulness Facets and Depression in Adolescents: Rumination as a Mediator. *Mindfulness, 7*(5), 1092-1102. doi:10.1007/s12671-016-0547-3

Schaffer, D., & Kipp, K. (2010). *Developmental Psychology. Childhood and Adolescence* (8th ed.). Belmont, CA: Wadsworth Cengage Learning.

Shapiro, S., Lyons, K., Miller, R., Butler, B., Vieten, C., & Zelazo, P. (2015). Contemplation in the Classroom: a New Direction for Improving Childhood Education. *Educational Psychology Review, 27*(1), 1-30. doi:10.1007/s10648-014-9265-3

Stockings, E., Degenhardt, L., Mihalopoulos, C., Lui, A., Hobbs, M. J., & Patton, G. (2015). Symptom screening scales for detecting major depressive disorder in children and adolescents: A systematic review and meta-analysis of reliability, validity and diagnostic utility. *Journal of Affective Disorders, 174*, 447-463. doi:10.1016/j.jad.2014.11.061

Szabo, M. (2010). The short version of the Depression Anxiety Stress Scales (DASS-21): Factor structure in a young adolescent sample. *Journal of Adolescence, 33*, 1-8. doi:10.1016/j.adolescence.2009.05.014

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., . . . Stewart-Brown, S. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. *Health and Quality of Life Outcomes, 5*(63), 1-13. doi:10.1186/1477-7525-5-63

Tsang, K. L. V., Wong, P. Y. H., & Lo, S. K. (2012). Assessing psychosocial well-being of adolescents: a systematic review of measuring instruments. *Child: Care, Health and Development, 38*(5), 629-646. doi:10.1111/j.1365-2214.2011.01355.x

Tully, P. J., Zajac, I. T., & Venning, A. J. (2009). The Structure of Anxiety and Depression in a Normative Sample of Younger and Older Australian Adolescents. *Journal of Abnormal Child Psychology, 37*(5), 717-726. doi:10.1007/s10802-009-9306-4

van der Gucht, K., Takano, K., Raes, F., & Kuppens, P. (2017). Processes of change in a school-based mindfulness programme: cognitive reactivity and self-coldness as mediators. *Cognition and Emotion*, 1-8. doi:10.1080/02699931.2017.1310716

van der Velden, A. M., Kuyken, W., Wattar, U., Crane, C., Pallesen, K. J., Dahlgaard, J., . . . Piet, J. (2015). A systematic review of mechanisms of change in mindfulness-based cognitive therapy in the treatment of recurrent major depressive disorder. *Clinical Psychology Review, 37*, 26-39. doi:10.1016/j.cpr.2015.02.001

Wanden-Berghe, R. G., Sanz-Valero, J., & Wanden-Berghe, C. (2011). The Application of Mindfulness to Eating Disorders Treatment: A Systematic Review. *Eating Disorders, 19*(1), 34-48. doi:10.1080/10640266.2011.533604

Willemsen, J., Markey, S., Declercq, F., & Vanheule, S. (2011). Negative emotionality in a large community sample of adolescents: the factor structure and measurement invariance of the short version of the depression anxiety stress scales (DASS-21). *Stress and Health, 27*(3), e120-e128. doi:10.1002/smi.1342

Zenner, C., Herrnleben-Kurz, S., & Walach, H. (2014). Mindfulness-based interventions in schools—a systematic review and meta-analysis. *Frontiers in Psychology, 5*(603). doi:10.3389/fpsyg.2014.00603

Zoogman, S., Goldberg, S., Hoyt, W., & Miller, L. (2015). Mindfulness Interventions with Youth: A Meta-Analysis. *Mindfulness, 6*, 290-302. doi:10.1007/s12671-013-0260-4

*Figure 6.1* Flow of participants through study

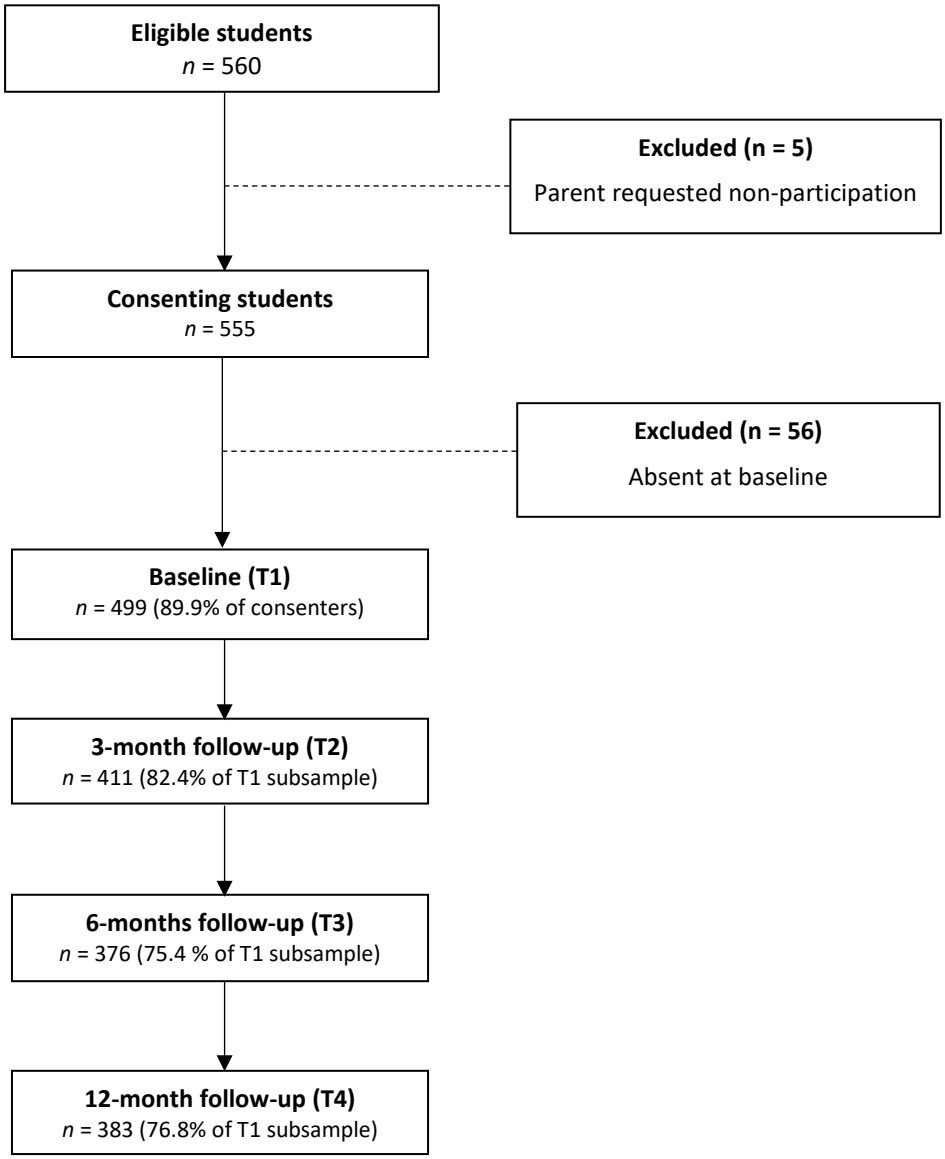

Table 6.1 *Eight factor structure of the Comprehensive Inventory of Mindfulness Experiences*[1]

| Subscale | Content | Cronbach's alpha[2] | Item total correlation range[2] |
|---|---|---|---|
| Awareness of Internal Experiences | Awareness of emotions | .66 | .45-.49 |
| Awareness of External Experiences | Awareness of environment | .74 | .55-.59 |
| Acting with Awareness | Awareness of present moment as opposed to being caught up in thinking about past/future | .66 | .44-.54 |
| Accepting and Nonjudgemental Orientation | Self-kindness/non-judgement with respect to one's mistakes | .75 | .55-.60 |
| Decentering and Nonreactivity | Ability to step back from difficult thoughts and emotions, and not react immediately | .73 | .49-.59 |
| Openness to Experience | Capacity to allow the presence of difficult emotions and thoughts | .65 | .40-.49 |
| Relativity of Thoughts | Recognition of thoughts as transient and subjective | .77 | .55-.63 |
| Insightful Understanding | Recognition that subjective interpretation of situations can create or compound difficulty | .72 | .48-.57 |

*Note*. [1]The adult (Bergomi et al., 2014) and adolescent (Johnson et al., 2016b) versions of the CHIME share the same eight factor structure. [2]Internal consistency scores are for the current study

Table 6.2 *Linear Mixed Model Results: Variability, Variability over Time and with Sex as Predictor*

| Model | A: Variance | B1: Variance explained by time | B2: sex explained variance | |
|---|---|---|---|---|
| Variable | Whole sample (N=499) | | Males (N=269) | Females (N=230) |
| | numerator *df*=1 | numerator *df*=3 | numerator *df*=3 | numerator *df*=3 |
| Mindfulness facets | | | | |
| Awareness of Internal Experiences | 21169.05 (493.7)** | 2.30 (408.3) | | |
| Awareness of External Experiences | 11668.03 (488.8)** | 6.19 (401.9)** | | |
| Acting with Awareness [1] | 8800.35 (483.2)** | 7.10 (401.0)** | 5.42 (221.5)** | 8.23 (181.8)** |
| Accepting and Nonjudgemental Orientation | 8257.45 (490.5)** | 0.01 (419.0) | | |
| Decentering and Nonreactivity | 12303.02 (479.6)** | 0.40 (404.6) | | |
| Openness to Experience [1] | 9780.03 (488.6)** | 0.57 (406.9) | 3.38 (223.9)* | 1.54 (180.8) |
| Relativity of Thoughts | 17966.34 (478.4)** | 3.56 (407.4)* | | |
| Insightful Understanding[1] | 6434.93 (495.6)** | 0.83 (404.9) | 0.94 (219.8) | 4.13 (181.7)** |
| Depression | 6020.97 (494.5)** | 3.40 (1177.5)* | | |
| Anxiety | 3890.49 (492.3)** | 3.87 (1182.8)** | | |
| Shape concerns[1] | 1668.81 (496.4)** | 1.91 (1157.8) | 0.54 (629.9) | 6.78 (529.3)** |
| Weight concerns[1] | 1091.71 (494.0)** | 3.71 (1162.9)** | 0.11 (632.8) | 8.41 (530.0)** |
| Wellbeing | 15256.37 (1,492.7)** | 1.90 (1171.3) | | |

*Note.* * $p < .05$ ** $p < .01$; [1] Testing Model C showed a significant interaction between sex and time

Table 6.3 *Means (SD) for Mindfulness Facets that showed Variability over Time either for whole sample, boys or girls*

| | Time | Whole sample ($N$ = 499) | | | Boys ($N$ = 269) | | | Girls ($N$ = 230) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Predictor (MF facet) | | M (SD) | Effect size (*95% CI*) | | M (SD) | Effect size (*95% CI*) | | M (SD) | Effect size (*95% CI*) | |
| AwEXT | T1 | 3.58 (.89) | T1vT2 | .13* (.002,.25) | | | | | | |
| | T2 | 3.47 (.86) | T1 v T3 | .16* .04,.29 | | | | | | |
| | T3 | 3.43 (.89) | T1 v T4 | .14* .01,.26 | | | | | | |
| | T4 | 3.46 (.85) | T2 v T3 | .05 -.08,.17 | | | | | | |
| | | | T2 v T4 | .01 -.11,.14 | | | | | | |
| | | | T3 v T4 | -.03 -.16,.09 | | | | | | |
| ActAware | T1 | | | | 3.06 (.83) | T1vT2 | .07 -.10,.24 | 2.98 (.87) | T1vT2 | .21* .03,.40 |
| | T2 | | | | 3.00 (.79) | T1 v T3 | -.14 -.31,.03 | 2.80 (.82) | T1 v T3 | .18* .001,.37 |
| | T3 | | | | 3.17 (.79) | T1 v T4 | -.02 -.19,.14 | 2.82 (.87) | T1 v T4 | .10 -.08,.29 |
| | T4 | | | | 3.08 (.79) | T2 v T3 | -.22* -.38,-.05 | 2.89 (.86) | T2 v T3 | -.02 -.21,.16 |
| | | | | | | T2 v T4 | -.10 -.27,.07 | | T2 v T4 | -.11 -.29,.08 |
| | | | | | | T3 v T4 | .11 -.06,.28 | | T3 v T4 | -.08 -.26,.10 |
| Openness | T1 | | | | 2.68 (.76) | T1vT2 | -.13 -.30,.04 | | | |
| | T2 | | | | 2.78 (.75) | T1 v T3 | -.25* -.42,-.08 | | | |
| | T3 | | | | 2.87 (.78) | T1 v T4 | -.10 -.27,.07 | | | |
| | T4 | | | | 2.76 (.81) | T2 v T3 | -.12 -.29,.05 | | | |
| | | | | | | T2 v T4 | .03 -.14,.19 | | | |
| | | | | | | T3 v T4 | .14 -.03,.31 | | | |
| Relativity | T1 | 3.67 (.77) | T1vT2 | .11 -.02,.23 | | | | | | |
| | T2 | 3.59 (.73) | T1 v T3 | .14* .02,.27 | | | | | | |
| | T3 | 3.56 (.75) | T1 v T4 | .07 -.06,.19 | | | | | | |
| | T4 | 3.62 (.73) | T2 v T3 | .04 -.08,.16 | | | | | | |
| | | | T2 v T4 | -.04 -.17,.08 | | | | | | |
| | | | T3 v T4 | -.08 -.21,.04 | | | | | | |
| Insight | T1 | | | | | | | 2.69 (.85) | T1vT2 | -.01 -.19,.17 |
| | T2 | | | | | | | 2.70 (.85) | T1 v T3 | .21* .03,.40 |
| | T3 | | | | | | | 2.51 (.84) | T1 v T4 | .07 -.11,.25 |
| | T4 | | | | | | | 2.63 (.87) | T2 v T3 | .22* .04,.41 |
| | | | | | | | | | T2 v T4 | .08 -.10,.26 |
| | | | | | | | | | T3 v T4 | -.14 -.32, .04 |

*Note.* * $p < .05$ ** $p < .01$; CHIME-A facets: Aware EXT = Awareness of External Experiences; Act Aware = Acting with Awareness; Openness = Openness to Experience; Relativity = Relativity of Thoughts; Insight = Insightful Understanding.

Table 6.4 *Linear Mixed Model Results for Mindfulness as a Predictor*

| Outcome variable | Predictor (MF facet) | Time | Group (High/Low MF facet) | Time*Group |
|---|---|---|---|---|
| Depression | | | | |
| Whole sample | AwINT | $F(3,392.4) = 3.31$* | $F(1,486.5) = 0.17$ | $F(3,392.4) = 0.84$ |
| ($N = 499$) | AwEXT | $F(3,393.9) = 2.70$* | $F(1,487.2) = 0.31$ | $F(3,393.9) = 1.34$ |
| | ACTAware | $F(3,396.1) = 3.01$* | $F(1,491.6) = 61.58$** | $F(3,396.1) = 3.23$* |
| | ANJ | $F(3,392.1) = 2.47$ | $F(1,486.1) = 118.54$** | $F(3,392.1) = 6.50$** |
| | DNR | $F(3,396.8) = 2.78$* | $F(1.494.9) = 56.52$** | $F(3,396.8) = 2.03$ |
| | Openness | $F(3,394.78) = 3.11$* | $F(1.488.02) = 6.86$** | $F(3,394.78) = 1.81$ |
| | Relativity | $F(3,393.62) = 3.00$* | $F(1,488.9) = 13.10$** | $F(3,393.6) = 0.67$ |
| | Insight | $F(3,393.6) = 3.33$* | $F(1,483.2) = 22.0$** | $F(3,393.6) = 2.82$* |
| Anxiety | | | | |
| Whole sample | AwINT | $F(3,401.5) = 3.50$* | $F(1,482.5) = 1.42$ | $F(3,401.5) = 1.06$ |
| ($N = 499$) | AwEXT | $F(3,402.7) = 4.22$** | $F(1,482.2) = 3.80$* | $F(3,402.7) = 1.33$ |
| | ACTAware | $F(3,406.6) = 3.72$** | $F(1,487.0) = 67.3$** | $F(3,406.6) = 3.81$** |
| | ANJ | $F(3,402.5) = 2.93$* | $F(1,483.7) = 74.05$** | $F(3,402.5) = 4.01$** |
| | DNR | $F(3,406.8) = 4.00$** | $F(1,489.4) = 25.00$** | $F(3,406.8) = 0.68$ |
| | Openness | $F(3,404.0) = 3.96$** | $F(1,484.1) = 14.46$** | $F(3,404.0) = 0.86$ |
| | Relativity | $F(3,403.2) = 3.70$** | $F(1,484.5) = 5.54$* | $F(3,403.2) = 0.33$ |
| | Insight | $F(3,403.0) = 3.96$** | $F(1,481.6) = 10.0$** | $F(3,403.0) = 0.59$ |
| Shape concerns | | | | |
| Females | AwINT | $F(3,176.57) = 5.38$** | $F(1,223.75) = 0.07$ | $F(3,176.57) = 1.68$ |
| ($N = 230$) | AwEXT | $F(3,176.90) = 5.86$** | $F(1,224.40) = 4.17$* | $F(3,176.90) = 0.43$ |
| | ACTAware | $F(3,177.25) = 5.46$** | $F(1,225.16) = 5.66$* | $F(3,177.25) = 1.02$ |
| | ANJ | $F(3,174.88) = 4.94$** | $F(1,224.23) = 36.66$** | $F(3,174.88) = 2.43$ |
| | DNR | $F(3,176.88) = 5.26$** | $F(1,226.57) = 22.81$** | $F(3,176.88) = 2.51$ |
| | Openness | $F(3,176.71) = 6.17$** | $F(1,224.34) = 0.19$ | $F(3,176.71) = 1.09$ |
| | Relativity | $F(3,176.49) = 5.75$** | $F(1,225.49) = 3.55$ | $F(3,176.49) = 1.07$ |
| | Insight | $F(3,176.19) = 6.25$** | $F(1,224.51) = 7.18$** | $F(3,176.19) = 2.70$* |
| Weight concerns | | | | |
| Females | AwINT | $F(3,173.90) = 6.12$** | $F(1,223.68) = 0.06$ | $F(3,173.90) = 1.36$ |
| ($N = 230$) | AwEXT | $F(3,174.33) = 6.39$** | $F(1,224.38) = 4.93$* | $F(3,174.33) = 0.28$ |
| | ACTAware | $F(3,175.53) = 6.09$** | $F(1,225.63) = 7.39$** | $F(3,175.53) = 0.77$ |
| | ANJ | $F(3,172.62) = 5.29$** | $F(1,225.66) = 33.23$** | $F(3,172.62) = 1.64$ |
| | DNR | $F(3,175.71) = 5.54$** | $F(1,226.65) = 20.89$** | $F(3,175.71) = 2.74$* |
| | Openness | $F(3,174.17) = 6.49$** | $F(1,224.23) = 0.64$ | $F(3,174.17) = 0.39$ |
| | Relativity | $F(3,173.87) = 6.07$** | $F(1,225.28) = 3.62$ | $F(3,173.87) = 0.42$ |
| | Insight | $F(3,174.08) = 6.13$** | $F(1,224.58) = 6.06$* | $F(3,174.08) = 1.41$ |

*Note.* * $p < .05$ ** $p < .01$; Mindfulness = Comprehensive Inventory of Mindfulness Experiences -Adolescents (CHIME-A) 8 facets: Aware INT = Awareness of Internal Experiences; Aware EXT = Awareness of External Experiences; Act Aware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental Orientation; DNR = Decentering and Nonreactivity; Openness = Openness to Experience; Relativity = Relativity of Thoughts; Insight = Insightful Understanding.

Table 6.5 *Means (SD) for Depression, Anxiety, Weight Concerns and Shape Concerns where Baseline Level of Mindfulness had a Main Effect of Group or Interaction*

| | | Whole sample models ($N$ = 499) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | DV | Depression | | | | | Anxiety | | | | |
| Predictor (MF facet) | | Baseline M *(SD)* | 3 months | 6 months | 12 months | Within Group ES T1 vs T4 *95% CI* | Baseline M *(SE)* | 3 months | 6 months | 12 months | Within Group ES T1 vs T4 *95% CI* |
| AwEXT | Low $N$ =295 | | | | | | .81 *(.60)* | .82 *(.64)* | .77 *(.58)* | .85 *(.60)* | -.07 *(-.23,.09)* |
| | High $N$ =204 | | | | | | .91 *(.62)* | .93 *(.55)* | .87 *(.65)* | .89 *(.65)* | .03 *(-.16,.23)* |
| Between Group ES *95% CI* | | | | | | | -.16 *(-.34,.01)* | -.18**(-.36,.003)* | -.16 *(-.34,.01)* | -.06 *(-.24,.11)* | |
| ACTAware | Low $N$ =202 | 1.09 *(.82)* | 1.06 *(.83)* | .92 *(.76)* | .97 *(.76)* | .15 (*-.04,.35)* | 1.14 *(.69)* | 1.10 *(.68)* | 1.00 *(.67)* | 1.03 *(.68)* | .16 *(-.03,.36)* |
| | High $N$ =297 | .52 *(.48)* | .57 *(.55)* | .62 *(.67)* | .70 *(.69)* | -.30**(-.46,-.14)* | .66 *(.46)* | .72 *(.51)* | .68 *(.53)* | .76 *(.56)* | -.20**(-.36,-.03)* |
| Between Group ES *95% CI* | | .89**(.70,1.08)* | .72* (.54,.91) | .42* (.24,.60) | .38* (*.20,.56*) | | .85* (.66,1.04) | .65* (*.47,.83*) | .54* (*.36,.72*) | .44* (*.26,.62*) | |
| ANJ | Low $N$ =188 | 1.21 *(.77)* | 1.13 *(.80)* | 1.05 *(.77)* | 1.06 *(.78)* | .19 (*-.01,.40*) | 1.16 (*.65)* | 1.14 *(.66)* | 1.07 *(.65)* | 1.0 1*(.62)* | *.24** (*.03,.44*) |
| | High $N$ =311 | .46 *(.46)* | .54 *(.55)* | .56 *(.62)* | .67 *(.66)* | -.37*(*-.53,-.21*) | .66 *(.50)* | .71 *(.51)* | .66 *(.54)* | .78 *(.61)* | -.22*(*-.37,-.06*) |
| Between Group ES *95% CI* | | 1.26*(*1.06,1.46*) | .90*(.71,1.09) | .72* (.53,.91) | .55* (*.37,.74*) | | .89* *(.70,1.08*) | .75* (*.57,.94*) | .70* (*.52,.89*) | .37* (*.19,.56*) | |
| DNR | Low $N$ =170 | 1.06 *(.81)* | 1.12 *(.82)* | .95 *(.75)* | 1.01*(.77)* | .06 (*-.15,.28*) | 1.01 *(.67)* | 1.08 *(.69)* | .98 *(.64)* | .99 *(.64)* | .03 (*-.18,.24*) |
| | High $N$ =329 | .59 *(.57)* | .58 *(.57)* | .64 *(.68)* | .72 *(.69)* | -.21*(*-.36,-.05*) | .76 *(.56)* | .76 *(.53)* | .72 *(.58)* | .81 *(.61)* | -.09 (*-.24,.07*) |
| Between Group ES *95% CI* | | .71* (*.52,.90*) | .81*(*.62,1.00*) | .44* (*.25,.63*) | .40* (*.22,.59*) | | .42* (*.23,.60*) | .54* (*.35,.73*) | .43* (*.25,.62*) | .29* (*.10,.48*) | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Openness | Low *N* =246 | .83 *(.72)* | .79 *(.71)* | .78 *(.73)* | .90 *(.75)* | -.10 (*-.27,.08*) | .95 *(.64)* | .93 *(.60)* | .87 *(.60)* | .95 *(.62)* | 0 (*-.18,.18*) |
| | High *N* =253 | .67 *(.67)* | .73 *(.71)* | .70 *(.72)* | .72 *(.70)* | -.07 (*-.25,.10*) | .75 *(.56)* | .80 *(.61)* | .75 *(.62)* | .78 *(.61)* | -.05 (*-.23,.12*) |
| Between Group ES *95% CI* | | .23* (*.05,.41*) | .08 (*-.09,.26*) | .11 (*-.07,.29*) | .25* (*.07,.42*) | | .33* (*.16,.51*) | .21* (*.04,.39*) | .20* (*.02,.37*) | .28* (*.10,.45*) | |
| Relativity | Low *N* =283 | .85 *(.75)* | .85 *(.73)* | .79 *(.73)* | .86 *(.72)* | -.01 (*-.18,.15*) | .89 *(.63)* | .92 *(.62)* | .86 *(.63)* | .91 *(.62)* | -.03 (*-.20,.13*) |
| | High *N* =216 | .61 *(.60)* | .65 *(.67)* | .69 *(.71)* | .74 *(.74)* | *-.19** (*-.38,-.004*) | .79 *(.58)* | .80 *(.59)* | .75 *(.58)* | .80 *(.62)* | -.02 (-.21,.17) |
| Between Group ES *95% CI* | | .35* (*.17,.53*) | .28* (*.11,.46*) | .14 (*-.04,.32*) | .16 (*-.01,.34*) | | .16 (*-.01,.34*) | .20* (*.02,.38*) | .18* (*.003,.36*) | .18 (*0.0,.35*) | |
| Insight | Low *N* =276 | .90 *(.75)* | .89 *(.75)* | .85 *(.75)* | .90 *(.77)* | 0 (*-.17,.17*) | .92 *(.63)* | .95 *(.64)* | .90 *(.64)* | .92 *(.64)* | 0 (*-.17,.17*) |
| | High *N* =223 | .56 *(.58)* | .61 *(.63)* | .62 *(.67)* | .70 *(.66)* | -.23*(*-.41,-.04*) | .76 *(.58)* | .76 *(.55)* | .71 *(.56)* | .81 *(.60)* | -.08 (*-.27,.10*) |
| Between Group ES *95% CI* | | .50* (*.32,.68*) | .40* (*.22,.58*) | .32* (*.14,.50*) | .28* (*.10,.45*) | | .26* (*.09,.44*) | .32* (*.14,.49*) | .31* (*.14,.49*) | .18 (*-.001,.35*) | |

Female models (*N* = 230)

| | DV | Weight concerns | | | | | Shape concerns | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Predictor (MF facet) | | Baseline M *(SD)* | 3 months | 6 months | 12 months | Within Group ES T1 vs T4 *95% CI* | Baseline M *(SD)* | 3 months | 6 months | 12 months | Within Group ES T1 vs T4 *95% CI* |
| AwEXT | Low *N* =128 | 2.34 *(1.59)* | 2.74 *(1.74)* | 2.64 *(1.56)* | 2.65 *(1.62)* | -.19 (*-.44,.05*) | 2.14 *(1.14)* | 2.46 *(1.29)* | 2.46 *(1.19)* | 2.45 *(1.20)* | -.26*(*-.51,-.02*) |
| | High *N* =102 | 1.91 *(1.58)* | 2.08 *(1.47)* | 2.27 *(1.79)* | 2.33 *(1.70)* | -.26 (*-.53,.02*) | 1.89 *(1.15)* | 1.98 *(1.10)* | 2.13 *(1.27)* | 2.13 *(1.23)* | -.20 (*-.48,.07*) |
| Between Group ES *95% CI* | | .27* (*.01,.53*) | .41* (*.14,.67*) | .22 (*-.04,.48*) | .19 (*-.07,.45*) | | .22 (*-.04,.48*) | .40* (*.13,.66*) | .27* (*.01,.53*) | .26* (*.003,.53*) | |
| ACTAware | Low *N* =99 | 2.51 *(1.74)* | 2.79 *(1.79)* | 2.87 *(1.73)* | 2.64 *(1.69)* | -.08 (*-.35,.20*) | 2.31 *(1.23)* | 2.49 *(1.29)* | 2.58 *(1.25)* | 2.37 *(1.23)* | -.05 (*-.33,.23*) |
| | High *N* =131 | 1.89 *(1.44)* | 2.22 *(1.52)* | 2.17 *(1.57)* | 2.40 *(1.64)* | -.33*(*-.57,-.09*) | 1.82 *(1.04)* | 2.09 *(1.17)* | 2.11 *(1.19)* | 2.25 *(1.22)* | -.38*(*-.62,-.14*) |
| Between Group ES *95% CI* | | .39* (*.13,.66*) | .35* (*.08,.61*) | *.43** (*.16,.69*) | .14 (*-.12,.41*) | | .44* (*.17,.70*) | .33* (*.06,.59*) | .39* (*.12,.65*) | .10 (*-.16,.36*) | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ANJ | Low *N* =91 | 2.96 *(1.54)* | 3.29 *(1.63)* | 3.16 *(1.61)* | 2.95 *(1.71)* | .01 (*-.28,.30*) | 2.66 *(1.05)* | 2.93 *(1.13)* | 2.83 *(1.15)* | 2.65 *(1.19)* | .01 (*-.28,.30*) |
| | High *N* =139 | *1.62 (1.41)* | 1.88 *(1.42)* | 2.06 *(1.57)* | 2.24 *(1.58)* | -.41* (*-.65,-.18*) | 1.62 *(1.02)* | 1.79 *(1.08)* | 2.00 *(1.18)* | 2.09 *(1.20)* | -.42*(*-.66,-.18*) |
| Between Group ES *95% CI* | | .92* (*.64,1.19*) | .94*(*.66,1.21*) | .69* (*.42,.97*) | .43* (*.17, .70*) | | 1.01*(*.73,1.29*) | 1.04* (*.76,1.32*) | .71* (*.44,.98*) | .47* (.20,.74) | |
| DNR | Low *N* =93 | 2.70 *(1.54)* | 3.12 *(1.60)* | 3.02 *(1.67)* | 2.73 *(1.59)* | -.02 (*-.31,.27)* | 2.46 *(1.08)* | 2.78 *(1.16)* | 2.73 *(1.17)* | 2.53 *(1.17)* | -.06 (*-.35,.23*) |
| | High *N* =137 | 1.79 *(1.54)* | 2.01 *(1.55)* | 2.12 *(1.59)* | 2.37 *(1.70)* | *-.36*(*-.60,-.12)* | 1.74 *(1.11)* | 1.90 *(1.15)* | 2.04 *(1.20)* | 2.17 *(1.24)* | -.37*(-.60,-.13) |
| Between Group ES *95% CI* | | .59* (*.32,.86*) | .71* (.44,.98) | .55* (.29,.82) | .22 (-.04,.48) | | .66* (.39,.93) | .76* (.49,1.03) | .58* (.31,.85) | .30* (.03,.56) | |
| Insight | Low *N* =135 | 1.80 *(1.67)* | 2.00 *(1.68)* | 2.07 *(1.76)* | 2.03 *(1.81)* | -.13 *(-.37,.11*) | 1.79 *(1.25)* | 1.90 *(1.34)* | 1.94 *(1.37)* | 1.92 *(1.38)* | -.10 (*-.34,.14*) |
| | High *N* =95 | 1.47 *(1.50)* | 1.43 *(1.51)* | 1.47 *(1.48)* | 1.64 *(1.54)* | -.11 (*-.40,.17*) | 1.39 *(1.15)* | 1.39 *(1.18)* | 1.44 *(1.20)* | 1.59 *(1.24)* | -.17 (*-.45,.12*) |
| Between Group ES *95% CI* | | .21 (*-.06,.47*) | .35* (*.09,.62*) | .36* (*.10,.63*) | .23 (*-.03,.49*) | | .33* (*.07,.59*) | .40* (*.13,.66*) | .38* (*.12,.65*) | .25 (-.01,.51) | |

*Note.* * $p < .05$ ** $p < .01$; ; ES = Effect size (Cohen's d). Mindfulness = Comprehensive Inventory of Mindfulness Experiences -Adolescents (CHIME-A) facets: (Awareness of Internal Experiences does not appear in this table as there was no main effect of group nor interaction for this facet); Aware EXT = Awareness of External Experiences; Act Aware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental Orientation; DNR = Decentering and Nonreactivity; Openness = Openness to Experience; Relativity = Relativity of Thoughts; Insight = Insightful Understanding

# Chapter 7 :

# Differential impact of an 8-week mindfulness programme in schools for younger versus older adolescents: a pilot study

This study will be submitted for publication following collection and analysis of 6-month follow-up data

**Candidate's contribution:**
CJ designed the study, trained in and delivered the intervention, and collected data. Analysis and manuscript prepared under supervision of Wade.
Research design 100%; Data collection 100%; Analysis 90%; Writing and editing 90%.

## 7.1 Abstract

Currently it is unclear how adult MBIs should be modified for youth, and at what ages programmes should be implemented for optimal impact. Recent non-replication with a 9-week programme in early adolescence suggested abbreviated programme content might be insufficient and/or that this age group are less receptive. This pilot study tested a more intensive 8-week programme (meditation, inquiry and session duration) across three adolescent age bands for feasibility and acceptability. Within this format there were no adverse effects, students rated the lessons as agreeable, and school staff deemed content developmentally appropriate across ages. For a small conscript sample ($N$ = 90) of Year 8 ($M_{age}$ = 13.39; $SD$ = 0.34) and Year 10 ($M_{age}$ = 15.45; $SD$ = 0.37) students, improvements in depression approached significance with a small to medium effect size (Cohen's $d$ = .35; 95% CI -0.07 - 0.76), but there were no effects on anxiety, weight/shape concerns, mindfulness or wellbeing at post-intervention. Increased difficulty with timetabling and greater resistance by mid adolescents was countered by potentially greater impact on key protective aspects of mindfulness, however, this needs further investigation in a larger sample together with follow-up. Large effect sizes ($d$ >.1.16) on depression, wellbeing and mindfulness in a small group ($N$ = 6) of volunteer Year 11 students ($M_{age}$ = 16.37; $SD$ = .41) also requires larger scale replication.

## 7.2 Introduction

Mindfulness based interventions (MBIs) in schools offer the tantalising possibility of improved attention, emotional and behavioural regulation with positive flow-on benefits impacting academic and life trajectories (Davidson et al., 2012; Zelazo & Lyons, 2012). However, it remains unclear how the successful adult MBIs should be modified and at what ages programmes should be implemented for optimal impact. There is preliminary evidence for benefits in primary school (Felver, Celis-deHoyos, Tezanos, & Singh, 2016), where programmes tend to focus more on sensory observation and games (e.g., Semple, Lee, Rosa, & Miller, 2010). However, the increased cognitive capacity of adolescents (Cook-Cottone, 2017, p. 94; Williamson, Modecki, & Guerra, 2015) allows MBIs that also include more conceptual mindfulness skills.

In mainstream secondary schools, only four studies have utilised rigorous testing in large randomised controlled trials (RCTs) with follow-up (Atkinson & Wade, 2015; Johnson, Burke, Brinkman, & Wade, 2016, 2017a; Raes, Griffith, van der Gucht, & Williams, 2014). Of these, only the two trials by Johnson and colleagues have been conducted independently of programme developers, testing the *.b*: *Mindfulness in Schools* curriculum, obtaining null results across a wide range of transdiagnostic outcome measures and potential mediators (anxiety, depression, wellbeing, weight/shape concerns, self-compassion, emotional regulation, mindfulness) in a broad band of socioeconomic demographics (combined $N$ = 865). Two hypotheses for the non-replication of improvements in depression, stress and wellbeing from an earlier large controlled trial using this curriculum (Kuyken et al., 2013) exist: first, that the programme content or format is insufficient to gain traction in youth in real world settings, or second, that the age group ($M$age = 13.54 years) tested may have been too young for a conceptually based MBI.

Traditional adult MBIs consist of a single module of delivery comprising 8 weekly sessions (2-2.5 hours) with 40 minutes of daily home practice and a full day silent retreat. Investigative post practice discussion ("inquiry") is also considered an essential ingredient (Crane et al., 2016), where the facilitator repeatedly demonstrates a kind, curious and accepting way of relating to experience and to oneself (Segal, Williams, & Teasdale, 2013, p. 253). For example, a participant might describe how they were unable to keep their mind from wandering during a meditation. A natural reaction might be to instantly judge oneself as "no good at this". Instead, the facilitator models an alternative attitude with gentle questioning *"Ah, your mind wandered – anyone else? Isn't it interesting the way our minds*

*work below the surface! What happened next?"* In this way the participant learns to be cultivate curiosity, bare observation (rather than instant judgement) and openness/acceptance to "the way things are right now" (McCown et al., page 127)

Modifications for adolescent MBIs typically include shortened session length and meditation duration together with elimination of the day long retreat (Zoogman, Goldberg, Hoyt, & Miller, 2015), with little detail reported regarding the degree of inquiry across youth curricula. The *.b* curriculum adopts the principle of caution during discussion of meditation experience, as a way of being careful not to reveal the "soft underbelly of the pupil" in a classroom setting. Suggested examples of responses to student experience are simply "*thank you*" or "*good noticing*". While the teacher manual suggests linking comments to concise teaching points (e.g., "I got bored" – *notice how we often don't want to be where we are*) this may require more skill than a briefly trained classroom teacher possesses and is also constrained by the relatively short sessions (a single lesson, e.g. 40 - 60 minutes). Conversely, the *Mindfulness Training for Teens* school curriculum, run by an experienced external facilitator with sessions approaching adult length (100 minutes; Raes et al., 2014) retains inquiry together with longer in-class meditations, and perhaps this is necessary to foster experiential "mind-shift" that lasts. Longer weekly sessions (2 hours) have been successfully used with clinical adolescents ($M_{age}$ 15.4 years, range 14-18; Biegel, Brown, Shapiro, & Schubert, 2009) although it is not clear how extensive their inquiry component was. Retaining inquiry together with longer sessions may therefore be one way to successfully increase "dose" in single module school-based MBIs where home practice compliance can be low (Johnson et al., 2016, 2017a). However, given the increased difficulty in accommodating longer weekly sessions in school curricula, especially for senior students, it is important to demonstrate the value of this approach. Therefore, the first aim of this study was to test whether the *Mindfulness Training for Teens* curriculum, more closely modelled on adult programmes (session duration, inquiry), was feasible, acceptable, safe and effective in Australian secondary schools when delivered independent of programme developers.

Although intervening in early adolescence has been proposed to capitalize on abstract reasoning before the escalating stressors of mid-late adolescence (Kuyken et al., 2013), null results with early adolescents ($M_{age}$ = 13.54 years; Johnson et al., 2016, 2017a) raise the possibility that conceptually based MBIs may be more effective for older adolescents, such as those who showed benefit in similar studies (Atkinson & Wade, 2015, $M_{age}$ = 15.7; Kuyken et al., 2013, $M_{age}$ = 14.8; Raes et al., 2014 $M_{age}$ = 15.4). Testing this hypothesis directly would guide optimal age for implementation in schools. Therefore the second aim of this

study was to compare the effects of the intervention across two age bands, Year 8 and Year 10 (first and third year of secondary school). For age as a moderator, we hypothesized that the older age group would show more improvement in outcome measures.

Little is known about the natural course of mindfulness over the lifespan (Baer, 2016, personal communication) or indeed, during the period of childhood neurocognitive maturation. It is therefore possible that various elements of mindfulness might develop at different rates during maturation, with the potential to target key components in age specific MBIs to improve effectiveness. A newly developed adolescent multifactor mindfulness measure (Johnson, Burke, Brinkman, & Wade, 2017b) was used to track the natural emergence of different aspects of this construct in young adolescents over 12 months together with their predictive effect on psychopathology ($N$ = 499; Baseline $M_{age}$ 13.45 years; $SD$ = .33; Johnson & Wade, *in press*). While mindfulness aspects remained relatively stable during this timeframe, three predictors of psychological health emerged; *Accepting and Nonjudgemental Orientation; Decentering and Nonreactivity, and Present Moment Awareness,* with the first especially notable. The third aim of this study was to add to nascent developmental models of mindfulness by measuring baseline levels of different facets of mindfulness in Year 8 versus Year 10 for cross-sectional comparison. We made no predictions for this novel investigation, but were particularly interested in differences for the three facets of mindfulness that have shown a protective effect.

## 7.3 Method

### 7.3.1 Participants

Three of five invited coeducational schools participated. The schools represented a broad range of socioeconomic (SES) according to the Index of Community Socio-Educational Advantage (ICSEA) whereby 1000 represents the mean, with a standard deviation of 100 (Australian Curriculum Assessment and Reporting Authority, 2012). Schools ranged from 949 to 1133 ($M$ = 1049.33, $SD$ 93.1) and were classified for this study as low SES (within one SD below the mean, public, School A), medium SES (within one SD above the mean, private, School B), or high SES (greater than one SD above the mean, private, School C). Schools A and B each provided a pair of Year 8 and of Year 10 (first and third year) students. School C could not accommodate the required double lesson into the Year 10 curriculum, but agreed to offer an after school option for volunteer senior students (Years 11 and 12; final two years of secondary school). Power analysis showed that to detect

a Cohen's *d* effect size of .30 (Kuyken et al., 2013; Raes et al., 2014), with a power level of .80, 107 participants per group (total $N = 360$) were required (Hedeker, Gibbons, & Waternaux, 1999), therefore we were underpowered to detect significant changes.

### 7.3.2 Design

There were insufficient volunteers in the senior group in School C to include a control group; these students were retained in the study as a separate sample to assess feasibility and acceptance, and report within-group effects. For Schools A and B a cluster (class based) randomised controlled design was used. Assignment to mindfulness or control was performed using the randomisation function in Excel 2010, and undertaken by the principal investigator prior to any contact with participating teachers. However, for one Year 10 pair of classes (School B), group allocation was based on timetable availability (i.e., by chance and not a self-selected group).

### 7.3.3 Procedure

Research approval was granted by the School Principals, the South Australian Department for Education and Child Development, and the Social and Behavioural Research Ethics Committee of Flinders University. Opt-out consent was approved. Testing was performed in a classroom setting with the principal investigator and teacher present. It was not possible for students or the researcher to be blind to the allocated treatment group.

### 7.3.4 Intervention

The *Mindfulness Training for Teens* curriculum (Dewulf, 2013) developed for adolescents aged 13 – 18 was used. This manualised programme, recently translated into English (Dewulf, 2017), consists of 8 weekly lessons. Lesson format is closely modelled on adult Mindfulness Based Stress Reduction (MBSR; Kabat-Zinn, 1990) and Mindfulness Based Cognitive Therapy (MBCT; Segal et al., 2013), with each session commencing with guided sitting or lying meditations (10 to 20 minutes) followed by group inquiry (discussion of experiences and facilitator guided interpretation) and interactive presentations on mindfulness concepts. From Lesson 2, students are invited to ring a bell at random intervals during the lesson to instigate a STOP practice (pausing, switching attention to the breath, and tuning in with one's present moment experience with an attitude of friendly acceptance) led by the facilitator and later by students in order to make this technique very familiar. The use

of short anchoring practices might be considered the "spine" of MBIs, used as a first step in dealing with difficult situations or feelings (Segal et al., 2013, p. 383).

Classes in our trial were delivered in a carpeted room away from normal classrooms, with soft lighting and scented candles to create a different and special atmosphere compared to normal lessons (Bluth et al., 2016). Students were seated in a circle to improve engagement, and given name tags for more personalised and inclusive discussions. Lesson length in a previous RCT testing this curriculum (Raes et al., 2014) was 100 minutes, which we shortened to 90 minutes to suit Australian school timetables inclusive of a 10-minute mid-lesson break. Key elements to retain in the shorter lessons were discussed with the programme developer prior to trial commencement. Given the extended nature of the meditations and inquiry with a conscript young audience, self-care instructions were added in our first lesson (options to seek help if distressing emotions arose). At the start of each meditation, students were also given the option of tuning out and taking a rest, or raising their hand if they wanted to leave the room with the school counsellor who attended each session together with the class teacher. Due to a number of students with known trauma backgrounds at School A, a discussion and meditation in the final lesson on forgiveness was modified after consultation with the school counsellor, following recent recommendations by Burrows (2017). Students were given a handout each week summarising the lesson and with instructions for formal and informal home practices, supported by a range of meditation audiofiles that they could download from the school intranet. Students were encouraged to undertake this extra practice to maximise brain change but home practice was not assessable. A midweek email was sent to class teachers with an invitation to read this to students to reiterate key points and as a reminder of home practices.

All mindfulness lessons were conducted by the first author (CJ), a mindfulness facilitator with over ten years of personal practice, training as an adult MBSR facilitator and prior experience teaching mindfulness in schools. The facilitator had one skype session with the course developer before commencing the study, and the opportunity to email questions prior to and during the course. The control groups undertook normal lessons (i.e., English, Christian Studies, Health/Physical Education or extended home group).

### 7.3.5 Primary outcome measures

***Negative affect.*** Negative affect was measured using the Depression and Anxiety subscales of the Depression, Anxiety and Stress Scale – Short form (DASS-21; Lovibond & Lovibond, 1995). The 7-item anxiety and depression factors show good fit in non-clinical

adolescents (Szabo, 2010; Tully, Zajac, & Venning, 2009; Willemsen, Markey, Declercq, & Vanheule, 2011). Each item is scored on a 4-point scale from 0 *"never"* to 3 *"almost always"*, with higher scores reflecting higher depression or anxiety over the past week. Cronbach's alpha in this study for depression was .88 (item-total correlations ranged from .40-.75) and for anxiety was .81 (.20-.69).

Given previous null results with adolescents raising concern over floor effects using DASS-21, we added an alternative measure for anxiety and for depression to check sensitivity. The 7-item Generalised Anxiety Disorder Scale (GAD-7) has demonstrated good psychometric properties (Spitzer, Kroenke, Williams, & Löwe, 2006) and is recommended for use from age 12 (Quittner et al., 2014). Items are scored on a 4-point scale from 0 *"not at all"* to 3 *"nearly every day"*, with higher scores reflecting higher anxiety over the past fortnight. Internal consistency in the current study was α =.92 with item-total correlations ranging from .65-.84. Additionally, we used the 20-item Center for Epidemiological Studies Depression Scale for Children (CES-DC) which shows good reliability and validity in adolescents (Fendrich, Weissman, & Warner, 1990; Radloff, 1991) and is scored on a 4-point scale from 0 *"not at all"* to 3 *"a lot"*; higher scores reflect higher depression over the past week. Cronbach's alpha for our study was α =.93 (item-totals .22-.84)

***Weight and Shape Concerns.*** The weight and shape subscales of the Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 1994), were used, which correlate well with the interview format which itself has excellent psychometric properties (Berg, Peterson, Frazier, & Crow, 2012; Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beaumont, 2004). These 12 items use a 7-point rating scale ranging from 0 *"not at all"* to 6 *"markedly"*. Questions relate to the last 28 days and higher scores indicate greater concerns. Internal consistency of the combined score in this study was α = .97 with item-total correlations ranging from .74-.88.

***Wellbeing.*** We used the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS), which has been validated in both university student and community adult populations (Tennant et al., 2007). This 14-item scale surveys the last two weeks; items are rated on a 5-point scale from 1 "*none of the time*" to 5 "*all of the time*", with higher scores signifying higher wellbeing. Internal consistency in the current study was α =.93 with item-total correlations ranging from .36-.82.

### 7.3.6 Secondary outcome measures

***Mindfulness.*** Aspects of mindfulness were measured using the multifactor Comprehensive Inventory of Mindfulness Experiences – Adolescents (CHIME-A). This 25-item scale has been validated for young adolescents from 13 years (Johnson et al., 2017b) and supports eight individual factors but not an overall total score. The questionnaire uses a 5-point rating scale ranging from 1 "*never true*" to 5 "*always true*" to survey the last two weeks. For each factor, a higher score indicates greater mindfulness. Internal consistency across the eight factors in the current study was as follows: *Awareness of Internal Experiences* (Cronbach's alpha = .63; item total correlation range = .38 - .51); *Awareness of External Experiences* (.76; .57 - .62); *Acting with Awareness* (.70; .49 - .54), *Accepting and Nonjudgemental Orientation* (.73; .44 - .63); *Decentering and Nonreactivity* (.70; .48 - .56); *Openness to Experience* (.65; .38 - .60); *Relativity* (.58; .34 - .42), and *Insight* (.72; .48 - .62).

***Fidelity and competence check.*** Audio recordings of lessons, labelled by Year level and by School (A-C) were randomly selected and reviewed by the programme developer such that each lesson was reviewed once. We used a marking rubric based on the adult Mindfulness Based Interventions Teaching Assessment Criteria (MBI-TAC, Crane et al., 2012) which assess a combination of adherence and competence across six domains. These guidelines were modified slightly to reflect the classroom environment and assess age appropriate delivery. For each lesson, a score out of six was given for each MBI-TAC domain, which were averaged into an overall score.

***Homework Practice.*** At post-intervention, students were asked *"During the mindfulness course, how often did you practice each of the following techniques outside of lessons?* Students were supplied with a range of techniques offered during the mindfulness course and asked to rate each on a 5-point scale as follows: 1 *"never",* 2 *"once or twice in total",* 3 *"greater than twice in total but less than once a week",* 4 *"once or twice each week"* to 5 *"three times or more each week".*

***Course acceptability measures.*** Participants in the mindfulness intervention groups undertook a survey in the last lesson of the course rating the following four questions on a 0-10 point Likert scale with higher scores indicating greater satisfaction/likelihood: *"How would you rate the course in terms of being enjoyable and interesting?", "How much do you think you have learnt during the course?", "In the future, how likely are you to use any of the techniques you have learnt?" and "How would you rate the instructor?".*

***Teacher feedback.*** In the last lesson, teachers and school counsellors who attended the mindfulness intervention classes were asked *Do you think this was a good age to deliver this course? Why or why not?*

### 7.3.7 Statistical analysis

All analyses were performed using IBM Statistical Package for the Social Sciences, Version 22 (IBM SPSS). Outcome measures were assessed for normality. Logistic regression analysis was conducted for the post-intervention data to test if any baseline outcome variable predicted absence. The primary analysis was conducted using ANCOVA, with baseline measures entered as covariates, followed by Year level as a moderator. After testing for whether data were missing at random, missing values were estimated via multiple imputation using Bayesian analysis. All available variables were included in the models and five data sets were imputed (see Enders, 2010; Rubin, 1987; Schafer, 1997 for review). The amount of home practice during the course was investigated as a moderator of outcome at T2 for the mindfulness group, using hierarchical multiple regression and controlling for baseline at Step 1, with the overall mean frequency of homework practices during the relevant period entered in Step 2.

## 7.4 Results

### 7.4.1 Description of participants

**Figure 7.1** shows the flow of participants through the RCT component of the study (Schools A and B). Three Year 10 students at School B opted out of this research project at T1, citing concern over missing an English lesson despite make-up classes being offered. Due to a changeover of semester timetables, only 22.6% of students from School A were present for post-intervention data collection. Data from this school could not be considered missing at random, thus only the sample from School B ($N = 90$) were included in quantitative analysis. Mean age of the remaining sample was 14.28 ($SD = 1.08$; range 12.86 – 16.11) of whom 52.2% were female. For the Year 8 subgroup, the breakdown was as follows: $M_{age} = 13.39$; $SD = 0.34$; 51.0% female, and for Year 10 students: $M_{age} = 15.45$; $SD = 0.37$; 53.8% female.

The small uncontrolled group of volunteer senior students (School C) are shown separately in **Figure 7.2**. After two lessons, all Year 12 students ($N = 11$) opted out of the study at this school, citing academic demands, however all Year 11 students continued ($N = 6$). Mean age of this remaining sample was 16.37 ($SD = .41$; range 15.93 – 16.97) of whom

66.7% were female. Student and staff feedback are included in the qualitative results, but descriptive statistics and within-group effect sizes are presented separately for this small sample.

### 7.4.2 Preliminary analysis

Data for depression, anxiety, and weight/shape concerns across all schools were positively skewed and transformed to achieve acceptable parameters for normality. After transformation there were between one and four outliers at baseline for the following variables: mindfulness (facets of *Acting with Awareness* and *Relativity*) and depression (CES-DC). These were retained in the analyses. Failure to complete post-intervention assessment at School B was not significantly related to any of our outcome variables at baseline.

### 7.4.3 Fidelity and competence

With one audio recording selected for each lesson by the curriculum developer, average lesson rating was in the "proficient" band (5.2/6, range 4.7 – 5.5). A comment was given that meditations were sometimes shorter and generally included less silence than in the original programme. For School B, of the 33 students (80.4%) who returned feedback forms in the last lesson, mean student ratings for the instructor were 8.91 (median 9; range 7-10). There were no differences in mean scores between Year 8 and Year 10 students, $t(31) = 0.73$, $p = .47$).

### 7.4.4 Baseline levels of mindfulness by age group

**Table 7.1** shows descriptive statistics for the eight facets of mindfulness in Year 8 versus Year 10 (School A and B). The senior sample at School C was not included due to self-selected bias. *Accepting and Nonjudgemental Orientation* was lower (worse) in Year 10s, with a small to medium effect size (Cohen's $d = .37$). *Openness to Experience* approached significance such that scores were higher in Year 10s with a similar effect size ($d = .34$).

### 7.4.5 Repeated measures analysis

Descriptive statistics for School B are shown in **Table 7.2**, with ANCOVA results in **Table 7.3**. Controlling for baseline, there were no significant differences between the mindfulness and control groups at post-intervention. However, the improvement in depression (DASS-21) approached significance with a small to moderate effect size ($d = .35$).

### 7.4.6 Moderation analyses

The addition of GAD and CES-DC as potentially more sensitive measures to detect change did not yield different results, so these were not used in moderation analyses for Year level (Year 8 versus Year 10). The analyses showed no significant differences (**Table 7.4)**. Given that we were strongly underpowered in this pilot study, and more so with subgroup analysis ($N$ = 16-26 versus required $N$ = 107 per group), the following trends are worthy of mention: for Year 10 only, small to moderate effect sizes were seen in three aspects of mindfulness: *Insight (*$d$ = .37), *Accepting and Nonjudgemental Orientation* ($d$ = .45) and *Decentering and Nonreactivity* ($d$ = .33).

### 7.4.7 Home practice

At post-intervention in School B, student subsamples of Year 8 and Year 10 that responded to these questions were small, but we report these results as a first step to inform implementation. Averaged across practices, only 27.1% of students in the mindfulness group undertook home practice once a week or more (**Table 7.5)**, comparable with our two previous school-based adolescent trials (Johnson et al., 2016, 2017a) and not differing between Year levels. However, a larger percentage of students in Year 8 regularly undertook brief informal practices whereas a greater number of Year 10 students listened to audiofiles, although these between group differences were not significant (attention to everyday activities $\chi^2(1) = .54$, $p = .26$, $\varphi = .20$; STOP/breath practices $\chi^2(1) = .05$, $p = .83$, $\varphi = .11$; listening to audiofiles $\chi^2(1) = .64$, $p = .42$, $\varphi = .23$) possibly reflecting small subgroup numbers. Problems with the school information technology system meant that the 24 audiofiles to support home practice were not uploaded onto the school's intranet before Lesson 2 of the programme. Despite multiple reminders and instructions, 66.7% of Year 8 and 18.2% of Year 10 students did not download the audiofiles; of these 50% across both groups cited technological issues while 50% were not interested. The amount of homework did not explain any significant variance in primary outcome variables (**Table 7.5**), also comparable with our previous mindfulness trials.

### 7.4.8 Descriptive statistics: School A volunteer students ($N$ = 6)

Descriptive statistics for this small sample are shown in **Table 7.6,** demonstrating very large within group effect sizes. All six students downloaded the home practice audiofiles, and five (83.3%) listened to the meditations. Descriptively, mean frequency averaged across home practices was higher than for the younger conscript groups ($M$ = 3.61; $SD$ = .90) but more similar across types of practice (Attention to everyday activities $M$ =

3.83; *SD* = .75; STOP/breath practices *M* = 3.83; *SD* = .98; listening to audiofiles *M* = 3.17; *SD* = .1.47). Percentage undertaking home practice once a week or more was much higher than the conscript groups: Attention to everyday activities, 66.7%; STOP/breath practices 50.0%; Listening to audiofiles 50.0%; average across practices 55.57%.

### 7.4.9 Qualitative Feedback

***Students.*** Of the 33 students (80.4%) at School B who returned feedback forms in the last lesson, mean ratings of the course were as follows: enjoyment and interest 6.92 (median 7; range 3-10), amount learnt 6.88 (median 7; range 4-10), and likelihood of using techniques in the future 6.59 (median 7; range 3-9) comparable to those reported in similar universal trials of mindfulness in secondary schools (Johnson et al., 2016, 2017a; Kuyken et al., 2013). T-tests showed no differences in these scores between Year 8 and Year 10 (enjoyment/interest, $t(31) = 0.04$, $p = .97$; amount learnt, $t(31) = -0.07$, $p = .94$; likely future use $t(31) = 0.36$, $p = .72$). All 6 volunteer students at School A returned feedback forms, with descriptively higher mean ratings as follows: enjoyment and interest 9.43 (median 9; range 9-10), amount learnt 8.43 (median 9; range 6-10), and likelihood of using techniques in the future 9.29 (median 10; range 8-10).

At School A, one Year 10 student, identified by his classroom teacher with pre-existing difficulties, was offered a choice whether to attend and discontinued after the first session. Three students reported anxiety or embarrassment at closing their eyes during practices. At School B, one Year 10 student decided to see the school counsellor after discussions on emotions and forgiveness raised her distress levels, but chose to continue attending mindfulness lessons. At School C, one Year 11 student undergoing significant external stress reported the course as enjoyable and beneficial for her.

***Teachers.*** Qualitative reports from school staff include all three schools. Classroom teachers and school counsellors reported all year levels (Year 8, 10 and 11) as appropriate for this curriculum. Year 8 staff believed their students were capable of understanding the ideas and practices, and one Year 8 teacher felt it was an age where boys especially needed to develop some behavioural regulation strategies. Another Year 8 teacher felt that splitting the extended lesson into two shorter lessons per week would help reinforce learning. Although Year 10 staff described this as “a perfect age” due to students’ ability to think in abstract terms, sustain attention and with more motivation due to increasing pressures, the only staff member (counsellor at School A) who attended lessons for both Year levels noted higher resistance from Year 10s. For the volunteer group of Year 11 students, staff commented on

the high level of motivation and engagement, reflecting their choice to be involved. This extended to these students choosing to attend school the day after exams had finished to complete the course.

***Facilitator.*** The facilitator also noticed greater resistance to the programme by Year 10 students, especially but not exclusively at School A (low SES). Across the three age groups, the only lesson modification required for younger students was giving more instructions before meditations and framing this as a challenge (e.g., *"Do you think it will be hard to stay still for 20 minutes? What might distract you? How could you manage this?"*), shortening some sitting meditations from 20 to 10 minutes if the group was restless, and giving more instructions compared to longer stretches of silence for senior students.

## 7.5 Discussion

This study tested an 8-week mindfulness programme closely modelled on adult MBI content and format for feasibility, acceptability and effectiveness across three adolescent age bands (Year 8, 10 and 11/12) in Australian secondary schools. This format was harder to accommodate within school timetables compared to a single lesson weekly format, and more so as age increased. An after school format for volunteer senior students in their penultimate year was acceptable. Across all year levels, lesson content was rated as agreeable to students, and deemed age appropriate by attending school staff, although more resistance was observed for Year 10 students. Within a format where classroom teacher and school counsellor were present, and students had the option of tuning out, there were no adverse effects despite longer meditations and more inquiry. Levels of compliance with invitational home practice were similarly low across Year 8 and Year 10 conscript groups (< 28.5% undertook home practice once a week or more) comparable with our two previous school-based adolescent trials with Year 8 (26.3%, Johnson et al., 2016; 24.4%, Johnson et al., 2017a). However, for the self-selected senior group, levels of home practice were much higher (more than 50% of these students undertook self-directed practice at least once a week).

For the underpowered quantitative component of the trial (combined Year 8 and 10 in one school), there were no differences between the mindfulness and control groups for any of our outcome variables at post-intervention. However, we note that the improvements in depression approached significance with a small to medium effect size ($d$ = .35), comparable with a previous study using the same measure with the same curriculum ($d$ = .32, $N$ = 408, Raes et al., 2014). It was also larger than our previous trials with the *.b* curriculum using this

same measure ($d \leq .18$, Johnson et al. 2016, Johnson et al., 2017a). There was a suggestion that our improvement in depression did not differ across age, however moderator groups were very small, limiting power to make conclusions.

At baseline, different aspects of mindfulness were compared for Year 8 versus Year 10 students to inform our understanding of the developmental emergence of this construct, with *Accepting and Nonjudgemental Orientation* lower (worse) in Year 10s ($d = .37$), suggestive of a natural decline. Within our small moderator subsamples, three aspects of mindfulness showed trends towards improvement post-intervention in the Year 10 sample only: *Accepting and Nonjudgemental Orientation*, *Decentering and Non-reactivity* and *Insight*, although confidence intervals were very wide. However, it is interesting to note that the former two aspects match significant predictors of transdiagnostic mental health in young adolescents (Johnson and Wade, *in press*). If these intervention effects can be demonstrated in a fully powered study, and tracked to see their effect over time on measures of psychological health, this curriculum shows promise in maintaining natural protective buffers for mental health. It remains to be seen whether this suggestion of increased traction in purported mediators in mid adolescence justifies accommodating MBIs later in school curricula.

Despite low power, an alternative explanation for the non-significant results is that 8-week single module MBIs for conscript adolescents – even with longer sessions and more detailed inquiry – are not sufficient to effect change. Booster sessions, regular brief classroom practices and/or multiple spiral learning modules across year levels may be indicated. However, these involve large scale commitments from schools, and are harder to test in RCT format with follow-up. Hence, continued evaluation of discreet programmes within well-designed trials is still indicated at this stage, especially given the large number of programmes continuing to use this format.

For the small sample of volunteer Year 11 students, effect sizes were very large ($d > 1.15$) for depression and wellbeing together with the majority of mindfulness facets. One explanation is that older age groups may respond more effectively to a single module MBI. Alternatively, we note that baseline levels of depression on DASS-21 ($M = 1.29$, $SD = .89$) were elevated in these volunteer students compared to School B's conscript sample ($M = .82$; $SD = .71$). Thus, improvements might reflect the higher response rates to MBIs in clinical samples of youth (Zoogman et al., 2015) such as those shown by Biegel et al. (2009; depression $d = .95$). Another possibility with a self-selected sample is the effect of "treatment confidence" where individuals engage and do better when receiving an intervention of choice

(e.g., Kwan, Dimidjian, & Rizvi, 2010). Related to this, more motivation for home practice (rates were double that of the younger conscript students) with a subsequent impact on dose of mindfulness may explain these high within-group effect sizes. Regardless, these promising preliminary results require replication in larger samples. It may also be useful to test self-selected groups across age bands: although this moves away from the universal approach, choosing to attend a meditation group may avoid the stigma of targeted programmes.

Poor engagement with students from low SES schools in two earlier studies (Johnson et al., 2016, 2017a) was improved by moving out of usual classrooms (Bluth et al., 2016) to an alternative, carpeted room with a "special" atmosphere (soft lighting and a scented candle). Better relationships were also fostered in this trial through seating students in a circle for direct eye contact, together with individual name tags. School staff suggested that two shorter sessions per week may further assist with attention span and more frequent reinforcement of mindfulness ideas.

Two major limitations of this preliminary study are the small sample size, and the large dropout rate of the low SES school at T2 reducing the generalisability of the results. Follow-up is indicated given the broadening of effect over time demonstrated with school interventions (Atkinson & Wade, 2015; Kuyken et al., 2013; Nehmy & Wade, 2015; van de Weijer-Bergsma, Langenberg, Brandsma, Oort, & Bogels, 2014).

## 7.6 Conclusion

A mindfulness programme closely modelled on adult MBI format in terms of content and session duration was feasible, acceptable and safe across three age bands in secondary school. For a small conscript sample ($N = 90$) of Year 8 and Year 10 students, improvements in depression approached significance with a small to medium effect size but there were no effects on anxiety, weight/shape concerns, mindfulness or wellbeing at post-intervention. Increased difficulty with timetabling and greater resistance by mid adolescents was countered by a potentially greater impact on key protective aspects of mindfulness, however, moderator groups were very small. Large effect sizes on depression, wellbeing and mindfulness in a very small group ($N = 6$) of volunteer Year 11 students also requires larger scale replication.

# References

Atkinson, M., & Wade, T. (2015). Mindfulness-based prevention for eating disorders: A school-based cluster randomised controlled pilot study. *International Journal of Eating Disorders, 48*, 1024-1037. doi:10.1002/eat.22416

Australian Curriculum Assessment and Reporting Authority. (2012). *Guide to understanding ICSEA.* Retrieved from http://www.acara.edu.au/verve/_resources/Guide_to_understanding_2012_ICSEA_values.pdf.

Berg, K., Peterson, C., Frazier, P., & Crow, S. (2012). Psychometric evaluation of the eating disorder examination and eating disorder examination-questionnaire: A systematic review of the literature. *International Journal of Eating Disorders, 45*, 428-438. doi:10.1002/eat.20931

Biegel, G. M., Brown, K. W., Shapiro, S. L., & Schubert, C. M. (2009). Mindfulness-Based Stress Reduction for the Treatment of Adolescent Psychiatric Outpatients: A Randomized Clinical Trial. *Journal of Consulting & Clinical Psychology, 77*(5), 855-866. doi:10.1037/a0016241

Bluth, K., Campo, R., Pruteanu-Malinici, S., Reams, A., Mullarkey, M., & Broderick, P. (2016). A School-Based Mindfulness Pilot Study for Ethnically Diverse At-Risk Adolescents. *Mindfulness, 7*(71), 90-104. doi:10.1007/s12671-014-0376-1

Burrows, L. (2017). "I feel proud we are moving forward": safeguarding mindfulness for vulnerable student and teacher wellbeing in a community college. *The Journal of Adult Protection, 19*(1), 33-46. doi:10.1108/JAP-08-2016-0015

Cook-Cottone, C. (2017). *Mindfulness and Yoga in Schools. A Guide for Teachers and Practitioners*. New York: Springer.

Crane, R., Soulsby, J., Kuyken, W., Williams, J., Eames, C., Bartley, T., . . . Silverton, S. (2012). The Bangor, Exeter and Oxford Mindfulness-Based Interventions Teaching Assessment Criteria. Bangor: Bangor University.

Davidson, R., Dunne, J., Eccles, J. S., Engle, A., Greenberg, M., Jennings, P., . . . Vago, D. (2012). Contemplative Practices and Mental Training: Prospects for American Education. *Child Development Perspectives, 6*(2), 146-153. doi:10.1111/j.1750-8606.2012.00240.x

Dewulf, D. (2013). *Mindfulnesstraining voor jongeren: Stappenplan voor hulpverleners.* Houten, the Netherlands: Lannoo.

Dewulf, D. (2017). *Mindfulness Training for Teens. Roadmap for Healthcare Professionals*. Advance copy of English translation from Author.

Enders, C. K. (2010). *Applied missing data analysis*. New York: Guilford Press.

Fairburn, C., & Beglin, S. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders, 16*, 363-370. doi:10.1002/1098-108X(199412)16:4<363::AID-EAT2260160405>3.0.CO;2-#

Felver, J. C., Celis-de Hoyos, C. E., Tezanos, K., & Singh, N. N. (2016). A Systematic Review of Mindfulness-Based Interventions for Youth in School Settings. *Mindfulness, 7*(1), 34-45. doi:10.1007/s12671-015-0389-4

Fendrich, M., Weissman, M., & Warner, V. (1990). Screening for depressive disorder in children and adolescents – validating the center for epidemiologic studies depression scale for children. *American Journal of Epidemiology, 131*, 538-551. doi:10.1093/oxfordjournals.aje.a115529

Hedeker, D., Gibbons, R., & Waternaux, C. (1999). Sample Size Estimation for Longitudinal Design With Attrition: Comparing Time-related Contrasts Between Two Groups. *Journal of Educational and Behavioral Statistics, 24*(1), 70-93. doi:10.3102/10769986024001070

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2016). Effectiveness of a school-based mindfulness program for transdiagnostic prevention in young adolescents. *Behaviour Research and Therapy, 81*, 1-11. doi:10.1016/j.brat.2016.03.002

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2017a). A randomized controlled evaluation of a secondary school mindfulness program for early adolescents: Do we have the recipe right yet? *Behaviour Research and Therapy, 99*, 37-46. doi:10.1016/j.brat.2017.09.001

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2017b). Development and Validation of a Multifactor Mindfulness Scale in Youth: The Comprehensive Inventory of Mindfulness Experiences-Adolescents (CHIME-A). *Psychological Assessment, 29*(3), 264-281. doi:10.1037/pas0000342

Johnson, C., & Wade, T. *(in press,* accepted 20.8.17). Which aspects of mindfulness are important to include in adolescent interventions? *Early Interventions in Psychiatry*. doi:10.1111/eip.12490

Kabat-Zinn, J. (1990). *Full Catastrophe Living*. New York: Dell.

Kuyken, W., Weare, K., Ukoumunne, O., Vicary, R., Motton, N., Burnett, R., . . . Huppert, F. (2013). Effectiveness of the Mindfulness in Schools Programme: non-randomised

controlled feasibility study. *British Journal of Psychiatry, 203*, 126-131. doi:10.1192/bjp.bp.113.126649

Kwan, B. M., Dimidjian, S., & Rizvi, S. L. (2010). Treatment Preference, Engagement, and Clinical Improvement in Pharmacotherapy versus Psychotherapy for Depression. *Behaviour Research and Therapy, 48*(8), 799-804. doi:10.1016/j.brat.2010.04.003

Lovibond, S., & Lovibond, P. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Sydney: Psychology Foundation.

Luce, K. H., & Crowther, J. H. (1999). The reliability of the eating disorder examination—Self-report questionnaire version (EDE-Q). *International Journal of Eating Disorders, 25*(3), 349-351. doi:10.1002/(SICI)1098-108X(199904)25:3<349::AID-EAT15>3.0.CO;2-M

Mond, J., Hay, P., Rodgers, B., Owen, C., & Beaumont, P. (2004). Validity of the Eating Disorder Examination Questionnaire (EDE-Q) in screening for eating disorders in community samples. *Behaviour Research and Therapy, 42*, 551-567. doi:10.1016/S0005-7967(03)00161-X

Nehmy, T. J., & Wade, T. D. (2015). Reducing the onset of negative affect in adolescents: Evaluation of a perfectionism program in a universal prevention setting. *Behaviour Research and Therapy, 67*, 55-63. doi:10.1016/j.brat.2015.02.007

Quittner, A., Goldbeck, L., Abbott, J., Duff, A., Lambrecht, P., Sole, A., . . . Barker, D. (2014). Prevalence of depression and anxiety in patients with cystic fibrosis and parent caregivers: Results of The International Depression Epidemiological Study across nine countries. *Thorax, 69*, 1090–1097. doi:10.1136/thoraxjnl-2014-205983

Radloff, L. (1991). The use of the Center for Epidemiologic Studies Depression Scale in adolescents and young adults. *Journal of Youth and Adolescence, 20*, 149-166. doi:10.1007/BF01537606

Raes, F., Griffith, J., van der Gucht, K., & Williams, J. (2014). School-based prevention and Reduction of Depression in Adolescents: A Cluster-Randomized Trial of a Mindfulness Group Program. *Mindfulness, 5*(5), 477-486. doi:10.1007/s12671-013-0202-1

Rubin, D. B. (1987). *Multiple imputation for nonresponse in surveys*. New York: John Wiley & Sons.

Schafer, J. L. (1997). *Analysis of incomplete multivariate data*. London: Chapman & Hall.

Segal, Z., Williams, J., & Teasdale, J. (2013). *Mindfulness-based Cognitive Therapy for Depression* (2nd ed.). New York NY: Guilford Press.

Semple, R., Lee, J., Rosa, D. P., & Miller, L. (2010). A Randomized Trial of Mindfulness-Based Cognitive Therapy for Children: Promoting Mindful Attention to Enhance Social-Emotional Resiliency in Children. *Journal of Child and Family Studies, 19*, 218–229. doi:10.1007/s10826-009-9301-y

Spitzer, R. L., Kroenke, K., Williams, J. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The gad-7. *Archives of Internal Medicine, 166*(10), 1092-1097. doi:10.1001/archinte.166.10.1092

Szabo, M. (2010). The short version of the Depression Anxiety Stress Scales (DASS-21): Factor structure in a young adolescent sample. *Journal of Adolescence, 33*, 1-8. doi:10.1016/j.adolescence.2009.05.014

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., . . . Stewart-Brown, S. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. *Health and Quality of Life Outcomes, 5*(63), 1-13. doi:10.1186/1477-7525-5-63

Tully, P. J., Zajac, I. T., & Venning, A. J. (2009). The Structure of Anxiety and Depression in a Normative Sample of Younger and Older Australian Adolescents. *Journal of Abnormal Child Psychology, 37*(5), 717-726. doi:10.1007/s10802-009-9306-4

van de Weijer-Bergsma, E., Langenberg, G., Brandsma, R., Oort, F., & Bogels, S. (2014). The Effectiveness of a School-Based Mindfulness Training as a program to Prevent Stress in Elementary School Children. *Mindfulness, 5*(3), 238-248. doi:10.1007/s12671-012-0171-9

Willemsen, J., Markey, S., Declercq, F., & Vanheule, S. (2011). Negative emotionality in a large community sample of adolescents: the factor structure and measurement invariance of the short version of the depression anxiety stress scales (DASS-21). *Stress and Health, 27*(3), e120-e128. doi:10.1002/smi.1342

Williamson, A., Modecki, K., & Guerra, N. (2015). SEL Programs in high School. In J. A. Durlak, C. Domitrovich, R. P. Weissberg, & J. Gullotta (Eds.), *Handbook of Socioemotional Research and Practice*. New York: Guilford.

Zelazo, P. D., & Lyons, K. E. (2012). The Potential Benefits of Mindfulness Training in Early Childhood: A Developmental Social Cognitive Neuroscience Perspective. *Child Development Perspectives, 6*(2), 154-160. doi:10.1111/j.1750-8606.2012.00241.x

Zoogman, S., Goldberg, S., Hoyt, W., & Miller, L. (2015). Mindfulness Interventions with Youth: A Meta-Analysis. *Mindfulness, 6*, 290-302. doi:10.1007/s12671-013-0260-4

*Figure 7.1* Flow of participants through study (RCT component)

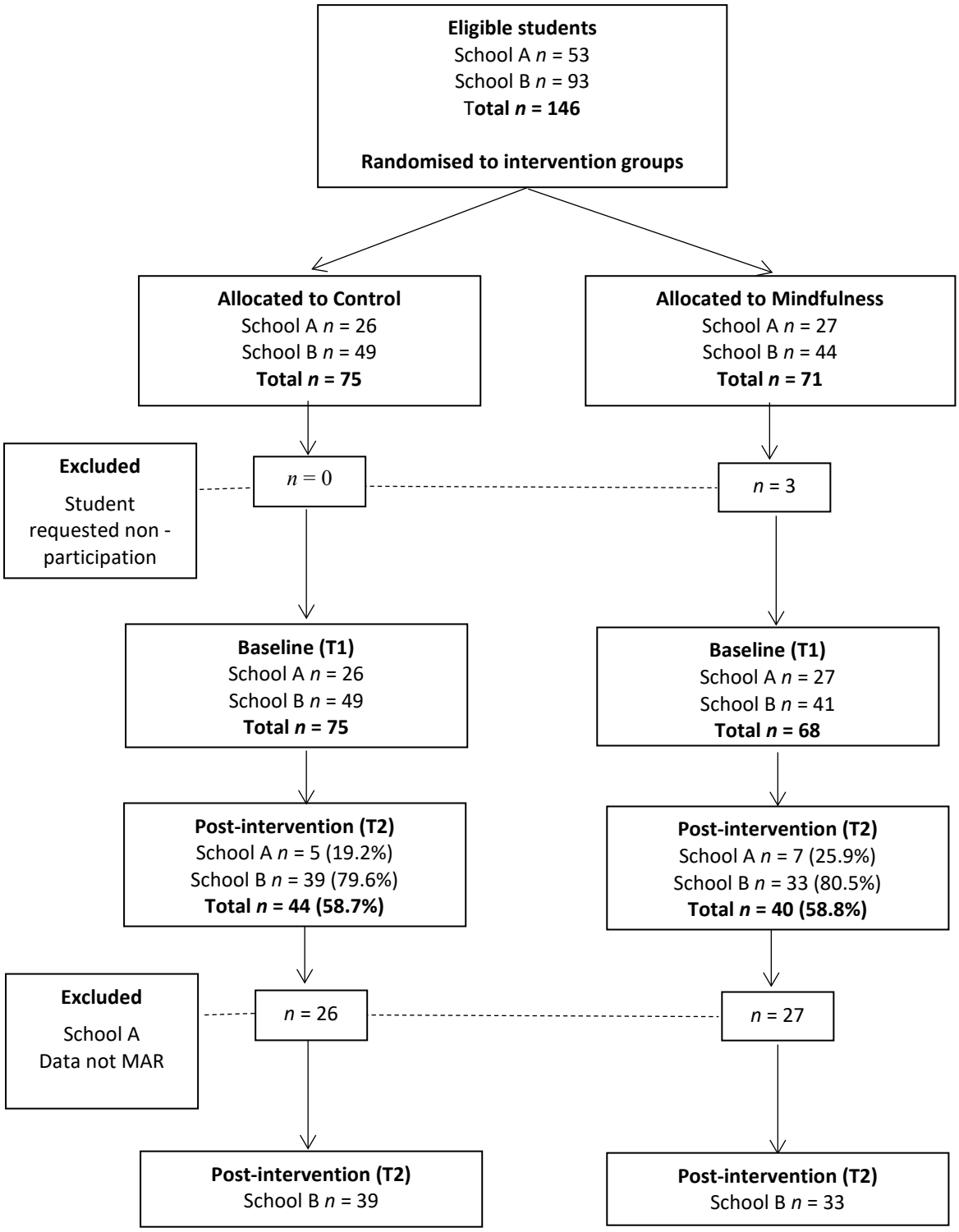

*Figure 7.2* Flow of participants through study (Self-selected sample)

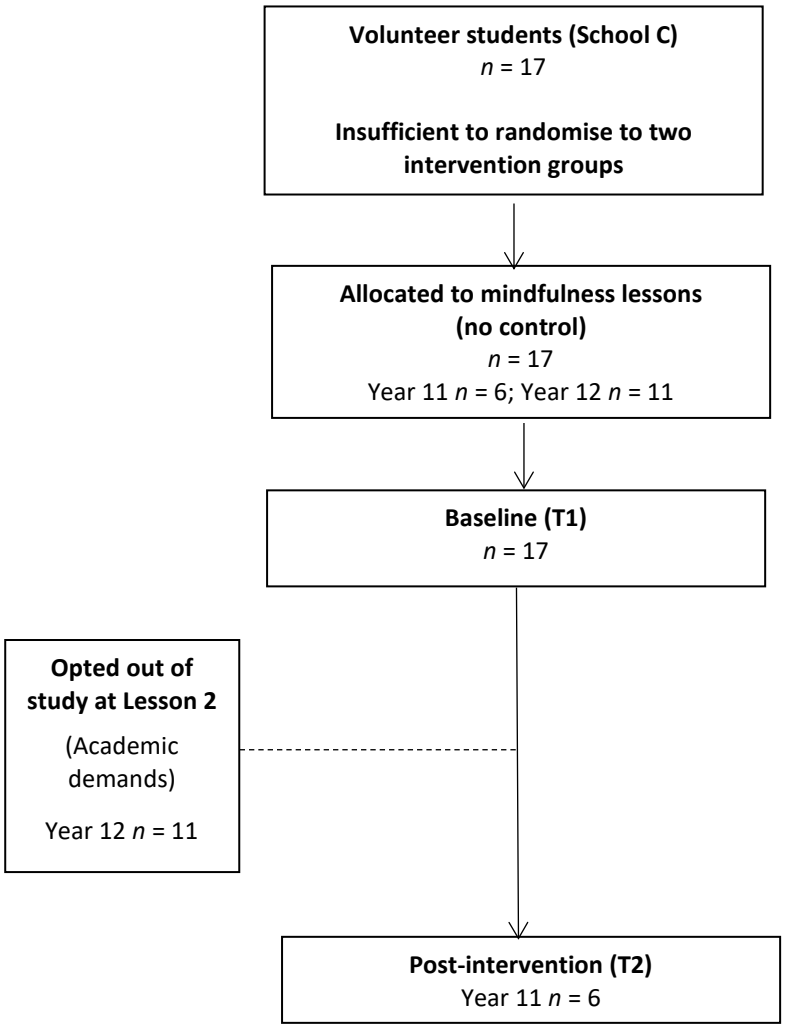

Table 7.1 *Baseline levels of mindfulness in Year 8 versus Year 10 students (Schools A and B, N = 135)*

| | | Y8 (*N* = 75) | | Y10 (*N* = 60) | | | |
|---|---|---|---|---|---|---|---|
| | | Mean | *SD* | Mean | *SD* | Between group ES | *95% CI* |
| Mindfulness facet | Aware INT | 3.56 | *.76* | 3.63 | *.64* | -0.10 | -0.44, 0.24 |
| | Aware EXT | 3.67 | *.92* | 3.45 | *.96* | 0.23 | -0.11, 0.58 |
| | Act Aware | 2.80 | *.86* | 2.72 | *.90* | 0.09 | -0.25, 0.43 |
| | Accept/NJ | 2.98 | *.83* | 2.66 | *.91* | 0.37 | **0.03, .71** |
| | Decenter/NR | 3.09 | *.70* | 3.02 | *.79* | 0.09 | -0.25, 0.43 |
| | Openness | 2.44 | *.74* | 2.69 | *.75* | -0.34 | -0.68, 0.01 |
| | Relativity | 3.60 | *.61* | 3.63 | *.63* | -0.05 | -0.39, .29 |
| | Insight | 2.90 | *.88* | 2.69 | *.90* | 0.24 | -0.10, .58 |

*Note.* Mindfulness = Comprehensive Inventory of Mindfulness Experiences -Adolescents (CHIME-A); where abbreviated: Aware INT = Awareness of Internal Experiences; Aware EXT = Awareness of External Experiences; Act Aware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental Orientation; DecNR = Decentering and Nonreactivity.

Table 7.2 *Descriptive Statistics and for Mindfulness and Control groups at Baseline and Post-Intervention*

| | | | | Control | | Mindfulness | |
|---|---|---|---|---|---|---|---|
| | | Cronbach α<br>*r* item-total | | Mean | *SD* | Mean | *SD* |
| Depression | DASS-21 | .87 (.35-.76) | T1 | 0.82 | *0.71* | 0.58 | *0.53* |
| | | | T2 | 0.82 | *0.75* | 0.53 | *0.59* |
| | CES-DC | .94 (.27-.82) | T1 | 1.00 | *0.69* | 0.81 | *0.56* |
| | | | T2 | 1.00 | *0.75* | 0.77 | *0.48* |
| Anxiety | DASS-21 | .84 (.27-.74) | T1 | 0.74 | *0.57* | 0.80 | *0.67* |
| | | | T2 | 0.68 | *0.57* | 0.76 | *0.58* |
| | GAD-7 | .91 (.57-.81) | T1 | 0.84 | *0.85* | 0.68 | *0.67* |
| | | | T2 | 0.86 | *0.88* | 0.78 | *0.79* |
| Wellbeing | WEMWBS | .94 (.36-.82) | T1 | 3.29 | *0.84* | 3.76 | *0.73* |
| | | | T2 | 3.23 | *0.92* | 3.66 | *0.71* |
| Weight/Shape concerns | EDE-Q | .98 (.75-.92) | T1 | 1.90 | *1.96* | 1.55 | *1.70* |
| | | | T2 | 1.73 | *1.91* | 1.40 | *1.78* |
| Mindfulness | Aware INT | .60 (.34-.52) | T1 | 3.47 | *0.71* | 3.80 | *0.55* |
| | | | T2 | 3.62 | *0.77* | 3.82 | *0.57* |
| | Aware EXT | .77 (.60) | T1 | 3.41 | *0.93* | 3.93 | *0.81* |
| | | | T2 | 3.38 | *0.87* | 3.76 | *0.70* |
| | Act Aware | .71 (.47 - .59) | T1 | 2.72 | *0.91* | 2.68 | *0.90* |
| | | | T2 | 2.84 | *0.84* | 2.94 | *0.84* |
| | Accept/NJ | .78 (.54 - .68) | T1 | 2.78 | *0.86* | 2.84 | *1.01* |
| | | | T2 | 2.88 | *0.85* | 3.04 | *0.96* |
| | Decenter/NR | .72 (.53-.54) | T1 | 3.01 | *0.76* | 3.21 | *0.73* |
| | | | T2 | 3.01 | *0.79* | 3.19 | *0.79* |
| | Openness | .69 (.40 - .64) | T1 | 2.57 | *0.77* | 2.48 | *0.75* |
| | | | T2 | 2.69 | *0.86* | 2.56 | *0.74* |
| | Relativity | .60 (.36 - .45) | T1 | 3.67 | *0.61* | 3.73 | *0.68* |
| | | | T2 | 3.62 | *0.75* | 3.69 | *0.62* |
| | Insight | .75 (.53 - .62) | T1 | 2.66 | *0.91* | 3.18 | *0.88* |
| | | | T2 | 2.80 | *0.82* | 3.04 | *1.02* |

*Note.* Measures: DASS-21 = Depression Anxiety Stress Scale: Depression /Anxiety subscales; CES-DC = Centre for Epidemiological Studies Depression Scale for Children; GAD-7 = Generalised Anxiety Disorder Scale; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale; EDE-Q = Eating Disorder Examination-Questionnaire: Weight/shape concerns subscales; Mindfulness = Comprehensive Inventory of Mindfulness Experiences -Adolescents (CHIME-A); where abbreviated: Aware INT = Awareness of Internal Experiences; Aware EXT = Awareness of External Experiences; Act Aware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental Orientation; DecNR = Decentering and Nonreactivity.

Table 7.3 *Analysis of Covariance and Between Group Effect Sizes at Post-intervention (T2)*

| | | Control ($N$ = 49) | | Mindfulness ($N$ = 41) | | | |
|---|---|---|---|---|---|---|---|
| | | EMM | *SE* | EMM | *SE* | Between group ES | *95% CI* |
| Depression | DASS-21[1] | .65 | *.03* | .72 | *.03* | 0.35 | *-0.07 - 0.76* |
| | CES-DC | .92 | *.04* | .88 | *.05* | -0.12 | *-0.54 - 0.29* |
| Anxiety | DASS-21 | .74 | *.06* | .77 | *.05* | 0.09 | *-0.33 - 0.50* |
| | GAD-7[1] | .63 | *.03* | .66 | *.04* | 0.12 | *-0.29 - 0.54* |
| Wellbeing | WEMWBS | 3.37 | *.11* | 3.50 | *.11* | 0.18 | *-0.24 - 0.59* |
| Weight/Shape concerns | EDE-Q | 1.06 | *.07* | .91 | *.08* | -.30 | *-.72 - 0.11* |
| Mindfulness | Aware INT | 3.70 | *.11* | 3.76 | *.11* | 0.08 | *-0.33 - 0.49* |
| | Aware EXT | 3.52 | *.12* | 3.59 | *.16* | 0.07 | *-0.34 - 0.49* |
| | Act Aware | 2.88 | *.10* | 2.88 | *.13* | <0.01 | *-0.41 - 0.42* |
| | Accept/NJ | 2.83 | *.16* | 3.00 | *.14* | 0.17 | *-0.25 - 0.58* |
| | Decenter/NR | 3.01 | *.14* | 3.19 | *.15* | 0.19 | *-0.23 - 0.60* |
| | Openness | 2.66 | *.12* | 2.61 | *.13* | -0.06 | *-0.47 - 0.35* |
| | Relativity | 3.61 | *.14* | 3.69 | *.14* | 0.09 | *-0.32 - 0.50* |
| | Insight | 2.88 | *.13* | 2.88 | *.19* | 0 | *-0.41 - 0.41* |

*Note.* [1]Variable was inversely transformed therefore higher score indicates improvement. Measures: DASS-21 = Depression Anxiety Stress Scale: Depression /Anxiety subscales; CES-DC = Centre for Epidemiological Studies Depression Scale for Children; GAD-7 = Generalised Anxiety Disorder Scale; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale; EDE-Q = Eating Disorder Examination-Questionnaire: Weight/shape concerns subscales; Mindfulness = Comprehensive Inventory of Mindfulness Experiences -Adolescents (CHIME-A); where abbreviated: Aware INT = Awareness of Internal Experiences; Aware EXT = Awareness of External Experiences; Act Aware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental Orientation; DecNR = Decentering and Nonreactivity.

Table 7.4 *Estimated Marginal Means for Levels of Moderator (Year level) by Treatment Group (2) with Between Group Effect Sizes*

| Moderator | Outcome | Mean *(SE)* | | Between-group ES *(95%CI)* | Mean *(SE)* | | Between-group ES *(95%CI)* |
|---|---|---|---|---|---|---|---|
| Year Level | | Year 8 | | | Year 10 | | |
| | | C (*N*=26) | MF (*N*=25) | | C (*N*=23) | MF (*N*=16) | |
| | Depression [1] | 0.66 *(.04)* | 0.73 *(.04)* | 0.35 (-0.20 - 0.91) | 0.63 *(.06)* | 0.72 *(.05)* | 0.36 (-0.28 - 1.00) |
| | Anxiety | 0.73 (.07) | 0.80 *(.07)* | 0.20 (-0.35 - 0.75) | 0.76 *(.08)* | 0.73 *(.09)* | -0.08 (-0.72 - 0.56) |
| | Wellbeing | 3.42 *(.15)* | 3.50 *(.15)* | 0.11 (-0.44 - 0.66) | 3.31 *(.16)* | 3.51 *(.18)* | 0.27 (-0.37 - 0.92) |
| | Weight/Shape | 1.10 *(.09)* | 0.90 *(.10)* | -0.42 (-0.98 - 0.13) | 0.98 *(.12)* | 0.92 *(.14)* | -0.11 (-0.75 – 0.53) |
| | Mindfulness | | | | | | |
| | Aware INT | 3.78 *(.14)* | 3.76 *(.17)* | -0.03 (-0.58 - 0.52) | 3.60 *(.17)* | 3.75 *(.21)* | 0.19 (-0.45 - 0.83) |
| | Aware EXT | 3.48 *(.15)* | 3.42 *(.16)* | -0.08 (-0.63 - 0.47) | 3.59 *(.17)* | 3.81 *(.26)* | 0.25 (-0.39 - 0.89) |
| | Act Aware | 2.84 *(.14)* | 2.81 *(.14)* | -0.04 (-0.59 - 0.51) | 2.92 *(.17)* | 2.98 *(.23)* | 0.07 (-0.57 - 0.71) |
| | Accept/NJ | 2.82 *(.18)* | 2.82 *(.20)* | 0.00 (-0.55 - 0.55) | 2.84 *(.22)* | 3.27 *(.22)* | 0.45 (-0.20 - 1.09) |
| | Decenter/NR | 3.02 *(.17)* | 3.09 *(.17)* | 0.08 (-0.47 - 0.63) | 3.00 *(.22)* | 3.34 *(.27)* | 0.33 (-0.31 - 0.97) |
| | Openness | 2.61 *(.15)* | 2.67 *(.16)* | 0.08 (-0.47 - 0.63) | 2.71 *(.18)* | 2.51 *(.21)* | -0.24 (-0.88 - 0.40) |
| | Relativity | 3.64 *(.15)* | 3.69 *(.17)* | 0.06 (-0.49 - 0.61) | 3.57 *(.25)* | 3.70 *(.24)* | 0.12 (-0.52 - 0.76) |
| | Insight | 2.92 *(.17)* | 2.63 *(.17)* | -0.34 (-0.90 - 0.21) | 2.84 *(.18)* | 3.26 *(.37)* | 0.37 (-0.27 - 1.02) |

*Note.* [1]Variable was inversely transformed therefore higher score indicates improvement. Measures: Depression /Anxiety = subscales of DASS-21: Depression Anxiety Stress Scale; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale; Weight/Shape = Weight/Shape subscales of EDE-Q = Eating Disorder Examination-Questionnaire; Mindfulness = Comprehensive Inventory of Mindfulness Experiences - Adolescents (CHIME-A); where abbreviated: Aware INT = Awareness of Internal Experiences; Aware EXT = Awareness of External Experiences; Act Aware = Acting with Awareness; AccNJ = Accepting and Nonjudgemental Orientation; DecNR = Decentering and Nonreactivity.

Table 7.5 *Home Practice Compliance and Regression Analysis Showing the Extent to which Frequency of Home Practice Predicted Change on the Outcome Measures (N = 32 respondents)*

| Home practice compliance | | | | | | |
|---|---|---|---|---|---|---|
| | Year 8 (*N* = 21) | | Year 10 (*N* = 11) | | Whole sample | |
| Mindfulness practice | Mean frequency *(SD)* | Percentage with high frequency[1] | Mean frequency *(SD)* | Percentage with high frequency[1] | Mean frequency *(SD)* | Percentage with high frequency[1] |
| Attention to everyday activities e.g. eating | 3.24 *(1.38)* | 47.6 | 2.91 *(0.94)* | 27.3 | 3.00 *(1.28)* | 40.6 |
| STOP breathing space, or tuning into breath anchor | 2.71 *(1.19)* | 28.6 | 2.55 *(1.04)* | 18.2 | 2.51 *(1.17)* | 25.0 |
| Listening to meditation audiofiles at home | 1.81 *(1.12)* | 9.5 | 2.45 *(1.44)* | 27.3 | 1.94 *(1.24)* | 15.6 |
| Overall | 2.59 *(0.92)* | 28.5 | 2.64 *(0.69)* | 24.3 | 2.60 *(0.84)* | 27.1 |

| Regression analysis (whole sample) | | | | |
|---|---|---|---|---|
| | | Model 1 | Model 2 | Home Practice[3] |
| | | Baseline DV[2] | Baseline DV | |
| Depression | $R^2$ | .46** | | |
| | $R^2\Delta$ | | | .04 |
| | $\beta$ | .68** | .70** | -.19 |
| Anxiety | $R^2$ | .44** | | |
| | $R^2\Delta$ | | | .01 |
| | $\beta$ | .66** | .67** | .09 |
| Wellbeing | $R^2$ | .40** | | |
| | $R^2\Delta$ | | | .06 |
| | $\beta$ | .63** | .68** | -.26 |
| Weight/Shape concerns | $R^2$ | .62** | | |
| | $R^2\Delta$ | | | .00 |
| | $\beta$ | .79** | .78** | .06 |

*Note.* [1]undertook homework once a week or more; [2]Model 1 contains baseline measure of each outcome variable; [3] Mean frequency of home practice; Depression/Anxiety = DASS-21 subscales; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale; Weight/shape concerns = Weight/shape subscales of the Eating Disorder Examination-Questionnaire.

Table 7.6 *Descriptive statistics for the Volunteer Senior Sample (N = 6) and within group effect sizes.*

| Outcome variable | | T1 | | T2 | | Within group ES | *95% CI* |
|---|---|---|---|---|---|---|---|
| | | Mean | *SD* | Mean | *SD* | | |
| Depression | DASS-21 | 1.29 | .89 | .40 | .34 | **1.32** | ***.07-2.57*** |
| Anxiety | DASS-21 | 1.00 | .61 | .86 | .58 | .24 | *-.90-1.37* |
| Wellbeing | WEMWBS | 3.07 | .70 | 4.20 | .39 | **-1.99** | ***-3.38--.61*** |
| Weight/Shape concerns | EDE-Q | 2.11 | 1.20 | 2.03 | .93 | .03 | *-1.10 – 1.17* |
| Mindfulness | Aware INT | 4.00 | .79 | 4.06 | .25 | -.10 | *-1.23-1.03* |
| | Aware EXT | 3.89 | .98 | 4.17 | .51 | -.36 | *-1.50-.78* |
| | Act Aware | 2.17 | .62 | 2.83 | .51 | -1.16 | *-2.39-.06* |
| | Accept/NJ | 2.39 | 1.10 | 3.39 | .39 | -1.21 | *-2.44-.02* |
| | Decenter/NR | 3.00 | .79 | 3.78 | .34 | **-1.28** | ***-2.53--.04*** |
| | Openness | 2.13 | .44 | 2.79 | .40 | **-1.57** | ***-2.86--.28*** |
| | Relativity | 3.50 | .46 | 4.00 | 0.00 | **-1.54** | ***-2.83--.25*** |
| | Insight | 2.83 | 1.01 | 3.83 | .28 | **-1.35** | ***-2.60--.10*** |

*Note.* ES = Cohen's *d*; Measures: Depression /Anxiety = subscales of DASS-21: Depression Anxiety Stress Scale; Wellbeing = Warwick Edinburgh Mental Wellbeing Scale; Weight/shape concerns = Weight/shape subscales of the Eating Disorder Examination-Questionnaire Mindfulness = Comprehensive Inventory of Mindfulness Experiences -Adolescents (CHIME-A); where abbreviated: Aware INT = Awareness of Internal Experiences; Aware EXT = Awareness of External Experiences; Act Aware = Acting with Awareness; AccNJ = AccNJ = Accepting and Nonjudgemental Orientation; DecNR = Decentering and Nonreactivity. Significant ES are bolded.

# Chapter 8 : General Discussion

## 8.1 Overview

This thesis aimed to address the gap between the rapidly expanding application of Mindfulness Based Interventions (MBIs) in youth and a very limited evidence base (Burke, 2010; Greenberg & Harris, 2012; Semple, Droutman, & Reid, 2017). Our first two experiments applied a rigorous randomised controlled trial (RCT) design to a popular and promising 9-week adolescent curriculum designed for 11-16 year olds, *.b Mindfulness in Schools*. This represented the first use of an RCT design with this programme. We also broadened the outcome factors to investigate its potential as a transdiagnostic prevention programme (anxiety, depression and eating disorders) and investigated moderators of change (gender, SES, baseline levels of psychopathology). In two large RCTs (combined total $N$ = 863) in early adolescents ($M_{age}$ 13.54) independent of MBI programme developers for the first time in secondary schools, we found no intervention effects on any outcome factor either at post-intervention or at 3-12 month follow-up. Further, there were no improvements in moderator subsamples. In an attempt to increase the strength of the intervention, we also included a treatment arm that invited parental involvement in a flexible and easily accessible format. Outcomes for this condition were not significantly different from the control condition.

Currently, it remains unknown how to adapt the successful adult mindfulness based interventions (MBIs) for youth, and it is therefore perhaps unsurprising that MBIs for this population might not be robust. One impediment has been the lack of an appropriate measure of mindfulness for this population that would allow tracking of its individual elements developmentally and as potential mediators of intervention effect. Our next study developed and validated the first multifactor mindfulness measure for adolescents (CHIME-A), opening the way for finer grained component research in youth. We then examined associations between eight aspects of mindfulness at baseline and natural 12-month trajectories of anxiety, depression and eating disorder risk factors in early adolescents ($M_{age}$ at baseline 13.45 years). This analysis demonstrated a transdiagnostic protective effect for three facets of mindfulness (*Accepting and Nonjudgemental Orientation*, *Decentering and Nonreactivity*, and *Acting with Awareness*), although this effect waned over time, supporting the use of MBIs to boost these helpful elements.

Beyond content issues, it was also unclear whether the *.b* programme, diluted to a single short lesson per week, simply lacked sufficient intensity to effect change and/or

whether early adolescence was an unreceptive age for conceptual MBIs. We therefore conducted a pilot study ($N = 90$) testing an alternative 8-week curriculum (*Mindfulness in Teens*) more closely modelled on adult MBI to increase dose (more in-class meditation and inquiry in longer weekly sessions) across two conscript age bands ($M_{ages}$ 13.39; 15.45). Although we were underpowered ($N = 90$), improvements in depression at post-intervention approached significance with a larger effect size (Cohen's $d = .35$; 95% CI -0.07 - 0.76) than our previous RCTs using this same measure ($d \leq .18$, Johnson et al. 2016, Johnson et al., 2017a). Although moderator subgroups were very small, this effect did not differ in Year 8 versus Year 10. However, only the older group showed sizeable (non-significant) improvements in two key facets of mindfulness (*Accepting and Nonjudgemental Orientation,* $d = .45$; *Decentering and Nonreactivity,* $d = .33$) with potential to mediate subsequent reduction in psychopathology. Large effect sizes ($d > .1.16$) were also demonstrated in a third small group ($N = 6$) of volunteer Year 11 students ($M_{age} = 16.37$). Collection of 6-month follow-up data beyond this thesis will be instructive in interpreting these results. However, these preliminary novel findings suggest that continuing to test discreet age bands for optimal effect (rather than programmes being broadly designed for primary or secondary school students), and increasing the at-school dose of single module MBIs, are both worthy of further investigation in larger samples.

## 8.2 Integration with recent research

During the four years of this thesis, a number of overviews (Chadwick & Gelbar, 2016; Renshaw & Cook, 2016; Semple, Droutman, & Reid, 2017), systematic reviews (Black, 2015; Maynard, Solis, Miller, & Brendel, 2017) and meta-analyses (Kallapiran, Koo, Kirubakaran, & Hancock, 2015; Klingbeil et al., 2017; Zenner, Herrnleben-Kurz, & Walach, 2014; Zoogman, Goldberg, Hoyt, & Miller, 2015) have been published regarding MBIs in youth. The most recent meta-analysis of clinical and school-based research covering studies through 2015 (Klingbeil et al., 2017) reported small to moderate benefits across a range of domains for the 48 controlled studies included: externalising problems, Hedges $g = .30$; affect, $g > .25$; social competence, $g = .37$ and physical health, $g = .22$. Effect sizes were larger at follow-up (averaged across domains, $g = .40$) than at post-intervention ($g = .32$). Problems with diverse and small samples together with inadequate measures and heterogenous interventions limit the interpretation of the current body of research (Zenner et al., 2014)

which may also explain the surprising lack of significant moderators such as age, instructor experience and dosage (Zoogman et al., 2015). Our results from two large RCTs (total $N$ = 863) suggest further that these effects are not robust, and we agree with Klingbeil et al. (2017) and Kallipiran et al. (2015) that mediation and dismantling studies are required to better understand which parts of these interventions drive positive effects, together with further exploration of moderators in tight experimental designs. The results of the body of research presented here do not currently support universal roll out of adolescent MBIs.

However, meta-analyses of non-acceptance based, disorder-specific, universal prevention programmes also show small effect sizes for anxiety (Cohen's $d$ =.12-.19) and depression ($d$ =.09-.19), with effects washing out by 12-18 months (Mychailyszyn, Brodman, Read, & Kendall, 2012; Stockings et al., 2015; Werner-Seidler, Perry, Calear, Newby, & Christensen, 2017). For eating disorders, while insufficient universal studies preclude meta-analyses, the most promising approach (Media Literacy) has demonstrated small effects on eating disorder risk factors ($d \geq .26$) with effects sustained at 12 months ($d \geq .34$; Watson et al., 2016; Wilksch et al., 2015). Thus, in the absence of superior alternatives (particularly for anxiety and depression), mindfulness remains one alternative for ongoing rigorous investigation. Further, it has been suggested that MBIs may offer a unique bridge that underpins the effectiveness of many other socio-emotional learning programmes by teaching youth *how* to steady themselves under the influence of hot cognitions in order to access and apply cognitive strategies learnt under other socioemotional curricula (McKenna, 2015). If we can find ways to effectively embed this strategy in young people this is a worthy ongoing pursuit.

## 8.3 Directions for future research

Continuing to test the plethora of 8- to 10-week programmes in secondary schools in the absence of any knowledge of active ingredients is a costly and slow endeavour. Conducting shorter modules to experimentally test different components is recommended to better inform the content of subsequent large school RCTs. Previous investigators have successfully trialled tightly focused 3-week programmes that showed immediate impact on perfectionism (Fairweather-Schmidt & Wade, 2015) and eating disorder risk factors at six months (Atkinson & Wade, 2015), using CBT and targeted mindfulness techniques, respectively. Our research suggests the following aspects of mindfulness as elements to

isolate, expand on and compare in this format: *Accepting and Nonjudgemental Orientation*, *Decentering and Nonreactivity*, and *Acting with Awareness*. With *Accepting and Nonjudgemental Orientation* emerging as a potential key ingredient, measures to counter resistance to self-compassion might need to be included (Gilbert, McEwan, Matos and Rivis, 2011). Different elements should be tested not only within but across age bands, potentially leading to spiral learning modules that focus on age-matched key ingredients while reinforcing general mindfulness practices. Cognitive approaches (e.g., Fairweather-Schmidt & Wade, 2015) should also be directly tested against mindfulness to see if the increased teacher training and amount of home practice required for the latter is justified. Research here should also include moderation analyses to see whether certain students (e.g., male versus female, younger versus older adolescents) might respond better to different aspects of mindfulness, or to CBT versus mindfulness.

Conversely, sustained repetitive practice may be necessary to adequately strengthen new neural pathways (Greenberg & Harris, 2012; Meiklejohn et al., 2012) and short experimental modules may lose this critical component. One avenue for further investigation within 8-week modules is to make home practice and the mindfulness programme itself assessable to increase engagement and dose. Progressively testing objective scores on computer based attention tasks, or via the Meditation Breath Attention Score (MBAS; Frewen, Hargraves, DePierro, D'Andrea, & Flodrowski, 2016) may provide some form of biofeedback which could increase student incentive to put in practice to see brain changes unfold. Recording log-in data when accessing meditation audiofiles is another opportunity to increase accountability with home practice (Lloyd, White, Eames, & Crane, 2017). Increased scaffolding of newly learned skills to real-life scenarios is also recommended, such as was used in Atkinson & Wade's (2015) body focused MBI with youth. Students could undergo challenges to mood and repetitive self-critical thinking (e.g., facebook comparisons with others, giving a talk in front of the class, speaking to someone new, lining up to kick a goal under pressure, or other situations that present a personal challenge) and practice applying mindfulness strategies in behavioural experiments. Collectively, these strategies may help increase engagement in conscript adolescents, which may in turn improve effectiveness.

Another option worthy of exploration is offering voluntary rather than conscript MBIs for secondary school students. Although some form of education about emotions and thoughts might be considered essential, perhaps it is unreasonable to mandate participation in

formal meditation. Further, mindfulness has been conceptualised as comprising intention, attention and attitude (Shapiro, Carlson, Astin, & Freedman, 2006; Shapiro & Schwartz, 2000, pp. 253-270), and therefore conscript audiences may lack the critical first component that sustains practice when motivation inevitably wavers (Kabat-Zinn, 1990; p. 46). Although this moves away from the universal model, offering mindfulness as a "brain training" elective may avoid the stigma associated with selective or targeted mental health programmes in schools while capitalising on the higher engagement and effectiveness that occurs with self-selected treatments (Kwan, Dimidjian, & Rizvi, 2010).

Across prevention programmes generally, the optimal age for intervention remains unknown (Werner-Seidler, 2017). Within MBI research, there have now been a growing number of RCTs in primary schools (Britton et al., 2014; Devcich, Rix, Bernay, & Graham, 2017; Flook et al., 2010; Napoli, Krech, & Holley, 2005; Parker, Kupersmidt, Mathis, Scull, & Sims, 2014; Raveepatarakul, Suttiwan, Iamsupasit, & Mikulas, 2014; Ricarte, Ros, Latorre, & Beltran, 2015; Schonert-Reichl, Oberle, Stewart Lawlor, Abbott, & Thomson, 2015; Sibinga, Webb, Ghazarian, & Ellen, 2016; van de Weijer-Bergsma, Langenberg, Brandsma, Oort, & Bogels, 2014), although these face similar methodological limitations together with smaller sample sizes. We hypothesised that early adolescence might capitalise on the emergence of conceptual understanding, however many new barriers also emerge at this age: increasing self-awareness, self-doubt and peer distraction, less eagerness to please and more desire for autonomy, together with rotating class schedules that add implementation challenges and reduce opportunities for reinforcement of practices (Cook-Cottone, 2017, pp. 93-94). Mindfulness training has been conceived as a "neural training regime" (Shapiro et al., 2015) that repeatedly pairs activation between the prefrontal cortex and the limbic system (Zelazo & Lyons, 2012). Perhaps the benefits of strengthening this link may be even greater if this occurs before the developmental mismatch between affective processing and cognitive control that manifests in adolescence (Riediger & Klipker, 2014, p. 197). Evidence shows that primary aged children enjoy MBIs that include learning about the neurobiology of the brain and how to anchor themselves when they get wobbly (Vickery & Dorjee, 2016; https://mindfulnessinschools.org/what-is-b/paws-b-curriculum/). Further, these programmes may be easier to disseminate at scale using trained classroom teachers, given there is less need for detailed post meditation inquiry with younger children. Thus, continuing research in preadolescent children is also recommended. It is probable that more than one key entry point

for mindfulness, together with some resistant periods, will be identified across the developmental trajectory.

The impact of gender was mixed across our research. In our first RCT, anxiety worsened in males at three months post-intervention compared to controls ($d$ = .22), yet gender did not moderate intervention effects in our second RCT. During validation of the CHIME-A questionnaire, young adolescent males naturally scored higher on two key mindfulness subscales (*Accepting and Nonjudgemental Orientation* and *Decentering and Nonreactivity)*. Further, in our longitudinal study, only in females were escalating weight and shape concerns predicted by low baseline levels of mindfulness *(Accepting and Nonjudgemental Orientation > Decentering and Nonreactivity > Acting with Awareness).* Taken together, these findings suggest that MBIs could behave differently between sex, where perhaps a greater natural deficit exists in females. A recent small pre-post study ($N$ = 15; 62% female; age range 13-18; Bluth, Roberson, & Girdler, 2017) suggested variations in the way males and females engaged with and responded to their intervention. These authors hypothesised that while MBIs may be equally effective between sex, mechanisms and temporal order of change may differ, reflecting different rates of maturation. Further, they suggested that finer grained investigation may reveal differences in preferences for intervention content, which may affect engagement and impact. Taken together with our findings, we agree that gender differences should continue to be carefully explored.

Theoretically, it might have been expected that the CHIME-A facets of mindfulness countering our transdiagnostic risk factors of interest would show the strongest relationships to psychopathology, and this held true for *Accepting and Nonjudgemental Orientation* (maps onto self-critical perfectionism), and *Decentering and Nonreactivity* together with *Acting with Awareness* (both map onto rumination). The relationship with emotional regulation was less clear. A link here not only with *Decentering and Nonreactivity* but also with *Awareness of Internal Experiences* and *Openness to Experience* might have been expected. On the one hand, simply being aware of emotions as they are happening (*Awareness of Internal Experiences*) without also being non-reactive to them may not be useful. However, recent research suggests that the ability to differentiate negative emotions in adolescents *is* related to wellbeing (Lennarz et al., 2017) and perhaps this CHIME-A facet (and teaching about emotions within youth MBIs) might benefit from greater inclusion of this aspect. Similarly, *Openness to Experience* includes items not only related to avoidance and dislike of difficult

emotions, but also to engaging in distraction when these experiences are present, the latter of which can be adaptive (Nolen-Hoeksema, 1991). This may explain its weaker predictive effect on pathology than hypothesised, and this facet may also benefit from refinement in a future version of CHIME-A. Expanding our comparison of trait mindfulness in Year 8 versus Year 10, it would be useful to test the CHIME-A across a broader range of age bands in youth to gain greater insight into its developmental stages. Testing lower age limits for comprehension of this questionnaire is also recommended; with a teacher reading each question to ensure comprehension this might enable its use in middle primary years (e.g., from age 10).

## 8.4 Limitations

A key limitation of this study was the reliance on self-report measures with their inherent risk for bias; a criticism shared across mindfulness research in adults but until recently still considered the most practical approach (Sauer et al., 2013). Mindfulness questionnaires have been further criticised for not comprehensively representing the mindfulness construct, and for differential interpretation of items according to meditation experience (Grossman, 2011), however, these concerns were considered during the development of the recent adult and adolescent versions of the CHIME (Bergomi, Tschacher, & Kupper, 2013; Johnson, Burke, Brinkman, & Wade, 2017). Despite a call for broadening of measures in youth mindfulness research (Davidson et al., 2012; Greenberg & Harris, 2012; Zelazo & Lyons, 2012; Zenner et al., 2014) to include third party reports (e.g., parents and teachers) of behavioural measures (e.g., prosocial behaviour, self-regulation) these measures are not exempt from bias due to difficulty blinding to group assignment. Further, providing student level data for a class of 25 students can be a prohibitive teacher load, especially at multiple data collection points. Objective measures such as salivary cortisol levels at rest (Schonert-Reichl et al., 2015) and during social and cognitive stress tests (Bluth et al., 2017), computerised tests of executive function (e.g., working memory, sustained or selective attention; Napoli et al., 2005; Parker et al., 2014; Quach, Jastrowski Mano, & Alexander, 2016; Ricarte et al., 2015; Schonert-Reichl et al., 2015) and scalp measurement of event related brain potentials (ERPs; Sanger & Dorjee, 2015) have been successfully utilised in a range of preadolescent and adolescent pre-post designs. Addition of such measures as both outcomes and potential mediators of change is recommended in future longitudinal research.

We are also currently trialling linkage with student academic assessments that occur at a national level in Australian public schools from Year 3 (average age 8.5 years) as another objective measure of impact.

Recent reviews also call for greater inclusion of active control groups to better delineate non-specific treatment effects (Greenberg & Harris, 2012; Meiklejohn et al., 2012; Zenner et al., 2014) such as may occur when novel external facilitators teach programmes in schools. Although we used normal curricular controls, this limitation (which can inflate improvements) was less of an issue given our null results. Feasible examples of active controls are starting to emerge in the field and include a substance abuse programme (Bluth et al., 2016) and hatha yoga (Quach et al., 2016). Moving forward, this is also an important design feature to address.

A notable strength of this thesis is the large sample sizes across Studies 1-4 ($N$ = 308 – 555). However, the small sample sizes in the final RCT testing a more intensive intervention across age groups ($N$ = 6 - 90) preclude definitive conclusions, and further research is needed to explore these tentative findings. Although beyond the time constraints of this thesis, 6-month follow-up data will be collected in late 2017, aiming to also include more participants from the low SES school involved. Further, a grant application to collect data in a larger sample is under second stage review.

Another novel contribution of the thesis is its inclusion of a broad range of socioeconomic bands across participating schools. High data wastage occurred in the first RCT testing the *.b* curriculum ($N$ = 308) due to poor return rates of consent forms in the low SES school although this was successfully addressed in the second trial ($N$ = 555) with passive consent approval where we found no moderating effect of SES on outcomes. Data issues in the low SES school were also encountered in the final RCT ($N$ = 90) testing the more intensive *Mindful Teens* curriculum where we were not able to include any of the 53 students from this school due to low attendance rates at post-intervention data collection. Thus, the quantitative results of the final pilot study have reduced generalisability.

However, with a single facilitator running interventions across schools we were able to uniquely compare logistics and acceptability of the programmes. A qualitative interview and informal discussions with staff in the lowest SES school (where sustained engagement was relatively low) generated some logistical recommendations (e.g., using a different room

to interrupt classroom dynamics, see page 23). Importantly, school staff across all SES bands believed the content and structure of both interventions to be appropriate.

## 8.5 Conclusions

Currently, mindfulness curricula in secondary schools may not be universally robust in real-world settings independent of programme developers, and caution is warranted to temper their widespread implementation. This instability has arisen in large part due to a lack of understanding of how to dilute the successful adult programmes, with a plethora of modifications on offer (dosage, content, format) in the absence of theoretical or empirical guidance. The development of a multifactor measure of mindfulness for adolescents opens the way for mapping the developmental emergence of mindfulness together with identifying potential key ingredients via mediational analysis. Early adolescence may not be a receptive window for mindfulness interventions, although further testing is recommended to compare the effects and mechanisms of action across age bands. Based on our results, a comprehensive range of options for further investigation have been proposed.

References

Atkinson, M., & Wade, T. (2015). Mindfulness-based prevention for eating disorders: A school-based cluster randomised controlled pilot study. *International Journal of Eating Disorders, 48*, 1024-1037. doi:10.1002/eat.22416

Bergomi, C., Tschacher, W., & Kupper, Z. (2013). Measuring Mindfulness: First Steps Towards the Development of a Comprehensive Mindfulness Scale. *Mindfulness, 4*(1), 18-32. doi:10.1007/s12671-012-0102-9

Black, D. (2015). Mindfulness Training For Children And Adolescents: A State Of The Science Review. In Brown, K., Creswell, J., & Ryan, R. (Eds.), *Handbook Of Mindfulness. Theory, Research And Practice* (pp. 283-310). New York, NY: Guildford Press.

Bluth, K., Campo, R., Pruteanu-Malinici, S., Reams, A., Mullarkey, M., & Broderick, P. (2016). A School-Based Mindfulness Pilot Study for Ethnically Diverse At-Risk Adolescents. *Mindfulness, 7*(71), 90-104. doi:10.1007/s12671-014-0376-1

Bluth, K., Roberson, P. N. E., & Girdler, S. S. (2017). Adolescent Sex Differences in Response to a Mindfulness Intervention: A Call for Research. *Journal of Child and Family Studies*, 1-15. doi:10.1007/s10826-017-0696-6

Britton, W., Lepp, N., Niles, H., Rocha, T., Fisher, N., & Gold, J. (2014). A randomized controlled pilot trial of classroom-based mindfulness meditation compared to an active control condition in sixth-grade children. *Journal of School Psychology, 52*, 263-278. doi:10.1016/j.jsp.2014.03.002

Burke, C. (2010). Mindfulness-Based Approaches with Children and Adolescents: A Preliminary Review of Current Research in an Emergent Field. *Journal of Clinical and Family Studies, 19*(2), 133-144.

Chadwick, J., & Gelbar, N. (2016). Mindfulness for children in public schools: Current research and developmental issues to consider. *International Journal of School and Educational Psychology, 4*(2), 106-112. doi:10.1080/21683603.2015.1130583

Cook-Cottone, C. (2017). *Mindfulness and Yoga in Schools. A Guide for Teachers and Practitioners*. New York: Springer.

Davidson, R., Dunne, J., Eccles, J. S., Engle, A., Greenberg, M., Jennings, P., . . . Vago, D. (2012). Contemplative Practices and Mental Training: Prospects for American

Education. *Child Development Perspectives, 6*(2), 146-153. doi:10.1111/j.1750-8606.2012.00240.x

Devcich, D. A., Rix, G., Bernay, R., & Graham, E. (2017). Effectiveness of a Mindfulness-Based Program on School Children's Self-Reported Well-Being: A Pilot Study Comparing Effects With An Emotional Literacy Program. *Journal of Applied School Psychology*, 1-23. doi:10.1080/15377903.2017.1316333

Fairweather-Schmidt, A., & Wade, T. (2015). Piloting a perfectionism intervention for pre-adolescent children. *Behaviour Research and Therapy, 73*, 67-73. doi:10.1016/j.brat.2015.07.004

Flook, L., Smalley, S., Kitil, M., Galla, B., Kaiser-Greenland, S., Locke, J., . . . Kasari, C. (2010). Effects of Mindful Awareness Practices on Executive Functions in Elementary School Children. *Journal of Applied School Psychology, 26*, 70-95. doi:10.1080/15377900903379125

Frewen, P., Hargraves, H., DePierro, J., D'Andrea, W., & Flodrowski, L. (2016). Meditation Breath Attention Scores (MBAS): Development and Investigation of an Internet-Based Assessment of Focused Attention During Meditation Practice. *Psychological Assessment, 28*(7), 830-40. doi:10.1037/pas0000283

Gilbert, P., McEwan, K., Matos, M., & Rivis, A. (2011). Fears of compassion: Development of three self-report measures. *Psychology and Psychotherapy: Theory, Research and Practice, 84*, 239-255. doi:10.1348/147608310X526511

Greenberg, M. T., & Harris, A. R. (2012). Nurturing Mindfulness in Children and Youth: Current State of Research. *Child Development Perspectives, 6*(2), 161-166. doi:10.1111/j.1750-8606.2011.00215.x

Grossman, P. (2011). Defining Mindfulness by How Poorly I Think I Pay Attention During Everyday Awareness and Other Intractable Problems for Psychology's (Re)Invention of Mindfulness: Comment on Brown et al. (2011). *Psychological Assessment, 23*, 1034-1040. doi:10.1037/a0022713

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2017). Development and Validation of a Multifactor Mindfulness Scale in Youth: The Comprehensive Inventory of Mindfulness Experiences-Adolescents (CHIME-A). *Psychological Assessment, 29*(3), 264-281. doi:10.1037/pas0000342

Kabat-Zinn, J. (1990). *Full Catastrophe Living*. New York: Dell.

Kallapiran, K., Koo, S., Kirubakaran, R., & Hancock, K. (2015). Review: Effectiveness of mindfulness in improving mental health symptoms of children and adolescents: a meta-analysis. *Child and Adolescent Mental Health, 20*(4), 182-194. doi:10.1111/camh.12113

Klingbeil, D. A., Renshaw, T. L., Willenbrink, J. B., Copek, R. A., Chan, K. T., Haddock, A., . . . Clifton, J. (2017). Mindfulness-based interventions with youth: A comprehensive meta-analysis of group-design studies. *Journal of School Psychology, 63*, 77-103. doi:10.1016/j.jsp.2017.03.006

Kwan, B. M., Dimidjian, S., & Rizvi, S. L. (2010). Treatment Preference, Engagement, and Clinical Improvement in Pharmacotherapy versus Psychotherapy for Depression. *Behaviour Research and Therapy, 48*(8), 799-804. doi:10.1016/j.brat.2010.04.003

Lennarz, H. K., Lichtwarck-Aschoff, A., Timmerman, M. E., & Granic, I. (2017). Emotion differentiation and its relation with emotional well-being in adolescents. *Cognition and Emotion*, 1-7. doi:10.1080/02699931.2017.1338177

Lloyd, A., White, R., Eames, C., & Crane, R. (2017). The Utility of Home-Practice in Mindfulness-Based Group Interventions: A Systematic Review. *Mindfulness*. doi:10.1007/s12671-017-0813-z

Maynard, B., Solis, M., Miller, V., & Brendel, K. (2017). Mindfulness-based interventions for improving cognition, academic achievement, behavior and socio-emotional functioning of primary and secondary students. *Campbell Systematic Reviews, 5*. doi:10.4073/csr2017.5

McKenna, C. (2015). Mindful Educators Essentials Course. http://www.mindfulschools.org

Meiklejohn, J., Phillips, C., Freedman, M., Griffin, M., Biegel, G., Roach, A., . . . Saltzman, A. (2012). Integrating mindfulness training into K-12 education: Fostering the resilience of teachers and students. *Mindfulness, 3*(4), 291-307. doi:10.1007/s12671-012-0094-5

Mychailyszyn, M. P., Brodman, D. M., Read, K. L., & Kendall, P. C. (2012). Cognitive-Behavioral School-Based Interventions for Anxious and Depressed Youth: A Meta-Analysis of Outcomes. *Clinical Psychology: Science and Practice, 19*(2), 129-153. doi:10.1111/j.1468-2850.2012.01279.x

Napoli, M., Krech, P., & Holley, L. (2005). Mindfulness training for elementary school students: The attention academy. *Journal of Applied School Psychology, 21*, 99-125. doi:10.1300/J370v21n01_05

Nolen-Hoeksema, S. (1991). Responses to Depression and Their Effects on the Duration of Depressive Episodes. *Journal of Abnormal Psychology, 100*(4), 569-582. doi:10.1037/0021-843X.100.4.569

Parker, A., Kupersmidt, J., Mathis, E., Scull, T., & Sims, C. (2014). The impact of mindfulness education on elementary school students: evaluation of the Master Mind program. *Advances in School Mental Health Promotion, 7*(3), 184-204. doi:10.1080/1754730X.2014.916497

Quach, D., Jastrowski Mano, K. E., & Alexander, K. (2016). A Randomized Controlled Trial Examining the Effect of Mindfulness Meditation on Working Memory Capacity in Adolescents. *Journal of Adolescent Health, 58*(5), 489-496. doi:10.1016/j.jadohealth.2015.09.024

Raveepatarakul, J., Suttiwan, P., Iamsupasit, S., & Mikulas, W. (2014). A mindfulness enhancement program for Thai 8- to 11-year old children: Effects on mindfulness and depression. *Journal of Health Research, 28*, 335–341.

Renshaw, T. L., & Cook, C. R. (2016). Introduction to the Special Issue: Mindfulnes in the Schools - Historical Roots, Current Status, and Future Directions. *Psychology in the Schools, 54*(1), 5-12. doi:10.1002/pits.21978

Ricarte, J., Ros, L., Latorre, J., & Beltran, M. (2015). Mindfulness-based intervention in a rural primary school: Effects on attention, concentration, and mood. *International Journal of Cognitive Therapy, 8*, 258–270. doi:10.1521/ijct_2015_8_03

Riediger, M., & Klipker, K. (2014). Emotion Regulation in Adolescence. In J. J. Gross (Ed.), *Handbook of Emotion Regulation* (2nd ed.). New York: Guilford Press.

Sanger, K. L., & Dorjee, D. (2015). Mindfulness training for adolescents: A neurodevelopmental perspective on investigating modifications in attention and emotion regulation using event-related brain potentials. *Cognitive, Affective, & Behavioral Neuroscience, 15*(3), 696-711. doi:10.3758/s13415-015-0354-7

Sauer, S., Walach, H., Schmidt, S., Hinterberger, T., Lynch, S., Büssing, A., & Kohls, N. (2013). Assessment of Mindfulness: Review on State of the Art. *Mindfulness, 4*(1), 3-17. doi:10.1007/s12671-012-0122-5

Schonert-Reichl, K., Oberle, E., Stewart Lawlor, M., Abbott, D., & Thomson, K. (2015). Enhancing Cognitive and Social–Emotional Development Through a Simple-to-Administer Mindfulness-Based School Program for Elementary School Children: A Randomized Controlled Trial. *Developmental Psychology, 51*(1), 52-66. doi:10.1037/a0038454

Semple, R. J., Droutman, V., & Reid, B. A. (2017). Mindfulness Goes To School: Things Learned (So Far) From Research And Real-World Experiences. *Psychology in the Schools, 54*(1), 29-52. doi:10.1002/pits.21981

Shapiro, S., & Schwartz, G. (2000). *The role of intention in self-regulation: Toward intentional systemic mindfulness*. San Diego: Academic Press.

Shapiro, S., Carlson, L., Astin, J., & Freedman, B. (2006). Mechanisms of Mindfulness. *Journal of Clinical Psychology, 62*(3), 373–386. doi:10.1002/jclp.20237

Shapiro, S., Lyons, K., Miller, R., Butler, B., Vieten, C., & Zelazo, P. (2015). Contemplation in the Classroom: a New Direction for Improving Childhood Education. *Educational Psychology Review, 27*(1), 1-30. doi:10.1007/s10648-014-9265-3

Sibinga, E., Webb, L., Ghazarian, S., & Ellen, J. M. (2016). School-Based Mindfulness Instruction: An RCT. *Pediatrics, 137*(1), 1-8. doi:10.1542/peds.2015-2532

Stockings, E., Degenhardt, L., Dobbins, T., Lee, Y., Erskine, H., Whiteford, H., & Patton, G. (2015). Preventing depression and anxiety in young people: a review of the joint efficacy of universal, selective and indicated prevention. *Psychological Medicine, 46*(1), 11-26. doi:10.1017/S0033291715001725

van de Weijer-Bergsma, E., Langenberg, G., Brandsma, R., Oort, F., & Bogels, S. (2014). The Effectiveness of a School-Based Mindfulness Training as a program to Prevent Stress in Elementary School Children. *Mindfulness, 5*(3), 238-248. doi:10.1007/s12671-012-0171-9

Vickery, C. E., & Dorjee, D. (2016). Mindfulness training in primary schools decreases negative affect and increases meta-cognition in children. *Frontiers in Psychology, 6*. doi:10.3389/fpsyg.2015.02025

Watson, H. J., Joyce, T., French, E., Willan, V., Kane, R. T., Tanner-Smith, E. E., . . . Egan, S. J. (2016). Prevention of eating disorders: A systematic review of randomized, controlled trials. *International Journal of Eating Disorders, 49*(9), 833-862. doi:10.1002/eat.22577

Werner-Seidler, A., Perry, Y., Calear, A. L., Newby, J. M., & Christensen, H. (2017). School-based depression and anxiety prevention programs for young people: A systematic review and meta-analysis. *Clinical Psychology Review, 51*, 30-47. doi:10.1016/j.cpr.2016.10.005

Wilksch, S. M., Paxton, S. J., Byrne, S. M., Austin, S. B., McLean, S. A., Thompson, K. M., . . . Wade, T. D. (2015). Prevention Across the Spectrum: a randomized controlled trial of three programs to reduce risk factors for both eating disorders and obesity. *Psychological Medicine, 45*(9), 1811-1823. doi:10.1017/S003329171400289X

Zelazo, P. D., & Lyons, K. E. (2012). The Potential Benefits of Mindfulness Training in Early Childhood: A Developmental Social Cognitive Neuroscience Perspective. *Child Development Perspectives, 6*(2), 154-160. doi:10.1111/j.1750-8606.2012.00241.x

Zenner, C., Herrnleben-Kurz, S., & Walach, H. (2014). Mindfulness-based interventions in schools—a systematic review and meta-analysis. *Frontiers in Psychology, 5*(603). doi:10.3389/fpsyg.2014.00603

Zoogman, S., Goldberg, S., Hoyt, W., & Miller, L. (2015). Mindfulness Interventions with Youth: A Meta-Analysis. *Mindfulness, 6*, 290-302. doi:10.1007/s12671-013-0260-4