

Mindfulness and Coping with Stress: A Multi-Method Examination

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Statement of Authorship and Sources

This thesis contains no material published elsewhere or extracted in whole or in part from a thesis by which I have qualified for or been awarded another degree or diploma.

No parts of this thesis have been submitted towards the award of any other degree or diploma in any other tertiary institution.

No other person's work has been used without due acknowledgment in the main text of the thesis.

All research procedures reported in the thesis received the approval of the relevant Ethics/Safety Committees.

In producing this thesis, I engaged in two collaborations. The first was with Dr. Hannes Le Roy at the University of Rotterdam, who agreed to include several measures for my research (i.e., those specified in Study 1 of this thesis) as a part of data collection he was undertaking for separate research. Following data-collection, Dr Le Roy provided me with this data, which I then analysed and wrote up as Study 1 of this thesis.

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Signed.....

Date.....

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ABSTRACT

Theories of mindfulness emphasise its role in enhancing self-regulation, including in the presence of negative emotion. However, most studies of mindfulness in social and clinical psychology have focused on its influence on affective outcomes such as stress, anxiety and well-being, rather than on outcomes relating to self-regulation. In this thesis I aim to address this gap by examining whether mindfulness enhances approach and inhibits avoidance coping responses following stressful events.

In two studies, mindfulness was manipulated using a brief induction (Study 1) and a multi-session intervention (Study 2), and the effects of both manipulations on approach and avoidance coping were examined, relative to controls. In Studies 3 and 4, I examined the effects of two mindfulness components – acceptance and cognitive defusion – on coping responses. Study 3 manipulated acceptance and cognitive defusion via a brief induction and examined effects on behavioural measures of approach and avoidance. Study 4 measured the effects of acceptance and cognitive defusion as intra-individual difference variables on coping with daily stressful events. In addition, Studies 1 to 3 examined whether perceived stress moderated the effects of mindfulness manipulations on coping responses, which has not been done before.

Across Studies 1 to 3, there were significant, small-to-medium main effects of mindfulness manipulations on coping responses, as well as consistent evidence for perceived stress as a moderator of these effects on avoidance coping. In Study 4, I found that cognitive defusion predicted greater approach and less avoidance coping both within the same day and across days. Together these findings suggest that mindfulness and mindfulness components have an important role to play in enhancing coping responses. Mindfulness appears to most consistently reduce avoidant forms of coping, and these

effects are most substantial among relatively stressed individuals. These findings are consistent with theories of mindfulness which emphasise its role in behaviour-regulation, and provide novel evidence for these effects in the context of coping with stressful events. At a practical level, this research suggests that mindfulness interventions serve to reduce general avoidant behaviours such as blame-shifting, conflict-avoidance and defensive responding; and should have particular benefits in high-stress contexts.

CHAPTER 1

INTRODUCTION

The costs of stress

There is evidence that psychological stress and anxiety are taking a significant toll on populations in industrially developed countries. It has been estimated that in OECD countries, around 5% of the working-age population has a severe mental illness and an additional 15% of the population is effected by more common conditions such as mild-to-moderate depression and anxiety (OECD, 2015). The fourth European Survey of Working Conditions (Parent-Thirion, Macais, Hurley & Vermeulen, 2007) concluded that stress is the second-most reported workplace health problem in Europe, affecting on average 22% of workers across 27 countries. And data from the United Kingdom indicates that one worker in six experiences mental health problems such as depression, anxiety or stress at any given time; and this figure rises to one-in-five if problems related to drug and alcohol misuse are included (Seymour & Grove, 2005).

Just as alarmingly, there is evidence that the way individuals are coping with these stressors is often ineffective, with increases in absenteeism, presenteeism (i.e. being at work while ill or unproductive) and the use of pharmaceuticals to cope with mental ill-health. For example, a 2002 US survey found that 42.1% of absences attributed to mental ill-health involved 31 or more days away from work per annum (National Institute for Occupational Safety and Health, 2004). An Australian study (Medibank, 2008) found that stress-related

workplace absenteeism and presenteeism cost the Australian economy around AUD 11.6 billion in 2006, equating to around 1.5% of Australia's GDP.

The incidence of anti-depressants and anti-anxiety medications as means of coping with stress is also on the rise across OECD countries. For example, in 2010, more than one-in-five US adults was regularly consuming at least one mental health drug, an increase of 22% from the year 2000 (Medco, 2011). The OECD estimates that the direct (e.g., cost of medications and long-term care costs) and indirect costs (e.g., absenteeism, presenteeism and stress-related staff turn-over) of mental ill-health exceeds 4% of GDP in a number of OECD countries (OECD, 2014).

As a consequence, the past five years has seen a growing interest among governments, employers and civil society organisations across the OECD in tackling mental health problems (OECD, 2015). An important part of this effort lies in helping individuals to access healthy ways of coping with stress, such as seeking counselling or psychological support, or broader social support, rather than engaging in avoidant or addictive coping strategies that are maladaptive over the long-term. In this context, a number of alternative 'life-style' therapies and approaches to handling stress have gained popularity, as they have minimal side-effects, are cheap to administer, are highly flexible to the individuals' life-situation and are not addictive. Central among these is mindfulness.

The mindful revolution

Over the last decade, there has been an exponential rise in interest in mindfulness-based approaches to coping with stress and building mental health. The world's largest organisations such as Google, Apple and IBM are embracing mindfulness programs as a means of enhancing staff engagement and managing the demands of an 'always-on' work culture. There has also been an upsurge of interest in mindfulness in the helping

professions, including for staff and students or patients in schools, hospitals, law-enforcement agencies and other service organisations as a means of enhancing resilience and protecting against burnout (Poulin, Mackenzie, Soloway, & Karayolas, 2008). Finally, mindfulness-based approaches to treating psychopathology (so-called ‘third-wave’ therapies; Hayes, Luoma, Bond, Masuda, & Lillis, 2006) have increased substantially over the past decade (Khoury et al., 2013). Indeed, in February 2014 Time Magazine declared a ‘mindful revolution’ in the developed world, running a cover-story on mindfulness that captured global media attention, perhaps marking a high-point in popular media interest in the construct.

Accompanying this rise in popular interest in mindfulness has been an exponential increase in mindfulness research over the past two decades. Mindfulness-based interventions have been studied for their effects on clinical outcomes such as anxiety, depression and psychosis (Hofmann, Sawyer, Witt, & Oh, 2010; Khoury et al., 2013), physical health behaviours (Keng, Smoski, & Robins, 2011), addictions (Bowen & Marlatt, 2009), and more recently, outside the clinic, on stress-reduction and well-being enhancement, in domains including corporations (Reb, Narayanan, & Chaturvedi, 2012), schools (Zenner, Herrnleben-Kurz, & Walach, 2014), healthcare organisations (Khoury, Sharma, Rush, & Fournier, 2015) and law-enforcement agencies (Williams, Ciarrochi, & Deane, 2010).

Mindfulness-based theoretical models

Mindfulness research has largely occurred in a bottom-up way, with research programs mainly driven by empirical research testing the efficacy of mindfulness across a range of domains and outcomes, such as those outlined above. However in the last decade, researchers have started to offer theoretical accounts of *how* mindfulness operates,

including possible mediators of mindfulness processes on outcomes of interest (e.g., Brown, Ryan, & Creswell, 2007; Hayes et al., 2006; Shapiro, Carlson, Astin, & Freedman, 2006).

A common explanation for how mindfulness has its effect is through a shift in an individual's perspective: from experiencing thoughts, feeling and sensations *as* oneself (i.e., as the subject of one's experience) to experiencing these phenomena as separate from oneself (i.e., as the object of one's experience). This change in perspective involves the increase in 'psychological distance', meaning mental and physical experiences are viewed with greater objectivity and non-attachment (Shapiro et al., 2006). This same basic process has been described in several theoretical accounts of mindfulness as 'reperceiving' (Shapiro et al., 2006), 'decentering' (Teasdale et al., 2002) and as the experience of 'self-as-context' (Hayes et al., 2006).

Shapiro et al. (2006) describe how reperceiving in-turn facilitates enhanced behavioural regulation - that is, a greater willingness to be exposed to unpleasant thoughts, feelings and sensations, reduced emotional reactivity, and greater response flexibility due to being less 'caught up' in events as they occur. Other mindfulness theorizing is consistent with these basic descriptions of enhanced behavioural regulation following mindfulness practice, independent of how much negative affect a person experiences (e.g., Brown et al., 2007; Hayes et al., 2006).

Mindfulness and behavioural responses to stress

Despite these clear theoretical predictions regarding the effects of mindfulness on behavioural regulation, the vast majority of mindfulness research to-date has focused solely on affective outcomes such as anxiety, depression, stress and well-being in both clinical (Hofmann et al., 2010; Khoury et al., 2013) and non-clinical settings (Khoury et al., 2015;

Sharma & Rush, 2014).

Much less research has examined the role of mindfulness in enhancing *behavioural* responses to aversive experiences, such as individuals' coping responses following stressful events. Coping responses are one way of examining individuals' behavioural responses to stress, and include both publically observable behaviour, such as active coping, planning and behavioural disengagement, as well as 'private' behaviour, such as positive reinterpretation, denial and self-distraction (Skinner, Edge, Altman, & Sherwood, 2003; Weinstein, Brown, & Ryan, 2009). Empirical support for the effects of mindfulness on coping will provide valuable evidence for the basic theoretical claim outlined above: that is, that mindfulness enhances behavioural regulation in the presence of negative affect. The need to fill this research gap is underscored at a practical level, given the growing costs of maladaptive coping with stress outlined above, and the associated upsurge in interest in mindfulness-based interventions as a stress-management tool within organisations and the general community (Virgili, 2013).

The present thesis

The aim of this thesis is to test whether mindfulness enhances individuals' coping responses following stressful experiences. In studying coping responses, the frame-work of approach versus avoidance coping (Roth & Cohen, 1986) is used in this thesis to describe two basic (and orthogonal) responses an individual may have to stressful experiences. Approach coping describes attention directed *toward* a stressor, while avoidance coping described attention directed *away* from a stressor (Roth & Cohen, 1986). Approach and avoidance is one of the most widely-researched models of coping (Kato, 2013) and has been used in several previous studies of mindfulness and coping (e.g., Halland et al., 2015; Sears & Kraus, 2009; Walach et al., 2007).

As outlined in Chapter 2, studies of mindfulness and coping have to-date been hampered by problems of small sample sizes and limited statistical power to detect effects. Moreover, the heterogeneity of mindfulness interventions in studies of mindfulness and coping to-date makes it difficult to draw clear conclusions from this research. The aim of this thesis is therefore to highlight several of these gaps in this literature, and then to fill them using a multi-method approach: that is, using both experimental and longitudinal research methods. In this thesis, a multi-method approach enabled basic psychological processes relating to mindfulness and coping to be tested in a controlled laboratory environment (Studies 1 and 3); and then these same processes to be tested *in vivo*, using both experimental (Study 2) and longitudinal daily diary methods (Study 4).

This thesis is structured as follows: Chapter 2 provides an overview of the extant research on coping, mindfulness, and studies exploring both constructs together. It highlights several of the limitations and gaps in this literature and then frames these as research questions to be examined in this thesis. Chapter 3 is an overview of the analytic methods used in this thesis, and introduces structural equation modelling and multi-level modelling, the two main analytic approaches used in this thesis.

Chapters 4 to 7 are the substantive chapters of the thesis. Chapter 4 reports Study 1, a laboratory experiment in which a brief mindfulness induction was compared with two control inductions (self-affirmation and relaxation) for its effect on coping responses. Chapter 5 reports Study 2 which extended Study 1 by testing the effects of a multi-session mindfulness intervention on coping with significant monthly stressors. Chapters 6 and 7 tested two mindfulness ‘components’ hypothesized to particularly enhance coping responses: acceptance and cognitive defusion (Hayes et al., 2006). Chapter 6 reports Study 3, a laboratory-based experiment that compared brief acceptance and cognitive defusion inductions with two control inductions (self-affirmation and relaxation) upon coping

responses measured behaviourally. Chapter 7 reports Study 4 which was a longitudinal study testing whether both acceptance and cognitive defusion predicted greater approach and less avoidance coping with *daily* stressors, over a 20-day period. Chapter 8 discusses the results of these studies and attempts to identify coherent themes emerging from this body of work, before drawing together its main conclusions.

CHAPTER 2

LITERATURE REVIEW

This chapter provides an overview of the literature on coping and mindfulness, and reviews the evidence for why mindfulness interventions should enhance coping responses. In addition, this chapter identifies several under-researched areas of this literature that warrant further investigation and are addressed in the substantive chapters of this thesis. The chapter concludes with the aims of the thesis and the major research questions it addresses.

Coping responses

According to Lazarus and Folkman's (1987) transactional theory, stress occurs when the demands of a situation are appraised as exceeding the individual's capacity to respond to it. In such situations, the individual makes two general kinds of appraisal: a primary appraisal of whether the stressor represents a threat, potential harm or a challenge; and a secondary appraisal of the person's ability to influence the stressful situation (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Lazarus, 1993). These appraisals are said to occur simultaneously but shape a person's coping response to a stressful experience (Folkman et al., 1986).

Coping responses have been defined as "efforts to prevent or diminish threat, harm, and loss, or to reduce associated distress" following a stressful experience (Carver & Connor-Smith, 2010, p. 685); and as "thoughts and behaviors that people use to manage the internal and external demands of situations that are appraised as stressful" (Folkman &

Moskowitz, 2004). In this way, coping describes the different methods individuals' employ to reduce the *impact* of stressful encounters, and is an inherently situation-specific construct (Lazarus & Folkman, 1987).

Coping responses are generally viewed as conscious, effortful responses to stress, and this distinguishes them from defenses, which are generally viewed as automatic and unconscious responses to stress or threat (Cramer, 1998; Kramer, 2010). The research on coping is extensive, and dozens of classifications of coping responses have been offered over the past four decades (see Skinner, Edge, Altman, & Sherwood, 2003). Within this literature, the distinction between avoidance and approach coping is one of the most widely used (Carver & Connor-Smith, 2010; Skinner et al., 2003). Moreover, this distinction has been used in a number of studies of mindfulness and coping (e.g., Halland et al., 2015; Josefsson, Lindwall, & Broberg, 2012; Sears & Kraus, 2009; Weinstein et al., 2009), so using it in the present thesis builds upon previous research into mindfulness and coping.

Approach and avoidance coping

Approach and avoidance coping have been described as being, respectively, “cognitive and emotional activity that is oriented either toward or away from threat” (Roth & Cohen, 1986, p. 813). Approach coping involves reducing distress by taking steps to directly remove the stressor or reduce its impact (Carver & Connor-Smith, 2010). On the other hand, avoidance coping involves efforts to reduce distress by taking actions (e.g., behavioural disengagement) or cognitions (e.g., denial) to avoid direct contact with or exposure to the stressor (Carver & Connor-Smith, 2010). A key distinction between approach and avoidance coping is the *orientation* of the individual in relation to the stressor – either toward (i.e., approach coping) or away from it (i.e., avoidance coping). Examples of approach coping include seeking to learn from a stressful experience, planning a

response and positively reframing the experience, while examples of avoidance coping are denial, distraction and mental disengagement (Weinstein et al., 2009).

Although avoidant coping responses often serve short-term adaptive functions by reducing exposure to a threat (e.g., Sherman & Cohen, 2006), they come at the cost of not learning from the stressful experience (van 't Riet & Rutter, 2013) or missing out on important information (Brown & Locker, 2009). Over the long term, avoidance coping has been associated with significantly worse psychological well-being (Penley, Tomaka, & Wiebe, 2002; Rayburn et al., 2005; Roesch et al., 2005) whereas approach coping has been found to predict enhanced well-being (Duangdao & Roesch, 2008; Penley et al., 2002; Roesch et al., 2005; Suls & Fletcher, 1985).

Measuring approach and avoidance coping responses

Several psychometrically reliable and valid scales have been used to measure approach and avoidance coping. Perhaps the most commonly-used of these is the COPE Inventory (Carver, Scheier, & Weintraub, 1989). This scale is composed of 13 subscales, each describing a specific coping response (e.g., denial, self-distraction, planning, positive reinterpretation) using four items for each subscale. Although not explicitly designed to measure approach and avoidance coping (but rather designed to measure specific coping behaviours), the COPE Inventory has been commonly used to do so (e.g., Deisinger, Cassisi, & Whitaker, 1996; Lyne & Roger, 2000; Stowell, Kiecolt-Glaser, & Glaser, 2001; Weinstein et al., 2009). Another scale that has been used more recently to measure approach and avoidance coping is the Brief COPE (Carver, 1997), comprised of two items for each of the 13 subscales of the COPE Inventory. A number of studies (e.g., Kapsou, Panayiotou, Kokkinos, & Demetriou, 2010; Karekla & Panayiotou, 2011) have obtained distinct approach and avoidance factors from this scale. In addition, the Coping Inventory of

Stressful Situations (CISS) has been used to examine approach and avoidance coping (Enders & Parker, 1990). The CISS is comprised of three factors: task-oriented coping (similar to approach coping); emotion-oriented coping; and avoidance coping.

However a criticism of the coping literature is its reliance on self-report measures of global coping traits, rather than measuring coping in the context of specific stressors (Shikai, Nagata, & Kitamura, 2014). Reviews of coping measures have found substantial discrepancies between measures of global coping traits and retrospective measures of specific coping responses (Schwartz, Neale, Marco, 1999; Shikai et al., 2014). To address this criticism, versions of major coping scales, such as the Ways of Coping Questionnaire (Folkman et al., 1986) and the COPE Inventory, have been recast in situation-specific terms. While this goes some way to addressing the problem, other studies have identified further discrepancies between retrospective and momentary measures of coping responses, due to recall biases associated with retrospective measures (Ptacek, Smith, Espe, & Raffety, 1994; Stone et al., 1998), though this is not as significant as the discrepancies between global and retrospective coping measures (Todd et al., 2004).

Based on this evidence, there is merit in using context-specific rather than global measures in the study of coping, and when possible, using momentary or daily measures of coping-in-context, rather than retrospective measures. This thesis used context-specific measures of coping in several ways: in Studies 1 and 2 (Chapters 4 and 5 respectively), subjects were asked to recall a recent stressful event and report their coping responses using the COPE Inventory; while in Study 4 (Chapter 7), on a daily basis, subjects recorded their levels of approach and avoidance coping with daily stressors.

Finally, almost no attention has been paid in the coping literature to the use of behavioural measures of coping. While behavioural measures are generally more difficult

to administer than surveys and have been in general decline in social and personality psychology research in recent decades (Baumeister, Vohs, & Funder, 2007), they represent a much higher standard of evidence than self-reports and their use could be further explored in the study of coping. Such measures have been used, for example, in the study of defensiveness (Mueller & Dweck, 1998; Nussbaum & Dweck, 2008), and the coping literature could arguably draw from literature such as this in designing measures of observable coping behaviour. No published study has yet used a behavioural measure of coping responses. To address this gap, a behavioural measure of both approach and avoidance coping was piloted in Study 3 (Chapter 6), measuring the extent to which subjects approached and avoided social comparison following failure.

The goodness-of-fit hypothesis

As well as exploring the antecedents and consequences of various coping behaviours, coping researchers have also examined contextual factors that moderate the expression of specific coping behaviours (Folkman & Moskowitz, 2004). One such contextual factor is the extent to which a stressor is controllable (Park, Armeli, & Tennen, 2004). The concept of ‘stressor controllability’ is conceptually similar to secondary appraisal outlined above, in that both concepts relate to an individual’s ability to influence a stressful situation. However the two constructs can be distinguished on the basis that secondary appraisal relates to an individual’s perceived *personal ability* or *self-efficacy* in relation to the stressor; while the stressor controllability relates to the *nature* of the stressor itself, and whether it is something that can in fact be influenced or changed (e.g., a heated discussion with someone) or not (e.g., a piece of bad news; Lazarus & Folkman, 1987).

Individuals are said to adjust their coping response based on how controllable a stressor is, and this is known as the goodness-of-fit hypothesis (Folkman & Moskowitz,

2004; Park, et al., 2004). According to this hypothesis, when a stressor is controllable, problem-solving coping strategies are said to be more likely, whereas when a stressor is difficult to control, more emotion-focused and avoidant strategies are more likely (Folkman & Moskowitz, 2004). This response-environment fit is claimed to serve an adaptive outcome, as individuals are not wasting energy addressing stressors that cannot be changed (Folkman & Moskowitz, 2004; Park et al., 2004). Moreover, the fit between coping response and situational control is said to predict how effectively individuals adapt to stressors, independent of the effects of specific coping strategies on an individual's well-being (Zeidner & Saklofske, 1996).

There is partial evidence for the goodness-of-fit hypothesis. Increases in problem-focused strategies when a stressor is controllable have been found, but there is less evidence for the use of avoidant and emotion-focused responses to uncontrollable stressors (Park et al., 2004). This may be because some emotion-focused (e.g., venting) and avoidant (e.g, distraction or denial) forms of coping may often not be adaptive, including in response to uncontrollable stressors. In the present thesis, measures of event controllability were administered in Study 4 (Chapter 7), enabling the goodness-of-fit hypothesis to be tested. Specifically, I examined whether or not mindfulness facilitates enhanced approach coping, measured as efforts to directly engage with the stressor, in controllable (but not uncontrollable) stressful situations. I expected that mindfulness would enhance the fit between the nature of a stressful situation and a person's response to it. The next section explores the nature of mindfulness and the evidence for its positive effects, before reviewing the effects of mindfulness training upon coping responses.

Mindfulness

The study of mindfulness in psychology research is a relatively recent phenomenon. Derived from Eastern contemplative traditions, mindfulness has attracted exponentially increasing interest among psychology researchers over the past two decades (Chiesa, 2012; Keng et al., 2011). Mindfulness interventions in both clinical and non-clinical contexts have been shown to have positive effects on psychological symptoms, such as anxiety and depression (Chiesa & Serretti, 2011; Keng et al., 2011; Khoury et al., 2013) and on stress more broadly (Brown et al., 2007; Khoury et al., 2015).

Defining mindfulness

Although there is some variation within psychology as to a definition of mindfulness, there is general consensus that it describes a particular way of paying attention – that is, with an openness and receptivity to moment-by-moment experience (Brown & Ryan, 2003; Shapiro et al., 2006). Indeed, perhaps the most widely-cited definition of mindfulness is “paying attention in a particular way: on purpose, in the present-moment and non-judgmentally” (Kabat-Zinn, 1990). A key feature of this definition is that it describes a particular form of individual *behaviour*, rather than a personality trait or a state, meaning that mindfulness is something that can be ‘done’ by individuals rather than being caused by a separate psychological process or set of behaviours (Hayes & Fletcher, 2005).

Despite this generally-accepted definition of mindfulness as a particular way of paying attention, there are a number of related definitions of mindfulness that vary around this basic idea in terms of their emphases. For example, another well-cited definition of mindfulness distinguishes the attentional (i.e., present-moment oriented) from the affective component (i.e., an attitude of openness and receptivity) of mindfulness, resulting in a two-facet definition (e.g., Bishop, et al., 2004). Others emphasise multiple facets, such as present-moment awareness, acceptance, not taking thoughts literally and viewing

experience from the perspective of an observer (Hayes et al., 2006); or observing, acting with awareness, describing present-moment experience, non-judging and non-reactivity to present-moment experience (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). Despite these variations in how mindfulness has been defined, and in-turn measured (see *Mindfulness Measures* section, below), there is evidence that the main extant measures of mindfulness display convergent validity and describe a common, over-arching construct (Siegling & Petrides, 2014). From this perspective, mindfulness as a singular construct appears to have a conceptual and psychometric coherence that makes it valid to study it as a unitary phenomenon. Studies 1 and 2 (Chapters 4 and 5) of this thesis take this approach, aiming to manipulate mindfulness as a unitary construct (i.e., an open and receptive awareness of present-moment phenomena).

However, one advantage of examining specific mindfulness facets or components is that doing so enables a more fine-grained analysis of which specific mindfulness behaviours influence different outcomes of interest (Bishop et al., 2006; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008; Hayes et al., 2006). A commonly-cited example of why this might be important is that the attentional element of mindfulness (i.e., attention directed toward one's current thoughts and feelings) has been found to undermine well-being in certain contexts such as rejection (Ayduk, Mischel, & Downey, 2002), physical pain (Roelofs, Peters, Patijn, Schouten, & Vlaeyen, 2004) and panic (Ehlers & Breuer, 1996), while in these contexts, acceptance (i.e., not seeking to change the form or frequency of one's experience) has been found to enhance well-being (Cardaciotto et al., 2008; Hayes et al., 2006). Identifying the various contexts in which specific mindfulness facets influence outcomes enables a more nuanced and precise understanding of the 'active ingredients' of mindfulness skills, and in-turn points to potential mediators by which it has its effects (Baer et al., 2006; Hayes et al., 2006).

In the context of enhancing the ways in which individuals cope with stress, there is evidence that two facets of mindfulness should have a particularly strong impact. One is acceptance and the other is cognitive defusion. Both these facets have been identified as core mindfulness components or sub-processes within the acceptance and commitment therapy literature (ACT; Hayes et al., 2006, 1999), though neither of these components is unique to the ACT conceptualisation of mindfulness. Next, these two components are discussed in more detail, along with the evidence for why one would expect each to have a particularly strong influence coping responses.

Acceptance

Acceptance has been defined as “actively embracing the private events evoked in the moment without unnecessary attempts to change their frequency or form” (Hayes & Fletcher, 2005, p. 7). Here, “private events” refer to individual experiences that cannot be directly observed by another, such as sensations, thoughts and emotions (Hayes et al., 1999). Aside from the ACT conceptualisation of mindfulness, other definitions of mindfulness similarly identify acceptance as an important component. As discussed, Bishop et al. (2006) distinguish acceptance from the attentional component of mindfulness, while others include constructs related to acceptance within their definitions of mindfulness, such as non-judgement and non-reactivity (Baer et al., 2006; Cardaciotto et al., 2008).

By accepting difficult or aversive thoughts, feelings and sensations, an individual is more likely to willingly engage with these experiences, and, in the context of coping, this means their behaviour is likely to be less avoidant and more approach-focused (Hayes et al., 2006; Shapiro et al., 2006). There is evidence for this from a number of sources. For example, experiential avoidance, which is the tendency to psychologically avoid unwanted

thoughts and feelings and the opposite of acceptance, has been shown to predict less approach coping (i.e., positive reframing) and more avoidance coping (i.e., denial, self-distraction and behavioural disengagement) with stressful events (Karekla & Panayiotou, 2011). Brief manipulations of psychological acceptance have been found to reduce behavioural avoidance and increase willingness to be exposed to aversive stimuli. For example, two studies randomly assigned individuals to receive brief manipulations of either psychological acceptance or experiential control, and then exposed them to CO₂-enriched air (a commonly-used analogue of a panic attack). Both studies found significantly greater willingness to be exposed to the CO₂-enriched air among those in the acceptance than the experiential control conditions (Eifert & Heffner, 2003; Levitt, Brown, Orsillo, & Barlow, 2004). In another, related study, subjects were randomly allocated to either psychological acceptance or thought control manipulations, with those in the former group reporting significantly more tolerance of receiving an electric shock (Gutiérrez, Luciano, Rodríguez, & Fink, 2004). Although not explicitly measuring approach and avoidance coping, these studies provide evidence of greater approach-oriented behaviour and less avoidance following an acceptance induction.

Further relevant evidence comes from studies of the effects of acceptance-based inductions on addictive behaviours. For example, Bowen and Marlatt (2009) found that brief instruction in mindfully accepting unpleasant smoking-related thoughts, feelings and sensations resulted in significantly less smoking over the subsequent seven days, while Gifford et al. (2004) found that seven individual and seven group therapy sessions focused on cultivating mindful acceptance as well as values-consistent action resulted in reduced smoking rates at 12 months follow-up relative to a treatment-as-usual control. Addictive behaviours such as smoking can be viewed as avoidance-oriented behaviour, as they take the individual away from contact with unpleasant thoughts and feelings (Gifford et al.,

2004), meaning that reductions in smoking incidence and other substance use implies a reduction in avoidance coping. Finally, a study found that following academic failure, self-compassion was negatively associated with avoidant coping responses among university students (Neff, Hsieh, & Dejitterat, 2005). Self-compassion is closely related to acceptance (Yadavaia, Hayes, & Vilaradaga, 2014). It involves noticing suffering and bringing kindness and acceptance to this experiences, and in this sense is closely related to self-acceptance (Neff, Kirkpatrick, & Rude, 2007). Taken together, this evidence suggests that acceptance, a core component of mindfulness, is likely to have a particularly strong influence on coping responses, enhancing approach and inhibiting avoidance coping.

Cognitive defusion

A second mindfulness component referred to as ‘cognitive defusion’ in the ACT literature (Hayes et al., 1999, 2006) may also have a particularly strong impact on how individuals cope with stress. Cognitive defusion describes the process of distancing from thoughts and involves a process of recognizing thoughts as verbal processes, rather than as literally the objects and events they represent (Blackledge, 2007; Gillanders et al., 2014). As a construct, cognitive defusion is similar to ‘reperceiving’ (Shapiro et al., 2006) and ‘decentering’ (Teasdale et al., 2002) used elsewhere in the mindfulness literature. Common to these constructs is ‘stepping back’ from thoughts and gaining perspective on them (Shapiro et al., 2006). Exercises designed to foster cognitive defusion typically involve the repetition of a word until it loses its literal meaning, or exercises in noticing and distancing from thoughts via a metaphor, for example placing each thought on an imaginary leaf and watching it float away down a stream (Hayes et al., 1999; and used in Study 3 [Chapter 6] of this thesis). With increased psychological distance from the content of one’s thoughts, and a perspective in which thoughts can be viewed as words and images rather than as facts, they have less influence on behaviour (Blackledge, 2007; Gillanders et al., 2014).

In the context of coping with stress, individuals who cognitively defuse from stress-related thoughts are less likely to avoid situations where they experience such thoughts (i.e., avoidance coping) and are more likely to engage with such situations in constructive ways (Gillanders et al., 2014). Support for this comes from a number of studies of cognitive defusion inductions, involving the repetition of aversive words, and the influence of such an induction on believability and distress in relation to aversive thoughts. These studies reported reductions in emotional discomfort and negative thought believability among non-clinical samples following brief cognitive defusion manipulations, relative to control conditions that were asked to control their thoughts or distract themselves (Mandavia et al., 2015; Masuda, Feinstein, Wendell, & Sheehan, 2010; Masuda, Hayes, Sackett, & Twohig, 2004; Masuda, Twohig, et al., 2010; Watson, Burley, & Purdon, 2010). Another study administered the ‘leaves on a stream’ cognitive defusion protocol, used in Study 3 of this thesis, prior to a cold-pressor task (i.e., inducing physical pain) and found those in the cognitive defusion condition showed significantly more pain tolerance than those in pain-control and attention-placebo control conditions (Takahashi, Muto, Tada, & Sugiyama, 2002). Pain tolerance involves the non-avoidance of a potentially stressful experience and a willingness to experience such pain, and so has links with greater approach coping. This evidence suggests that, by creating psychological distance from one’s stress-related cognitions (i.e., cognitive defusion), individuals are less likely to be governed by their stress-related thoughts, meaning they are likely to be less avoidant and more willing to engage in approach coping behaviours following stressful events.

Other commonly-studied mindfulness components, such as present-moment awareness, have not demonstrated as consistent or large effects on outcomes related to coping responses as acceptance and cognitive defusion have (Levin, Hildebrandt, Lillis, & Hayes, 2012). Further, in relation to present-moment awareness, there is evidence that in

stressful or unpleasant situations, greater awareness of internal states can actually *enhance* stress, anxiety and rumination, making avoidant responses such as substance abuse more likely (Cardaciotto et al., 2008). This is because increased attention to unwanted and negative internal states, without acceptance and distancing from related thoughts (i.e., cognitive defusion) is likely to intensify the experience of such unwanted thoughts and feelings, amplifying their impact (Cardaciotto et al., 2008; Hayes et al., 2006).

In this thesis, Studies 3 (Chapter 6) and 4 (Chapter 7) examined the effects of both acceptance and cognitive defusion on coping responses. This was done by experimentally manipulating acceptance and cognitive defusion in the laboratory and measuring their effects on approach and avoidance coping (Study 3), and by examining the effects of both mindfulness components on coping with daily stressors outside the laboratory (Study 4).

Mindfulness measures

Several measures of mindfulness as a general trait have been developed in the social and clinical psychology literature, including single-construct scales and multi-faceted scales (for reviews, see Chiesa, 2012; Keng et al., 2011). Commonly-used single-factor measures of mindfulness include the Mindful Attention and Awareness scale (MAAS; Brown & Ryan, 2003) and the Freiberg Mindfulness Inventory (FMI; Walach et al., 2006). A widely-used two-factor measure of mindfulness is the Philadelphia Mindfulness Scale (PMS; Cardaciotto et al., 2008), which measures the acceptance and attentional components of mindfulness as two separate factors. Finally, common multi-factor measures of mindfulness include the Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004), which includes four facets: observing, describing, acting with awareness, and non-reactivity; and the Five-Facets of Mindfulness Questionnaire (FFMQ; Baer et al., 2006), which adds a fifth mindfulness facet to the KIMS facets: non-judging. All of these scales have been found to have acceptable psychometric properties (Siegling & Petrides, 2014).

Whereas they are less common in the assessment of mindfulness, several state measures have also been validated, including a state-version of the MAAS (Brown & Ryan, 2003), the Toronto Mindfulness Scale (TMS; Lau et al., 2006), and more recently, the State Mindfulness Scale (SMS; Tanay & Bernstein, 2013).

Studies in this thesis primarily manipulate mindfulness (Studies 1 to 3; Chapters 4 to 6), rather than measuring it as an individual-difference construct. However in Study 4 (Chapter 7), state measures of acceptance and cognitive defusion are used, adapted respectively from the Acceptance and Action Questionnaire (AAQ; Bond et al., 2011) and the Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014). Further information about these scales is provided in Chapter 7.

Mindfulness interventions

A range of mindfulness interventions have been used to experimentally study the influence of mindfulness on outcomes of interest. These interventions range from multi-session interventions, such as the eight-week Mindfulness-Based Stress Reduction program (Kabat-Zinn, 1990; Kabat-Zinn et al., 1992), through to brief 10-15 minute mindfulness inductions (Keng et al., 2011). For the present thesis, both a multi-session mindfulness intervention (Study 2, Chapter 5) and a brief mindfulness induction (Study 1, Chapter 4) were conducted. A brief review of both kinds of intervention is provided next. In addition, induction studies of specific mindfulness components, namely acceptance and cognitive defusion, are reviewed below, as these are the focus of Studies 3 and 4 in this thesis.

Multi-session mindfulness interventions

Several multi-session mindfulness protocols have been developed over recent decades. Most notable among these are Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990); Mindfulness-Based Cognitive Therapy (MBCT; Segal et al., 2002);

Dialectical Behaviour Therapy (DBT; Linehan, 1993); and Acceptance and Commitment Therapy (ACT; Hayes et al., 1999).¹

MBSR (Kabat-Zinn, 1990) was originally developed as a group intervention for patients with chronic pain, but has been since delivered in a wide range of non-clinical settings, including workplaces (see Virgili, 2013, for a review). The MBSR program teaches mindfulness skills through both meditation and every-day mindful awareness as a means of reducing stress and being more present and connected with one's daily life. MBSR typically involves eight sessions, each lasting 2.5 hours, followed by a day-long silent retreat (Kabat-Zinn et al., 1992).

MBCT (Segal, Teasdale, Williams, & Gemar, 2002) is an eight week group program adapted from MBSR that was developed primarily to reduce instances of depressive relapse. It combines mindfulness training with cognitive therapy approaches and focuses on changing patients' relationship to unwanted thoughts and feelings that trigger relapse, rather than changing their frequency or content (Teasdale et al., 2002).

DBT (Linehan, 1993) was developed as a clinical treatment for suicidal and other self-harming behaviour. DBT combines traditional Cognitive Behavioral Therapy with Zen practices, and focuses on helping clients to increase acceptance of aversive emotions, and uses mindfulness to reduce avoidance of difficult emotion and fear responses (Linehan, 1993). DBT is delivered in four ways: individual therapy, group training, telephone consultations between the therapist and patient, and consultation team meetings for therapists.

ACT (Hayes et al., 1999) was also developed as a therapeutic approach that centres

¹ For a review of these protocols and their efficacy in relation to psychological outcomes, see Keng et al. (2011).

on mindfulness skills training, but a significant point of difference between ACT and the above interventions is its focus on values-clarification (Hayes et al., 2006). Central to the psychological flexibility model in ACT, mindfulness and acceptance skills are used to engage in behaviours that are consistent with an individual's personally-held values, even when doing so is uncomfortable or difficult (Hayes et al., 1999).

In addition, many variants of these protocols have been administered in studies of mindfulness (Khoury et al., 2013). These variations are typically due to constraints regarding the length of the protocol among a given sample (e.g., Bergen-Cico, Possemato, & Cheon, 2013), using a self- rather than instructor-led training approach (e.g., Hülshager, Alberts, Feinholdt, & Lang, 2012), a greater focus on mindfulness meditation (e.g., Sears & Kraus, 2009), or the use of mindfulness training approaches linked more directly to specific contemplative traditions, such as Vipassana training courses (e.g., Chambers, Lo, & Allen, 2007). As a result, there is considerable heterogeneity in the kinds of mindfulness interventions reported in the scholarly literature.

Mindfulness inductions

In addition to studying the effects of multi-session mindfulness interventions, several studies have examined the effects of brief mindfulness inductions upon outcomes of interest. Such mindfulness inductions commonly involve the application of conscious attention to an object (e.g., bodily sensations, sounds, etc), with an attitude of openness and curiosity, and are typically adapted from longer mindfulness protocols, such as MBSR or MBCT (Keng et al., 2011). Examples of protocols used in mindfulness induction studies include the 'raisin eating' exercise, in which individuals are guided through a process of touching, viewing, smelling and tasting a raisin in a deliberate and conscious manner (e.g., Heppner et al., 2008; Reb & Narayanan, 2014); attending to one's breathing in a non-judgmental way (e.g., Arch & Craske, 2006; Tan, Lo, & Macrae, 2014); and cultivating

awareness of sensations in the body (e.g., Ostafin & Kassman, 2012). These mindfulness inductions typically range in length from five (e.g., Tan et al., 2014) to 15 minutes (e.g., Arch & Craske, 2006).

In addition, there have been several induction studies of specific mindfulness components, and those focused on acceptance and cognitive defusion are reviewed here due to their relevance to this thesis. Acceptance inductions aim to promote willingness to be in contact with unwanted thoughts, emotions or sensations (Hayes et al., 2006). Examples of such inductions are 10-15 minute guided instructions in paying close attention to sensations and thoughts, and not trying to change or get rid of them in any way (e.g., Bowen & Marlatt, 2009; Levitt et al., 2004). In addition, other acceptance-focused manipulations emphasise *self*-acceptance (linked to self-compassion; Neff et al., 2005, 2007), which includes accepting difficult or unpleasant experiences with kindness but also knowing that such experiences are a common human experience (Yadavia et al., 2014). A self-acceptance induction like this was used in Study 3 (Chapter 6) of this thesis.

Several experimental studies over the last decade have administered cognitive defusion inductions (e.g., De Young, Lavender, Washington, Looby, & Anderson, 2010; Harnett & Carr, 2013; Masuda, Feinstein et al., 2010; Masuda et al., 2004; Masuda, Twohig, et al., 2010; Watson, Burley, & Purdon, 2010). Cognitive defusion inductions typically use metaphors and verbal exercises to reduce the literal believability of thoughts, and therefore undermine the impact of these thoughts upon individuals' behaviour (Hayes et al., 2006). Perhaps the most common research protocol for such inductions is a word repetition exercise that involves repeating a neutral word (e.g., "milk") multiple times, until it loses its literal meaning, then repeating negative self-referential words and noticing how these also lose their literality, and this has been used in several studies (e.g., De Young et

al., 2010; Masuda, Feinstein, et al., 2010; Masuda et al., 2004; Masuda, Twohig, et al., 2010; Watson et al., 2010). Another exercise used in studies to induce cognitive defusion is the ‘leaves on a stream’ protocol (Hayes et al., 1999), as discussed above. In this exercise, individuals visualize themselves sitting by a stream, watching leaves float down it. Each time they notice themselves thinking about something other than the exercise, they are asked to gently place the thought on a leaf and watch it float down the stream. This latter exercise is used in Study 3 (Chapter 6) of this thesis, due to its focus on creating psychological distance from thoughts and its use in inducing cognitive defusion elsewhere (Harnett & Carr, 2013; Takahashi et al., 2002; Tapper et al., 2009). This chapter has so-far reviewed mindfulness definitions, measures of mindfulness, and approaches for developing mindfulness over either an extended or brief period. I now turn to considering the existing literature on the effects of mindfulness interventions on coping responses – the primary focus of this thesis.

Mindfulness and coping responses

Despite the evidence for the effects of mindfulness interventions on affective outcomes such as stress reduction and increases in well-being (Hofmann et al., 2010; Keng et al., 2011; Khoury et al., 2013), much less research has examined the effects of mindfulness interventions upon overt *behaviours* following aversive experiences, such as coping responses. As discussed in Chapter 1, theories of mindfulness emphasise its role in enhancing self-regulation and non-habitual responding to negative affect (e.g., Hayes et al., 2006; Shapiro et al., 2006). Mindfulness is claimed to facilitate a change in perspective: from experiencing thoughts, feeling and sensations as oneself (i.e., as the subject of one’s experience) to experiencing these phenomena as separate from oneself (i.e., as the object of one’s experience). This change in perspective brings with it less automaticity and a greater willingness to be exposed to aversive experiences (Hayes et al., 2006; Brown &

Ryan, 2007; Shapiro et al., 2006), which, in-turn, may facilitate greater willingness to take direct action to remove or neutralize a stressor (i.e., approach coping) and less avoidance of direct contact with a stressor (i.e., avoidance coping). Based on these theoretical predictions, mindfulness is therefore expected to predict enhanced approach and inhibited avoidance coping responses following stressful events. In the next section, I review this literature, focusing on the evidence for the relation between mindfulness – as both a trait and an intervention – and approach and avoidance coping.

Trait mindfulness and coping responses

There is evidence that mindfulness as a general trait is associated with more approach and less avoidance coping. Weinstein et al. (2009) found that across two studies, trait mindfulness (measured using the MAAS; Brown & Ryan, 2003) predicted less avoidance and more approach coping with general life-stress (Study 2) and daily stressful events (Study 3), among a student sample. In another two studies reported in the same paper, individual differences in mindfulness predicted less avoidance coping with laboratory-induced stress (i.e., social comparison following a mental arithmetic task, Study 1) and the stress associated with the completion of a university course (Study 4).

Further, Palmer & Rodger (2009) found that higher trait mindfulness was associated with more adaptive (rational and detached) coping and less avoidance coping among a student sample. Trait mindfulness has also been associated with less avoidance of unavoidable distressing experiences (such as being criticised, humiliated or having one's weaknesses exposed) among a community sample (Bergomi, Ströhle, Michalak, Funke, & Berking, 2013). Finally, Neff, Hsieh, & Dejjitrat (2005) found that following academic failure, self-compassion (a construct that includes mindfulness) was negatively associated with avoidance-oriented coping strategies. Together, these results suggest that mindfulness

and coping (especially less avoidance coping) are correlated, and that self-reported mindfulness is associated in particular with non-avoidant responding to threatening situations.

Consistent with these findings, studies of mindfulness interventions and behavioural responses to stress more generally have found that mindfulness enhances choice and flexibility in responding to aversive experiences, so that the response is less avoidant and more values-consistent (Bond, Hayes, & Barnes-Holmes, 2006; Brown et al., 2007; Glomb et al., 2012). There is evidence that mindfulness reduces avoidance behaviours and reactivity across domains as varied as gambling (Lakey, Campbell, Brown, & Goodie, 2007), inter-personal communication (Heppner et al., 2008), physical activity (Chatzisarantis & Hagger, 2007) and exposure to unpleasant images (Arch & Craske, 2006). These studies investigating mindfulness and behavioural responses to aversive experiences provide further support for the proposition that increases in mindfulness should result in more willingness to approach stressful experiences (approach coping) and less reactivity to and avoidance of such experiences (avoidance coping).

Mindfulness inductions and coping responses

Although no study has explicitly examined the effects of a brief mindfulness induction on coping responses, a number of studies have found that general mindfulness inductions influence behaviours that are closely related to coping responses. For example Arch & Craske (2006) found that a brief mindful breathing exercise facilitated greater willingness to be exposed to distressing images relative to controls, among a sample of 60 university students. In another study, Heppner et al. (2008) found that a mindful raisin-eating induction resulted in less aggressive responses to anti-social behaviour, among an undergraduate sample of 175 students.

In addition, several studies have examined the effects of acceptance and cognitive defusion inductions on outcomes closely related to coping responses, as outlined above (see *Acceptance* and *Cognitive Defusion* sub-sections within the *Defining Mindfulness* section, above). Together, this evidence suggests that both acceptance and cognitive defusion inductions are likely to inhibit avoidance behaviours following stressful or aversive experiences and enhance individuals' willingness to engage with such experiences. Together, these studies provide evidence that mindfulness inductions, including those focused on acceptance and cognitive defusion processes, should enhance coping responses – at least over the short-term. However, studies of more elaborate mindfulness interventions have produced more inconsistent findings, as discussed next.

Mindfulness interventions and coping responses

To date there have been at least five studies of the effects of a mindfulness intervention on coping with stress. These interventions include the eight-week MBSR program (Tacón, McComb, Caldera, & Randolph, 2003; Walach et al., 2007), a six-week version of the MBSR program (Halland et al., 2015) and other multi-week mindfulness-meditation interventions (Josefsson et al., 2012; Sears & Kraus, 2009).

One study found that the eight-week MBSR program significantly increased positive coping (similar to approach coping) but did not reduce negative coping (similar to avoidance coping) among a sample of 17 German sales workers in relatively high-stress jobs (Walach et al., 2007; measured using the Coping with Stress Inventory; Janke & Erdmann, 1997). Another pilot study of 18 American women living with heart disease (Tacon et al., 2003) found that the eight-week MBSR program significantly reduced reactive coping (similar to emotion-focused coping) relative to a waitlist control condition,

but did not increase reflective coping or reduce suppressive coping (with coping measured using the Problem-Focused Styles of Coping; Heppner et al., 1995).

A more recent study (Halland et al., 2015) found that a six-week version of the MBSR program (involving shorter session lengths and a shorter day-long retreat than the standard MBSR protocol) increased problem-focused coping (similar to approach coping) relative to an active control condition (i.e., studying the standard curriculum) among a sample of 288 psychology and medicine university students. Interestingly, this study also found that the MBSR intervention reduced avoidance coping but only as a function of increased neuroticism, showing that among relatively neurotic individuals, the intervention reduced avoidance coping, but not among those reporting moderate and low levels of neuroticism.

Josefsson, Lindwall, and Broberg, (2012) assessed whether a (non-MBSR) mindfulness intervention enhanced approach and reduced avoidant coping among 126 working adults, measured using the COPE Inventory (Carver et al., 1989). Josefsson et al. (2012) administered eight, 45-minute mindfulness meditation sessions, over a four-week period. The mindfulness sessions involved a series of guided, sitting mindfulness meditations, including mindfulness of breathing, sensations, and of the body. Control conditions were a relaxation intervention of the same length and a waitlist condition. Following the interventions, the authors found no differences between either condition on either problem-focused or avoidance coping.

Lastly, Sears and Kraus (2009) administered two, multi-session mindfulness interventions – one focused on mindful attention and the other on loving-kindness – composed of weekly, 10-15 minute sessions over a 12-week period; as well as one longer intervention combining both mindful attention *and* loving-kindness meditation, composed

of weekly, two-hour sessions over seven weeks. However this study did not report changes in approach and avoidance coping following these interventions.

Together, these studies provide mixed evidence for the effects of multi-session mindfulness interventions upon approach and avoidance coping. While there is some evidence for the effects of the MBSR program on approach (Halland et al., 2015; Walach et al., 2007) and avoidance coping (Halland, et al., 2015; Tacon et al, 2003), these results were somewhat inconsistent (e.g., Josefsson et al., 2012; Sears & Kraus, 2009; Tacón et al., 2003), suggesting that mindfulness interventions may only influence an individuals' approach and avoidance coping responses in certain contexts. In the next section, I explore possible explanations for these mixed findings.

Explanations for mixed evidence from mindfulness and coping studies

Low statistical power

One explanation for these inconsistent findings is that several of the above studies (e.g., Sears & Kraus, 2009; Tacón et al., 2003; Walach et al., 2007) had small sample sizes, limiting their ability to detect intervention effects. For example, Sears & Kraus (2009) had sample sizes across four conditions of $n = 19$ (brief mindful attention), $n = 17$ (brief loving-kindness), $n = 11$ (extended mindfulness and loving-kindness) and $n = 10$ (waitlist control); Walach et al (2007) had sample sizes of $n = 11$ (treatment) and $n = 16$ (active control); and Tacon et al. (2003) had sample sizes of $n = 9$ (treatment) and $n = 9$ (waitlist control). In order to achieve statistical power of 0.8 (a commonly-accepted minimum in the social sciences; Tabachnick & Fidell, 2013), the total sample would need to be $N = 104$ ($n = 51$ per condition). This is sample-size is based on the following assumptions: the use of repeated-measures ANOVA with two experimental conditions and two measurement occasions (as in Tacón et al., 2003); a medium effect size of $f = 0.25$; $\alpha = .05$; and a

correlation among repeated measures of 0.7. This number increases to $N = 110$ for a study with two conditions and three measurement occasions (as in Walach et al., 2007).

These post-hoc power calculations suggest that several of the above coping studies were substantially under-powered, perhaps explaining their inconsistent findings. However, it should be noted that the study by Josefsson et al. (2012) used a significantly larger sample ($n = 46$ in the mindfulness treatment; $n = 40$ in the relaxation control; $n = 40$ in the waitlist control) and did not find differences between conditions on coping, suggesting that low statistical power may not be the only reason for the inconsistent pattern of results to-date.

Application of interventions to every-day experiences

Another possibility is that mindfulness interventions have a bigger influence on coping responses when they are contextualised to participants' lives and are focused on applying mindfulness to every-day situations. The studies that found positive effects on coping used MBSR (Tacón et al., 2003; Walach et al., 2007) or its reduced-form (Halland, et al., 2015). The MBSR program teaches both 'formal' mindfulness meditation, as well as 'informal' mindfulness of every-day events (Kabat-Zinn, 1990). The program aims to tailor mindfulness to the experiences of daily living, including focusing on participants' challenges and how mindfulness can help deal with these. In this sense, the program is explicitly targeted at helping individuals cope with the stresses they face on a daily basis. On the other hand, the interventions administered in the studies reporting null results (Josefsson et al., 2012; Sears & Kraus, 2009) were meditation-focused and had no explicit focus on informal mindfulness practice and applying mindfulness skills to every-day challenges. This difference in emphasis may, in turn, explain the pattern of results among these studies. If this were the case, it suggests either using the MBSR program in

subsequent mindfulness intervention studies, or more generally administering mindfulness interventions that explicitly teach skills in applying mindfulness skills to every-day challenges.

Stress as a moderator

Another explanation for these mixed results that was proposed by Josefsson et al. (2012) is that mindfulness training may influence coping behaviour among people experiencing high (but not low) levels of stress. The general pattern of findings outlined above supports this idea: the studies that did find significant effects of mindfulness interventions on coping were with individuals in relatively demanding sales roles (Walach et al., 2007) and women living with heart disease (Tacon et al., 2003), while Halland et al. (2015) found that individual differences in neuroticism interacted with an MBSR intervention to predict less avoidance coping. Neuroticism has been shown to be consistently correlated with perceived stress and negative affect (Mohiyeddini, Bauer, & Semple, 2015). In addition, several studies of brief acceptance and mindfulness inductions found reductions in avoidance behaviours in relatively stressful contexts, such as breathing CO₂ enriched air (Eifert & Heffner, 2003; Levitt et al., 2004), receiving an electric shock (Gutiérrez et al., 2004), or exposure to threatening images (Arch & Craske, 2006). Studies of cognitive defusion inductions found a similar results, such as less thought believability and distress (Masuda, Feinstein, et al., 2010; Masuda et al., 2004; Masuda, Twohig, et al., 2010), following exposure to negative self-referential thoughts. It may be, therefore, that mindfulness interventions only influence individuals' coping responses in relatively high-stress contexts. Conversely, in low-stress settings, individuals' coping responses may be relatively adaptive, meaning that mindfulness adds less value in terms of coping responses. However, this possibility has not been tested in published research.

Specific mindfulness components

Lastly, it may be that specific mindfulness components exert a particularly strong influence on coping responses. To our knowledge, this possibility has not been tested in published research. As discussed, there is evidence that psychological acceptance as well as cognitive defusion (which involves psychological distancing from thoughts) should positively impact individuals' coping responses. Based on ACT-based theorising (Hayes et al., 1999, 2006), acceptance is expected to influence coping, as acceptance increases individuals' willingness to be exposed to aversive experiences (approach coping) and inhibits the tendency to avoid such experiences (avoidance coping). Similarly, cognitive defusion is expected to enhance coping responses as individuals who cognitively defuse from their stress-related thoughts are less likely to be governed by such thoughts, which are commonly avoidant in nature (Hayes, et al., 1999, 2006). The evidence reviewed in the *Defining Mindfulness* section suggests that each of these mindfulness components is likely to enhance individuals' coping responses, increasing approach and decreasing avoidant responses. The evidence for the effects of other mindfulness components on coping, for example present-moment awareness, is weaker (for a review of the evidence for mindfulness components within the ACT framework, see Levin et al., 2012).

Aims of the thesis

Rather than building upon each other in a linear manner, the aim of the substantive chapters of this thesis was to fill several of the gaps in the mindfulness and coping literature identified above. In this context, the four substantive aims of this thesis are now briefly explained, followed by the articulation of three principal research questions.

The effects of brief and extended mindfulness manipulations upon coping responses

First, this thesis aimed to extend the as-yet limited evidence regarding the effects of mindfulness interventions upon approach and avoidance coping responses. Specifically, Studies 1 and 2 (Chapters 4 and 5) tested whether a brief mindfulness induction (Study 1), as well as a longer, multi-session mindfulness intervention (Study 2), increase approach coping and reduce the instances of avoidance coping following stressful experiences. The evidence reviewed above suggests that a mindfulness intervention increases approach (Halland et al., 2015; Walach et al., 2007) and reduces avoidance coping (Halland et al., 2015; Tacon et al., 2003), but this evidence is limited and preliminary. Further, there is evidence that brief acceptance *inductions* increase behaviours related to approach coping (willingness to be exposed to aversive stimuli; Eifert & Heffner, 2003; Levitt et al., 2004; Páez-Blarrina et al., 2008), as do cognitive defusion inductions (Masuda et al., 2004; Masuda, Twohig, et al., 2010).

As discussed, several studies of mindfulness and coping have had small sample sizes, limiting their ability to draw conclusions. The present thesis aims to address this short-coming by including sufficiently large samples that have acceptable levels of statistical power (0.8, as suggested by Tabachnick & Fidell, 2013).

In addition, several of the mindfulness interventions reviewed above that did not find significant effects on coping responses administered meditation-focused protocols, with limited attention to applications of mindfulness in daily life (e.g., Josefsson et al., 2012; Sears & Kraus, 2009). Study 2 (Chapter 5), which included a multi-week mindfulness intervention, aimed to address this issue by administering a mindfulness intervention (adapted from MBSR) that was specifically tailored to individuals' actual experiences of stress, rather than teaching mindfulness skills out of the context in which they are applied.

Stress as a moderator of the effects of mindfulness upon coping responses

Another issue emerging from the above literature is the possibility that mindfulness interventions only influence coping behaviour among relatively stressed individuals. Given the inconsistent findings within the mindfulness and coping literature, and the pattern of results from these studies outlined above, there is value in testing this in the present thesis. Accordingly, Studies 1 to 3 of this thesis tested this possibility, examining perceived stress as a moderator of the effects of mindfulness interventions upon coping responses. Study 1 measured general perceived stress over the past month, Study 2 measured perceived stress in relation to a specific stressful event, while Study 3 measured both kinds of perceived stress.

Mindfulness components and coping responses

The role of specific mindfulness components in influencing coping behaviour has not been examined in research to-date. In this thesis, acceptance and defusion are examined for their particular influence upon coping responses. As discussed, there is substantial evidence that both these components are likely to enhance coping responses. Study 3 (Chapter 6) compares the effects of brief 10-minute acceptance and defusion inductions with two control inductions (self-affirmation and relaxation) for their effects on coping with laboratory-induced stress. Study 4 (Chapter 7) extends this research beyond the laboratory, examining inter- and intra-individual differences in levels of acceptance and cognitive defusion as predictors of approach and avoidance coping with daily, naturally-occurring stressors.

Behavioural and context-specific measures of coping

Lastly, the present thesis aims to add to the methodological rigour of studies of coping and mindfulness by administering more ecologically valid measures of coping behaviour. As discussed, a criticism of many coping studies is their use of self-report

measures of global coping traits, rather than measuring coping in relation to specific stressors (Shikai et al., 2014). Research in the present thesis aims to avoid this criticism by using measures of coping that were linked to specific stressful experiences, rather than stress in general. In addition, this thesis aims to respond to calls for measuring coping as close to the ‘source’ of the stressor as possible (e.g., Ptacek et al., 1994; Stone et al., 1998), by studying daily coping with stressful events (Study 4, Chapter 7) as well as behavioural measures of coping with laboratory-induced stressors (Study 3, Chapter 6).

Research questions

The aims of this thesis as described above can be summarised in the following research questions:

1. Do mindfulness manipulations (both brief and multi-session) result in greater approach and less avoidance coping with stress?
2. Are these effects moderated by perceived stress, such that these effects are stronger among relatively stressed individuals?
3. Do acceptance and cognitive defusion result in greater approach and less avoidance coping with stress?

These questions are explored in the four substantive chapters of this thesis. Studies 1 and 2 (Chapters 4 and 5) test the effects of general mindfulness protocols on coping: Study 1 examines the effects of a brief mindfulness induction in a laboratory setting; while Study 2 explores the effects of a multi-session mindfulness group intervention in a naturalistic setting.

Studies 3 and 4 (Chapters 6 and 7) examine the effects of specific mindfulness components – acceptance and cognitive defusion – upon coping responses: Study 3 tests the effects of these mindfulness components inductions in a laboratory setting; while Study

4 seeks to test the relationships between both acceptance and cognitive defusion, and coping responses *in vivo*.

Studies 1 to 3 test the moderating effect of perceived stress upon the effects of the mindfulness inductions and interventions on approach and avoidance coping. Lastly, coping is measured in several ways throughout this thesis: Studies 1 and 2 administer measures of coping responses following significant life stressors; Study 4 administers daily-diary measures of coping with daily stressors; and Study 3 uses behavioural measures of coping with laboratory-induced stress. Before presenting the substantive studies of this, an overview of the main analytic methods used in this thesis is provided in Chapter 3.

CHAPTER 3

METHODS

An outline of the methods of each of the four studies in this thesis is provided with each respective study (i.e., Chapters 4 to 7). The present chapter therefore provides a general overview of the main analytic methods used in this thesis, which are structural equation modelling, to better account for measurement error in regression models (Chapter 5), and multi-level modelling, to take into account the nested structure of some of the datasets reported in this thesis (Chapters 6 and 7). Each of these general analytic approaches is briefly outlined next, as well as the approach taken to missing data.

Structural equation modelling

Structural equation modelling (SEM) enables the analyses of relations between latent constructs where measurement error, nonlinear effects and complex sampling designs (e.g., clustering) are accounted for (Bollen, 1989). Multivariate analyses using manifest models still include a measurement model, however the measurement model is not adjusted to reflect the way in which different scale items covary with one-another. A manifest model assumes all item covary in the same way. A latent (SEM) model does not make such an assumption, and instead allows the covariances between each item in a model to vary.

In SEM, two kinds of models are generally specified: a confirmatory factor analytic (CFA) model and a structural model. The CFA model tests the adequacy of the expected relations and constraints between the measured indicators (i.e., manifest items) and the underlying latent variables in the proposed model (Bollen, 1989). In the CFA model, all

covariances between variables in the hypothesised model are allowed to freely vary, in order to assess the degree to which the hypothesised model fits the data. Having established that the proposed model adequately fits the data, a structural model is tested in which paths between latent variables are specified and estimated based on hypothesised relations between variables (Tabachnick & Fidell, 2013).

Assessing model fit in SEM

In order to assess the adequacy of the measurement model proposed in each CFA model as well as the extent to which each structural model fits the underlying data, a number of fit indices are commonly used. These indices assess the fit between the sample covariance matrix (of the estimated model) and the estimated population covariance matrix. Although the χ^2 test has been commonly used to assess model fit, it is sensitive to sample size, meaning that with a large sample, a significant difference may be reported between the sample and population covariance matrices when the fit is in-fact relatively good. To avoid this problem, there has been growing interest in developing estimates of fit that do not rely on tests of significance and are therefore less sensitive to sample size in assessing model fit. Commonly-used alternative indices are the comparative fit index (CFI), the Tucker-Lewis index (TLI) and the root mean squared error of approximation (RMSEA; Schumacker & Lomax, 2010). In this thesis, I use each of these indices in measuring model fit (see Study 2, Chapter 5). Generally-accepted criteria for model fit are as follows: for CFI, values of .90 to .95 are considered acceptable and good-fitting, respectively (Hu & Bentler, 1999); for TLI, the same criteria apply (Cheung & Rensvold, 2002); and for RMSEA, values under .06 are said to reflect a good-fitting model, relative to the degrees of freedom in the model (Hu & Bentler, 1999), while values greater than .10 indicate a poor fitting model (Tabachnick & Fidell, 2013). In comparing the fit of different models, a number of criteria have been specified, as follows: for CFI and TLI, a change in these

indices of $\leq .01$ between successive models is recommended (Cheung & Rensvold, 2002); for the RMSEA, a change in this index of $\leq .015$ is commonly-used (Chen, 2007).

Time-invariance in SEM

A common approach in SEM is testing the invariance of a model across different groups (e.g., gender, experimental conditions) or over different measurement occasions (e.g., time-points; Millsap & Meredith, 2007). Under this approach, certain parameters (e.g., factor loadings, item intercepts, uniquenesses) are set to be invariant between groups or measurement occasions, depending on the specific research questions, and model fit is assessed under these additional constraints. This process is undertaken at the CFA stage of the analysis.

In the present thesis (Study 2, Chapter 5), only time-invariance is tested for. Specifically, Study 2 sought to test whether experimental interventions predicted changes in coping response over time, where the factor-structure of the (latent) coping variables was assumed to be consistent across time (i.e., time-invariant). In this situation, constraining factor-loadings to be equal across time-points is the only precondition for establishing time-invariance (Millsap, 2011). More complex models (e.g., longitudinal multi-group models) require other parameters (e.g., item intercepts) to be constrained to equality, but such a requirement did not apply in the present thesis. Lastly, the model fit criteria outlined above (i.e., thresholds for changes in CFI, TLI and RMSEA values) can be used to compare the fit of models that are not constrained to be equal over time versus those that are.

SEM in the present thesis

Study 2 (Chapter 5) is the only study in the present thesis to use an SEM approach. In that chapter, three general forms of CFA model were used: a basic measurement model, which tested the fit to the data of the hypothesised latent variable model; a CFA model in

which factor loadings for the same items were constrained to be equal across time and so tested for the time invariance of the model (per the discussion above); and a time-invariant CFA model in which relevant baseline covariates were added. In addition, two structural models were tested: one in which paths of interest within the time-invariant CFA model were specified and estimated; and another where relevant covariates were added to the previous structural model. In the present thesis, SEM analysis was undertaken in the ‘Lavaan’ and ‘Lavaan.survey’ packages of the R program (3.2.2; R Core Team, 2015).

Multi-level modelling

In cases where units of analysis are nested within each other (e.g., time-points within individuals within experimental conditions, or students within classrooms within schools), multi-level modelling is appropriate. Ignoring the nested structure of such datasets is likely to produce biased regression estimates (Singer & Willett, 2003). A multi-level modelling approach reduces this risk by explicitly modelling the effects of variables across different levels of analysis (Tabachnick & Fidell, 2013). For example, in the case of longitudinal multi-level modelling, where the predictor (e.g., dispositional mindfulness) and the outcome (e.g., coping responses) are each measured over multiple time-points for each individual, coping responses may vary based on each individual’s *average* level of dispositional mindfulness (i.e., between individuals), as well as each individual’s *variation* in dispositional mindfulness across time (i.e., within individuals). Thus coping can be predicted by both variation in mindfulness within individuals (level 1) as well as individual-differences in mindfulness (level 2). More complex analyses may include more than two levels of analysis (e.g., groups, schools, suburbs).

Additionally, in modelling these multi-level sources of variance, multi-level models include both fixed and random effects terms, in which the clustering variable of interest

(e.g., experimental condition) is included as a fixed factor, while the clustering variable(s) one wishes to control for (e.g., classroom or individual) is included as a random factor (or factors) in the model (Bolger & Laurenceau, 2013). In the previous example, if we were interested in how within-subjects variation in mindfulness predicts coping over time, we would estimate the intercept and slope of the within-subjects variation in mindfulness as fixed effects (as well as ‘time’), and the between-subjects variation in mindfulness as a random effect. If, on the other hand, we were interested in how two groups of individuals varied in their coping behaviour over time, we would treat ‘group’ and ‘time’ as fixed effects and ‘individual’ as a random effect term. In this way, the treatment of fixed versus random factors depends on which variables one wishes to make predictions from (fixed factors) and which variables may still provide an important source of variation in the dependent variable, but are not of direct relevance to the research question (random factors). In this thesis, both these approaches are taken: Chapter 6 uses multi-level models to study group-clustered datasets (i.e., individuals within classrooms within experimental conditions), treating ‘experimental condition’ as a fixed factor and ‘classroom’ as a random factor; while Chapter 7 explores longitudinal data (i.e., time-points within individuals), and so treats ‘within-subjects variation in the predictor over time’ as a fixed factor and ‘individual’ as a random factor. For a more detailed explanation of fixed and random effects, see Singer & Willett, 2003).

In addition to the standard multi-level modelling approach, I drew in this thesis upon two less common multi-level modelling approaches, which are both described next: within-subjects multi-level modelling and lagged multi-level modelling. Both these approaches are used in Chapter 7 of this thesis. In the present thesis, all multi-level analyses were conducted using the ‘lme4’, ‘nlme’ and ‘Hmisc’ packages of the R program (3.2.2; R Core Team, 2015).

Within-subjects multilevel modelling

When conducting longitudinal analyses, raw scores on level 1 variables for each individual can be disaggregated into level 1 and level 2 elements: the deviation in that individual's mean score for the variable from the grand-mean on the variable across all individuals in the sample (i.e., a between-subjects' component; level 2); and the deviation in the raw score for any individual at any time-point, from that individual's mean score on the variable (i.e., a within-subjects component; level 1). Figure 1 illustrates this basic approach to disaggregating level 1 variables.² In this figure, the diamonds represent data-points (one for each of the five time-points in the figure) for a given individual, ID. The thick solid line is the grand-mean on the predictor variable across all individuals and time-points, while the dashed line is the mean score on the predictor variable for a single individual (ID₁).

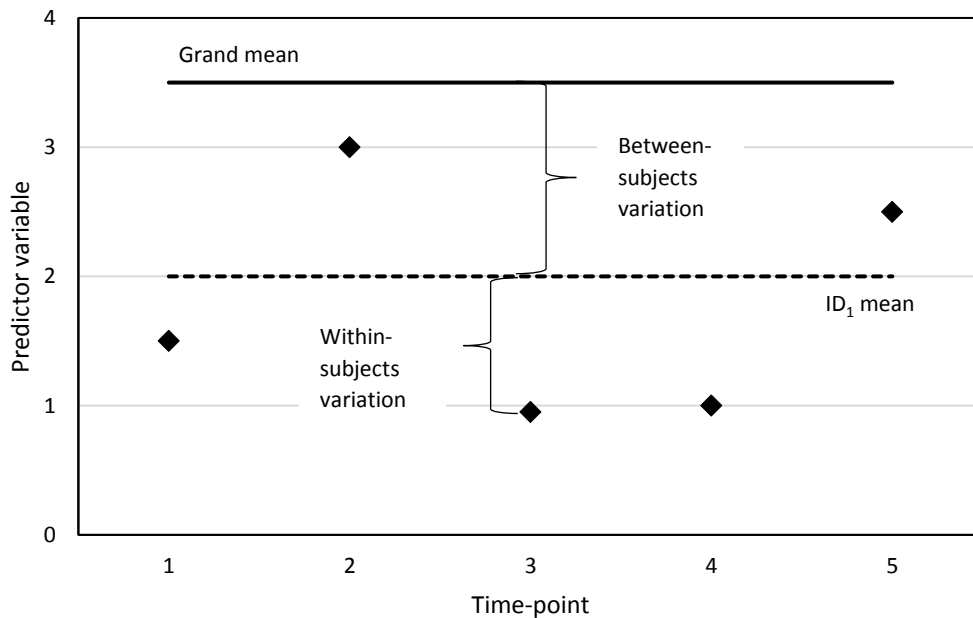


Figure 1. Example of a level 1 predictor variable disaggregated into its within- and between-subjects components for a single individual across 5 time-points.

² NB: Calculating the difference between each individual's mean score and the grand mean on a variable (i.e., the between-subjects component in Figure 1) is substantively identical to simply calculating each individuals' mean score on a variable.

To calculate within and between-subjects components of an independent variable (IV), the grand mean of the variable across individuals and time points is subtracted from each subjects' raw score on the IV at each time point, resulting in a variable called X_{ij} , the grand mean-centred score for each individual. This difference term is then divided into between and within-subjects components. The former, $X_{.j}$, is the mean score on the IV for each individual, across time points (the between-subjects component). The latter, $X_{ij} - X_{.j}$, is the difference between each individual's grand-mean-centred score on the IV and their individual mean score, and is a measure of how much each rating (at each time point) deviates from that individual's mean score (across all time points; Bolger & Laurenceau, 2013).

A model including these within and between-subjects effects is shown in Equation 1. Here, Y_{ij} is the dependent variable (DV), γ_{00} is an intercept term, $\gamma_{01}X_{.j}$ is the between-subjects mean term for the IV, $\gamma_{10}(X_{ij} - X_{.j})$ is the term for the within-subjects variation in the IV, $\gamma_{20}T_{ij}$ is a time variable, rescaled such that 0 is the middle of the time period (Bolger & Laurenceau, 2013). These are the fixed effects terms. The remaining three terms are random effects, where u_{0j} is a random intercept term for each individual, $u_{1j}(X_{ij} - X_{.j})$ is a within-subjects random slope term, and ϵ_{ij} is a random residual component, specific to each subject.

$$Y_{ij} = \gamma_{00} + \gamma_{01}X_{.j} + \gamma_{10}(X_{ij} - X_{.j}) + \gamma_{20}T_{ij} + u_{0j} + u_{1j}(X_{ij} - X_{.j}) + \epsilon_{ij} \quad (1)$$

Failure to identify these two separate sources of variance in a level 1 variable means that estimates may be biased, in the sense that putative level 1 effects are influenced by level 2 effects and vice-versa (Bolger & Laurenceau, 2013; Preacher, Zhang, & Zyphur, 2015). For example, it is possible that having a high average score on an IV (i.e., between-

subjects variation) predicts *positive* changes in a DV; while being above one's own average score on an IV at any given time-point (i.e., within-subjects variation) predicts *negative* changes in a DV, or vice-versa (Preacher et al., 2015).

Chapter 7 of this thesis takes this within-subjects approach in its longitudinal analyses. It focuses on within-subjects variation in two dependent variables (acceptance and cognitive defusion) over time and uses these to predict within-subjects variation in coping responses, controlling for between-subjects differences in these variables. In addition, Study 4 (Chapter 7) uses a lagged modelling approach, described next.

Lagged multi-level modelling

In order to draw stronger causal inferences about the relations between longitudinal IVs and DVs, lagged time-series models can be used (Kleiber & Zeileis, 2008). Such models predict the DV of interest by IV(s) lagged by a specified time-period. Evidence of such a lagged relationship provides stronger evidence than mere association that changes in the IV caused changes in the DV, though other factors such as the presence of possible confounds need to be appropriately dealt with (Schafer & Kang, 2008). Under a lagged time-series approach, the lagging period is arbitrary and needs to have a theoretical justification (Kleiber, & Zeileis, 2008). In the present research, a lag of one day was used on the basis that effects of mindfulness variables on coping outcomes were likely to be relatively context-specific and hence short-term, consistent with previous research of stress and coping (Affleck, Tennen, Urrows, & Higgins, 1994; Todd, Tennen, Carney, Armeli, & Affleck, 2004).

This approach to lagged multi-level modelling, in its most basic form, is illustrated in Equation 2.

$$Y_{ij} = \gamma_{00} + \gamma_{01}X_{(i-1)j} + \gamma_{10}Y_{(i-1)j} + u_{0j} + u_{1j}(X_{(i-1)j}) + \varepsilon_{ij} \quad (2)$$

Here, Y_{ij} represents today's scores on the DV, γ_{00} is an intercept term, $\gamma_{01}X_{(i-1)j}$ is the IV lagged by 1 day ($i-1$), across j individuals, and $\gamma_{10}Y_{(i-1)j}$ is the DV lagged by 1 day, across j individuals, to account for the autoregressive effects of the DV across time. Note that time is not modelled here, as it is built into the lagging structure of the model. These are the fixed effects. The random effects terms are u_{0j} , a random intercept term, $u_{1j}(X_{(i-1)j})$, a random slope term of the IV lagged by 1 day, for each individual, and ε_{ij} , a random residual term for each individual. Additional lagged or unlagged covariates may be added to this model as fixed factors.

Missing data

Missing data is an issue in nearly all datasets, especially in longitudinal studies, where participant drop-out is difficult to prevent. Ad-hoc approaches to missing data, such as list and pair-wise deletion methods and mean substitution have been criticised, as they tend to produce biased parameter estimates (Baraldi & Enders, 2010; Little, 2013). In recent years, more robust methods of handling missing data have been developed, such as full-information maximum likelihood (FIML) methods (Baraldi & Enders, 2010). FIML approaches have been shown to be robust to instances of non-normality in error distribution and provide adequate results even for low sample sizes and high rates of missing data (Enders, 2010; Graham, 2009; Graham, Olchowski, & Gilreath, 2007). In addition, the FIML approach produces unbiased estimates when data are missing at random (as opposed to missing completely at random), where traditional approaches do not (Baraldi & Enders, 2010). In the substantive chapters of this thesis, the FIML approach was used for handling missing data.

CHAPTER 4

STUDY 1

Introduction

The aim of this study was to examine the first two research questions of this thesis in a laboratory setting. Specifically, this study tested whether a brief mindfulness induction enhanced approach and lowered avoidance coping with a stressful experience; and secondly, whether individuals' levels of perceived stress moderated these effects. As noted in Chapter 2, several studies have found that brief, 10-15 minute mindfulness inductions have salutary effects, including lowering stress levels (Campbell-Sills, Barlow, Brown, & Hofmann, 2006), increasing empathy (Tan et al., 2014) and increasing willingness to breathe CO₂ enriched air (Eifert & Heffner, 2003; Levitt et al., 2004). This study built on these approaches and is the first that the author is aware of to examine the effects of a brief mindfulness induction on coping responses.

In addition, no published research has tested whether the effects of a mindfulness induction or intervention upon approach and avoidance coping responses are moderated by individual-differences in stress levels. As discussed in Chapter 2, the mixed evidence for the effects of mindfulness interventions on coping responses may be because such interventions only influence coping responses in relatively high-stress contexts. Consistent with this, studies that have reported significant effects of multi-session mindfulness interventions on coping responses have been with samples likely to be experiencing high levels of stress, such as women living with heart disease (Tacón et al., 2003) and workers

in a busy telesales centre (Walach et al., 2007). Moreover, brief mindfulness inductions have been shown to reduce avoidant responses to threat in relatively high-stress contexts, such as exposure to threatening images (Arch & Craske, 2006) and social rejection (Heppner et al., 2008). This study therefore tested whether levels of general perceived stress between individuals moderated the effects of the mindfulness induction, relative to controls, upon coping responses.

In the mindfulness literature, there has been some criticism of the over-reliance on waitlist rather than active controls in mindfulness research to date (Keng et al, 2012). To address this, a small number of studies have controlled for the relaxation effects of mindfulness interventions by including a relaxation control condition (e.g., Jain et al., 2007; Manocha, Black, Sarris, & Stough, 2011). The present study took this approach, including a progressive muscle relaxation control induction, described below. Relaxation interventions have been associated with less depression, anxiety and distress (Jorm, Morgan, & Hetrick, 2008; Manzoni, Pagnini, Castelnuovo, & Molinari, 2008), though the author is not aware of any research testing its effects on coping responses. In addition, a filler task was used as a no-treatment active control condition, again responding to calls for more active controls in studies of mindfulness and following a small number of studies to have taken this approach previously (e.g., Reb & Narayanan, 2014; Weinstein et al., 2009).

Specifically, the present study compared the effects of a brief (15-minute long) mindfulness induction with a relaxation induction and a filler task, on how undergraduate students reported they would cope with the stress of their most recent university exams (which had occurred approximately 5 months earlier), if they were experiencing that stress currently. The mindfulness induction was expected to result in increased self-reported approach and reduced avoidance coping, relative to the relaxation and filler-task controls,

and these effects were expected to occur particularly among individuals reporting relatively high levels of stress over the past month. Formally, the hypotheses of this study were:

Hypothesis 1: A mindfulness induction will result in more approach and less avoidance coping with a stressful experience, relative to relaxation and filler-task controls.

Hypothesis 2: Perceived stress will moderate the effect of a mindfulness induction upon coping with a stressful experience, resulting in more approach and less avoidance coping among individuals reporting relatively high (but not low) levels of perceived stress, relative to relaxation and filler-task controls.

Method

Participants and Procedure

Undergraduate students ($N = 204$; 71% female; mean age = 21; age range = 19-27) from a Dutch university volunteered in an hour's lab session for which they received financial compensation (9 Euros). This study was approved by the Human Ethics Committee at the Australian National University. Upon registering for the study, subjects were randomly allocated into one of three experimental conditions (mindfulness, $n = 69$; relaxation, $n = 67$; filler task, $n = 68$). Upon arrival at the research site, participants first took part in one of the three 15-minute inductions.

The mindfulness induction was a mindful candy eating exercise in which participants were directed to touch, smell, feel and taste a piece of candy in a slow and deliberate way, noticing thoughts, feelings and sensations, and re-directing their attention to the object of focus each time it wandered off. This induction was adapted from a similar exercise used in other mindfulness studies known as the 'raisin eating' exercise (Heppner

et al., 2008; Reb & Narayanan, 2014). The relaxation induction was the progressive muscle relaxation protocol, where individuals were directed to tense various parts of their body (e.g., feet, legs, hands) and then gradually relax them (McCallie, Blum, & Hood, 2008). The filler task was designed to be mildly challenging, so as to prevent subjects from becoming bored, but without inducing anxiety or distress (Reb & Narayanan, 2014; Weinstein et al., 2009). The task involved typing onto a screen a series of the same letters in a specified pattern, starting from 'a'. For example, 'aaa aaa aaa' then 'bbb bbb bbb' up to 'k'. All inductions were pre-recorded by appropriately qualified instructors to ensure consistency and accuracy.

Following the inductions, subjects undertook a problem-solving task that involved working in groups of nine people to generate as many uses for a brick as possible within a 15-minute time-frame. This task was included as part of another study but for the purposes of this study, served to create an interval between the inductions and the subsequent data collection, to test whether any effects of the brief mindfulness induction on self-reported coping were sustained through a challenging intervening problem-solving task. After this task, subjects completed the self-report measures of state mindfulness, general perceived stress, and approach and avoidance coping, described in the following section.

Measures

A four-item measure of *state mindfulness* was adapted from Reb and Narayan (2014; $\alpha = .75$) as a manipulation check of the effect of the inductions on state mindfulness. Items were: "I noticed the sensations of my body"; "I was aware of my thoughts without getting lost in them"; "I was aware of whether my muscles were tense or relaxed"; and "I was fully in the present moment", ranked on a one (*strongly disagree*) to five (*strongly agree*) Likert scale.

Monthly perceived stress was measured with the four-item version of the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983; $\alpha = .76$). Items were ranked on a one (*never*) to five (*very often*) Likert scale and sample items were: “In the last month, how often have you felt that you were unable to control the important things in your life?” and “In the last month, how often have you felt that things were going your way?”

Self-reported coping behaviour was measured using the Brief COPE Inventory (Carver, 1997). Subjects were asked to think of the stress associated with their most recent university exams, and rate how they would respond to that stress if they were experiencing it right now. Approach and avoidance coping was measured using items from the Brief COPE Inventory that relate to each form of coping, following other studies that have taken this approach (e.g., Doron et al., 2014; Lyne & Roger, 2000; Stowell et al., 2001; Weinstein et al., 2009). All coping items were rated on a one (*I do not do this at all*) to five (*I do this a lot*) Likert scale.

Approach coping (6 items; $\alpha = .69$) comprised items relating to active coping (e.g., “I took action to try and make the situation better”), acceptance (e.g., “I accepted the reality of the fact that it happened”), and positive reinterpretation and growth (e.g., “I looked for something good in what was happening”), with two items for each coping behaviour.

Avoidance coping (6 items; $\alpha = .72$) comprised items relating to denial (e.g., “I said to myself ‘this isn’t real’”), behavioural disengagement (e.g., “I gave up trying to deal with it”) and self-distraction (e.g., “I turned to other activities to take my mind of this”), also with two items for each of these coping behaviours.

Statistical analyses

Statistical power for this study (assuming a medium effect size ($f = .25$); a total sample size of 204; and $n = 67$ in the smallest condition) was .90. Experimental effects

were assessed using linear regression analyses with ordinary least squares estimation. When analyzing main (Hypothesis 1) and moderated effects (Hypothesis 2), relevant continuous variables (i.e., approach and avoidance coping, and perceived stress) were standardized. All statistical analyses in this study were conducted using the R software (R Core Team, 2015).

Results

Descriptive statistics and bivariate correlations for Study 1 variables appear in Table 1. There were no significant differences between the three experimental conditions on monthly perceived stress ($F [2, 201] = 2.60, p = .077$). As a manipulation check, the three conditions were compared on state mindfulness after the inductions. There was a significant overall difference in state mindfulness between conditions ($F [2, 201] = 16.40, p < .001$) with post-hoc analysis (Tukey's HSD) indicating significant differences between the mindfulness and filler task conditions, $MD = .41, p < .001$, and between the relaxation and the filler task conditions, $MD = .39, p < .001$, but not between the mindfulness and the relaxation conditions, $MD = .01, p = .984$. The lack of a difference in state mindfulness between the mindfulness and relaxation inductions is not surprising, given that this measure emphasized awareness of the body, which is central to progressive muscle relaxation. Consistent with this, previous research has found that mindfulness and progressive muscle relaxation interventions produce increases in attention and awareness that are not statistically different from each other (Agee, Danoff-Burg, & Grant, 2009).

Main effects of mindfulness induction on coping

Regarding main effects (Hypothesis 1), there were no significant differences between the mindfulness condition and either of the control conditions on approach coping (mindfulness vs. relaxation: $\beta = .21 [.17], t = 1.23, p = .220$; mindfulness vs. filler: $\beta = .09$

[.17], $t = .54$, $p = .590$) or avoidance coping (mindfulness vs. relaxation: $\beta = -.28$ [.17], $t = -1.66$, $p = .099$; mindfulness vs. filler: $\beta = -.02$ [.17], $t = -.10$, $p = .917$). Nor was there a significant difference between the relaxation and filler conditions on either approach ($\beta = .11$ [.17], $t = .66$, $p = .511$) or avoidance coping ($\beta = -.26$ [.17], $t = -1.52$, $p = .123$). Estimates by each condition on both approach and avoidance coping are shown in Table 1.

Table 1

Group means, standard deviations and bivariate correlations for study variables

	Mindfulness		Relaxation		Filler		Bivariate correlations		
	<i>(n = 69)</i>		<i>(n = 71)</i>		<i>(n = 64)</i>				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	1	2	3
Female (%)	70%		68%		75%				
Age	20.70	0.46	21.10	0.47	20.86	0.44			
1. Monthly stress	9.18	2.60	10.16	3.09	9.34	2.41			
2. State mindfulness	13.81	2.55	13.76	2.53	11.56	2.58	-.014		
3. Approach coping	15.91	4.31	15.42	4.73	15.70	4.34	-.272**	.145*	
4. Avoidance coping	4.32	2.41	4.73	2.50	4.34	2.36	.364**	-.066	-.351**

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

Perceived stress as a moderator of mindfulness induction on coping

I next tested Hypothesis 2 that monthly perceived stress would moderate the impact of the mindfulness induction upon coping, relative to the two control conditions. Consistent with this hypothesis, there was a significant interaction between monthly perceived stress and the mindfulness induction in predicting less avoidance coping, relative to the relaxation induction, $\beta = -.34$ (.16), $t = -2.18$, $p = .030$, but not between the mindfulness and filler inductions, $\beta = -.21$ (.18), $t = -1.18$, $p = .240$, as illustrated in

Figure 2. However, significant interaction effects were not found for the mindfulness condition compared to either control condition, on approach coping.

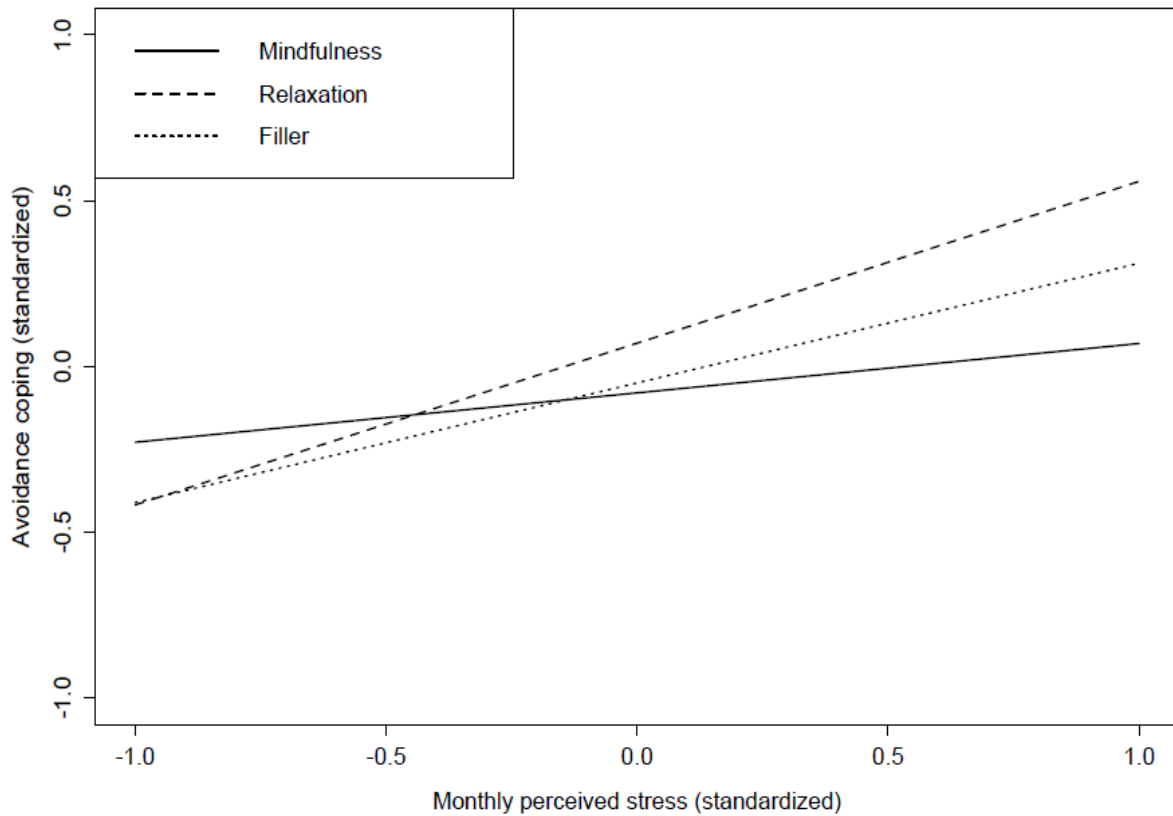


Figure 2. Experimental conditions interacting with monthly perceived stress to predict avoidance coping. Note. Avoidance coping and monthly perceived stress were standardized for this analysis.

Discussion

This study explored the first two research questions of this thesis, via a brief mindfulness induction: first, whether mindfulness enhances approach and inhibits avoidance coping responses; and second, whether these effects are moderated by individuals' levels of perceived stress. This study is the first that the author is aware of to test the effects of a mindfulness induction on coping responses, although previous studies have examined the effects of mindfulness inductions on related outcomes (e.g., responses

to threatening images, Arch & Craske, 2006; and responses to social rejection, Heppner et al., 2008).

Theories of mindfulness claim that it enhances self-regulation, thereby increasing the adaptiveness of an individual's response to aversive experiences (Brown et al., 2007; Shapiro et al., 2006; Hayes et al., 2006). When a person is mindful, they are able to 'step back' and notice present-moment experience with a sense of perspective, and this psychological distance is, in-turn, claimed to give the person more response options, including to stressful experiences, meaning their response is more effective and appropriate to the situation (Shapiro et al., 2006; Teasdale et al., 2002).

The findings of this study appear consistent with these theories of mindfulness. Regarding our first hypothesis that the mindfulness induction would have significant main effects on coping (enhancing approach and inhibiting avoidance coping) relative to the two control inductions, we did not find support for this. That is, there were no differences found on either approach or avoidance coping between any of the three experimental conditions. One explanation for this is that mindfulness interventions only influence coping responses among relatively stressed individuals, and it may be that in the present sample there were null effects among relatively unstressed individuals which masked the effects of the intervention for relatively stressed individuals. On the other hand, it may be that as stress levels rise, the self-regulation benefits of mindfulness also increase, meaning a brief mindfulness induction will have a bigger effect on coping responses. This was the second hypothesis of this study.

I did indeed find support for the second hypothesis of this study. Specifically, as the level of perceived stress increased between individuals, significant differences appeared between the mindfulness and relaxation conditions on avoidance coping. This suggests that

when levels of general perceived stress are low, being mindful does not improve a persons' coping responses, relative to engaging in relaxation or a filler activity. However, as stress levels rise, being mindful appears to have benefits for coping with stress in ways that relaxation does not. As discussed, this may be because being mindful facilitates enhanced behavioural regulation (i.e., less avoidance coping) in the presence of negative affect (i.e., stress) in a way that relaxation does not.

Of note, there were no differences in self-reported awareness of present-moment bodily sensations (i.e., the measure of state mindfulness) between the mindfulness and relaxation conditions following the inductions in this study; yet the above moderation effects were found. This suggests that mindfulness has its effects on coping responses not simply via being more attentive to bodily sensations in the present-moment. Rather, it may be the self-regulatory function of mindfulness that is the difference between it and relaxation, in terms of enhancing coping responses. Recall that participants in the mindfulness induction were directed to attend to the process of eating a piece of candy and, when they noticed their attention wander off, to gently re-direct back to the object. On the other hand, those in the relaxation condition did not receive any such self-regulatory instruction. Therefore it may be this self-regulatory aspect of mindfulness that enhances coping responses, perhaps through increased willingness to attend to present-moment experience – even if unpleasant – although this was not directly tested in the present study.

Another caveat from this study is that there were no significant differences between the mindfulness and filler conditions in terms of coping. One possibility is that the filler condition, in which participants were asked to type a series of letters on a succession of frames on a computer screen, may have induced a level of self-regulatory focus (explaining why there were no differences between the mindfulness and filler tasks on present-centred awareness post-intervention). Increased self-regulatory focus in both conditions may, in-

turn, explain why there were no significant differences between the mindfulness and filler conditions on coping, though I was not able to directly test this possibility.

There are a number of limitations of this study. First, this study did not measure mediators of mindfulness. Future studies of mindfulness inductions and coping responses could measure potential mediators of mindfulness, such as self-regulation. Doing this would help to isolate the specific mechanisms by which mindfulness has its effects. Although exploring such mediators was not a focus of this study, or indeed of this thesis more broadly, doing so would be a valuable future line of research.

Second, coping was measured in this study by asking participants to recall the stress of their most recent university exams and responding to how they would cope with such stress if they were experiencing it currently. Given that students' exams were approximately five months prior to the time of the present study, there would very likely have been issues with recall biases from using such an approach. Measuring coping in relation to a more proximal stressor would be an improvement on the present study.

Third, it may be that the mindfulness 'dose' was insufficient in the present study to elicit large changes in coping responses. In particular, this may explain the null findings in relation to main effects in this study. Consistent with previous research (e.g., Halland et al, 2015; Tacón et al., 2003; Walach et al., 2007), a more intensive mindfulness intervention may be needed for main effects on coping responses to be observed. Study 2 sought to address this issue by testing the effects of a multi-session mindfulness intervention upon individuals' coping responses.

Despite its limitations and exploratory nature, this study provides novel evidence that the effects of mindfulness on coping responses may be contingent on individuals' levels of psychological stress. Moreover, this finding is consistent with theoretical claims

outlined in Chapters 1 and 2 that mindfulness enhances behavioural regulation following aversive experiences (Brown et al., 2007; Shapiro et al., 2006; Hayes et al., 1999), and that this in-turn should enhance individuals' coping responses.

CHAPTER 5

STUDY 2

Introduction

This study extended Study 1 in two main ways. First, it tested the effects of a multi-week mindfulness intervention (adapted from the MBSR program) upon approach and avoidance coping responses to naturally-occurring – rather than laboratory-induced – stressors. Second, this study tested whether individuals' levels of perceived stress in relation to a specific stressor (rather than general stress over the past month, as in Study 1) moderated the effects of the mindfulness intervention on coping responses, relative to a waitlist control. While the author's preference would have been to use an active control group in this study, it was not logistically possible to do so.

Regarding the first point above, studies of the effects of multi-session mindfulness interventions upon coping responses have yielded mixed findings (as discussed in Chapter 2), possibly due to the use of small samples in several studies, limiting their statistical power to detect effects (e.g., Sears & Kraus, 2009; Tacón et al., 2003; Walach et al., 2007). The present study addressed this by using a sufficiently large sample so as to draw meaningful conclusions regarding intervention effects (see *Statistical analysis* below). Another issue in this literature is that the MBSR-based studies that found positive effects on coping (e.g., Halland et al., 2015; Tacón et al., 2003; Walach et al., 2007) included a range of non-meditational adjuncts, including: teaching 'informal' mindfulness skills such as mindfulness in every-day situations, mindful responses to stressful events and mindful communication; group conversation designed to reinforce the application of mindfulness

skills in every-day life; and written reflection on practice. On the other hand, studies reporting null results (e.g., Josefsson et al., 2012; Sears & Kraus, 2009) did not include such applications of mindfulness skills to every-day life and focused instead on mindfulness meditation. The present study therefore administered a mindfulness intervention that was adapted from MBSR and included substantial focus on applying mindfulness skills to daily life, alongside meditation, and tested the effects of such an intervention on coping responses.

The second way in which this study extended Study 1 was in testing whether individuals' levels of event-related perceived stress moderated the effects of the mindfulness intervention on coping responses, relative to a waitlist control. Evidence for this interaction effect will provide further support for the idea that mindfulness interventions may enhance coping responses among especially stressed individuals. In this study, I used a measure of state perceived stress in relation to an actual stressor, rather than perceived stress over the past month which was used in Study 1. Using a state measure of perceived stress enabled me to assess the relations between stress perceptions and coping responses regarding the *same* stressor.

In addition to examining the above primary research questions of this thesis, this study had a secondary aim: to compare the effects of the MBSR-adapted intervention with one based on ACT (Hayes et al., 1999). ACT is an increasingly popular methodology for enhancing psychological flexibility and values-consistent responding to challenging experiences (Keng et al., 2011; Öst, 2014). Although ACT is a mindfulness-based framework, it takes a different approach to training mindfulness skills that MBSR does. ACT teaches mindfulness skills mainly through non-meditational means (i.e., using metaphors, experiential exercises and emphasizing the application of mindfulness skills to daily life), while MBSR places substantial emphasis on mindfulness meditation, as well as

assisting individuals in applying mindfulness in daily life (known as ‘informal’ mindfulness practice; Kabat-Zinn et al., 1992). In addition, ACT interventions assist individuals in clarifying their personally-held values, and then use mindfulness skills to help people to act in values-consistent ways within domains of their life that they choose (Hayes et al., 1999, 2006). The secondary aim of this study was therefore to compare the effects on coping responses of an intervention that focuses solely on training mindfulness skills (i.e., the MBSR-adapted intervention) with one that combines mindfulness training with values-clarification exercises (i.e., the ACT intervention).

To date, there have been no published studies comparing the effects of an MBSR intervention with one based on ACT on coping responses, or indeed on any outcome. While there is evidence that ACT interventions reduce avoidance of unwanted thoughts and emotions, as well as publically observable avoidant behaviour in certain contexts (Keng et al., 2011; Levin et al., 2012), the author is not aware of any published research directly examining the influence of ACT-based interventions upon coping responses. I next review the evidence for the effects of both MBSR and ACT interventions on approach and avoidance coping responses.

MBSR interventions and coping with stress

As outlined in Chapter 2 of this thesis, the research on the effects of MBSR and related group interventions on coping is preliminary and has produced mixed results. There is some evidence that MBSR enhances approach forms of coping. For example, Walach et al. (2007) found that the full-length MBSR program increased positive coping (similar to approach coping) among a group of sales workers, while Halland et al. (2015) found that a shortened version of the MBSR program enhanced problem-focused coping among undergraduates. However, others have reported null results of a multi-week (non-MBSR)

mindfulness intervention on approach coping, among working adults (Josefsson et al., 2012) and undergraduates (Sears & Kraus, 2009). Given these mixed findings, I did not make predictions in the present study regarding the effect of the MBSR-adapted intervention on approach coping. Although mindfulness is claimed to increase willingness to be exposed to aversive stimuli (Shapiro et al., 2006), it is not clear this extends to approach forms of coping with stress and further exploration of this possibility is needed.

On the other hand, there is stronger evidence that MBSR-related interventions should reduce avoidance coping. Halland et al. (2015) found that a truncated MBSR program interacted with baseline neuroticism to predict less avoidance coping relative to a no-treatment control, while Tacón et al. (2003) found that MBSR resulted in less reactive coping (similar to avoidance coping) among women with heart disease. In addition, Weinstein et al. (2009) provided non-experimental evidence that trait and state mindfulness predicted less avoidance coping across four studies. In light of this evidence and theoretical claims that mindfulness facilitates a reduction in experiential avoidance (Hayes et al., 2006), I expected that an MBSR-adapted intervention would produce less avoidance coping relative to a waitlist control.

ACT interventions and coping with stress

To the author's knowledge, there have been no randomised controlled trials of the influence of an ACT intervention upon coping behaviour (Keng, et al., 2011; Öst, 2014). However, ACT interventions have been shown to reduce cigarette smoking (Bowen & Marlatt, 2009; Gifford et al., 2004, 2011) drug use (Hayes et al., 2004), and hair pulling (Woods, Wetterneck, & Flessner, 2006), which are avoidance-oriented behaviours, as they take the individual away from contact with unpleasant thoughts and feelings. Moreover, reductions in experiential avoidance, the avoidance of unwanted thoughts and feelings and

a key goal of ACT (Hayes et al., 2006), correlates highly with avoidance coping behaviours (Karekla & Panayiotou, 2011). This suggests that an ACT intervention, which aims to reduce experiential avoidance, should also reduce avoidant coping behaviours, such as distraction, behavioural disengagement and denial. I therefore expected the ACT intervention to reduce avoidance coping post-intervention.

ACT emphasises using mindfulness skills to act in values-consistent ways, and there is some evidence that this translates to more approach-type coping behaviours. For example individuals high in autonomous motivation, which includes drawing upon personally-held values, engage in more approach coping behaviours following stressful events (Weinstein et al., 2009) and display greater persistence after failure (Koestner & Zuckerman, 1994). However in some contexts, values-consistent responding may not involve approach coping. For example, in situations of substantial trauma, emotion-focused coping, rather than problem-solving, may be more appropriate and therefore values-consistent. Moreover, in situations that the individual cannot control (e.g., loss), approach coping may not be values-consistent. While there is evidence that over the long-term, approach coping predicts greater well-being (Duangdao & Roesch, 2008; Roesch et al., 2005), it is not clear that values-clarification (as taught in ACT) will, on average, produce greater approach coping. I therefore did not make predictions regarding the effect of the ACT intervention on approach coping. Based on the above evidence, the first hypothesis of this study was:

Hypothesis 1: An MBSR-adapted and an ACT intervention would both result in less avoidance coping with monthly stressors, relative to a waitlist control condition.

Although I did not make specific predictions regarding the effects of either the MBSR-adapted or the ACT intervention upon *approach* coping in this study, experimental

effects of each intervention on approach coping were tested for in exactly the same way as effects on avoidance coping were tested for.

The moderating role of perceived stress

Following the findings of Study 1 and the literature reviewed in Chapter 2, it was expected that the effects of both interventions upon avoidance coping would be stronger among relatively stressed individuals. As discussed, Study 1 found that perceived stress moderated the effect of a mindfulness induction in reducing avoidance coping, but there were no significant main effects. Further support for this proposition comes from a recent study (Halland, et al., 2015) which found that neuroticism (a construct strongly predictive of stress appraisals and negative emotions; Mohiyeddini et al., 2015) moderated the effects of a mindfulness intervention in reducing avoidance coping. In a similar vein, earlier studies found that MBSR interventions enhanced some coping responses among busy sales workers (Walach et al., 2007) and women with heart disease (Tacón et al., 2003), both populations likely experiencing considerable stress (though stress was not assessed in either of these studies). Moreover, brief mindfulness inductions have been shown to reduce avoidant responses to threat in relatively stressful contexts, such as exposure to threatening images (Arch & Craske, 2006) and social rejection (Heppner et al., 2008).

Regarding ACT interventions, there is evidence that ACT group therapy reduces stress and burnout and enhances well-being among individuals reporting high (but not low) levels of stress at baseline (Brinkborg, Michanek, Hesser, & Berglund, 2011). In addition, ACT component studies have similarly found reductions in avoidance behaviours in relatively high-stress settings, such as being exposed to CO₂ enriched air (Eifert & Heffner, 2003; Levitt et al., 2004) receiving an electric shock (Gutiérrez et al., 2004), an exposure to distressing thoughts (Mandavia et al., 2015; Masuda et al., 2004; Masuda, Twohig, et

al., 2010). I therefore expected that both interventions will have strongest effects on coping among individuals experiencing high levels of stress. The second hypothesis of this study was:

Hypothesis 2: Perceived stress will moderate the effect of an MBSR-adapted and an ACT intervention, resulting in less avoidance coping relative to a waitlist control.

Covariates

Lastly, this study tested the above hypotheses controlling for the effects of several demographic (age and gender) and non-demographic covariates (trait psychological distress, general self-efficacy and trait mindfulness). There is evidence that each of these covariates predicts greater approach and less avoidance coping with stressful events. Controlling for their effects in the present study meant the study was ‘doubly-controlled’ (i.e., randomised allocation to experimental conditions; and effects tested for with and without covariates in the models).

Regarding demographic covariates, there is evidence for gender differences in coping styles, with men tending to exhibit more approach forms of coping and women exhibiting more emotion-focused and avoidance forms of coping (Kapsou et al., 2010; Karekla & Panayiotou, 2011; Nicholls & Polman, 2007; Ptacek, Smith, & Zanas, 1992), though some studies have failed to find evidence for these differences (e.g., Antoniou & Bebetos, 2003; Pensgaard, Roberts, & Ursin, 1999). In addition, there is evidence that age is positively associated with approach coping (Antoniou & Bebetos, 2003; Goyen & Anshel, 1998) and negatively related to avoidance coping (Aldwin, 1991; Gianakos, 2002), consistent with developmental theories of coping (Vaillant, 1977).

Regarding the non-demographic covariates included in this study – trait psychological distress, general self-efficacy and trait mindfulness – there is evidence that

each is associated with less approach and more avoidance coping. In relation to psychological distress, a recent meta-analysis (Kato, 2013) found that active coping, planning and positive reinterpretation were each associated with less general distress, with small effect sizes (ranging from -0.05 to -0.13), while avoidance coping was associated with greater general distress, with small-to-medium-sized effects sizes (ranging from 0.18 to 0.30).

General self-efficacy has been found to predict more problem-focused (Chwalisz, Altmaier, & Russell, 1992) and active coping (Jex, Bliese, Buzzell, & Primeau, 2001), and less avoidance coping (Haney & Long, 1995; Jex et al., 2001; Rippetoe & Rogers, 1987). I therefore expected appraisals of personal self-efficacy to predict more approach and less avoidance coping with stress.

Lastly, and as reviewed in Chapter 2, there is evidence that trait mindfulness predicts less avoidance coping, and also some evidence that it predicts more approach coping. For example, Weinstein et al., (2009) found that among a student sample, trait mindfulness (measured using the MAAS; Brown & Ryan, 2003) predicted less avoidance coping with laboratory-induced stress (Study 1) and exam stress (Study 4), and more approach and less avoidance coping with monthly (Study 2) and daily stressors (Study 3). Further, Palmer and Rodger (2009) found that higher trait mindfulness was associated with more adaptive (rational and detached) coping and less avoidance coping among a student sample. Trait mindfulness has also been associated with less avoidance of unavoidable distressing experiences (such as being criticised, humiliated or having one's weaknesses exposed) among a community sample (Bergomi et al., 2013).

Method

Participants and procedure

Participants were recruited via online advertising for a mindfulness course at three Australian university campuses. The course was advertised as costing AUD 100, with a full refund available for course participants who completed the research surveys associated with the course. Ethics clearance for collecting these data was obtained from the author's institution. The flow of participants in this study is shown in Figure 1.

A total of 334 university students and staff registered for the course, and were randomly allocated online to one of three conditions: an MBSR-adapted condition, an ACT condition and a waitlist control condition. Simple random allocation to the three conditions was conducted using a computerised random number generator in the Qualtrics program as participants enrolled in the course. Participants, but not those administering the interventions, were blind as to which condition they were in.

Following allocation to an experimental condition, 44 participants withdrew, presumably because the course dates they received (as a result of the random allocation to groups) did not suit them. Following allocation to experimental conditions, participants provided informed consent to participate in the study and completed the first of two surveys in which data for the present study were collected. The first survey was administered in the week prior to the interventions commencing (Time 1), and a post-intervention survey was administered in the week following the third and final intervention session (Time 2; approximately 6 weeks following the Time 1 survey). A total of 85 participants (in the MBSR-adapted and ACT conditions) did not make the AUD 100 payment, did not provide informed consent or complete the baseline survey, and withdrew from the study. A further six participants in the waitlist control did not complete the baseline survey and withdrew from the study.

As a part of the baseline survey, all participants were screened for psychological distress (using the K10 scale; Kessler et al., 2002). The K10 scale has a range of 10-50 with a score above 30 indicating high risk of psychological distress (Kessler et al., 2002). A total of 24 participants reported K10 scores of greater than 30 (sample $M = 22.41$, $SD = 6.49$). These individuals were contacted and offered a phone call to inquire about mental health and extra support during sessions however, none were excluded from the study based on these follow-up consultations.

This left a total of 199 participants in the study. Of these, 73% were female with a mean age 35 (range =18 to 60; $SD = 11$). Around 72% identified as Caucasian, 15% as East or South Asian and 13% as 'other'. Ninety five percent of participants held an undergraduate diploma or degree and 37% held a master's or PhD degree.

A total of 40 participants did not complete the post-intervention survey, but remained in the study meaning their data could be used in the analyses. Of these, 25 participants were in the waitlist group. The larger number of drop-outs in the waitlist condition (31% of the total number in the waitlist condition) was likely because these individuals had not made the up-front payment prior to commencing the study so had less incentive to complete the study measures, whereas those in the other two conditions had made an up-front payment.

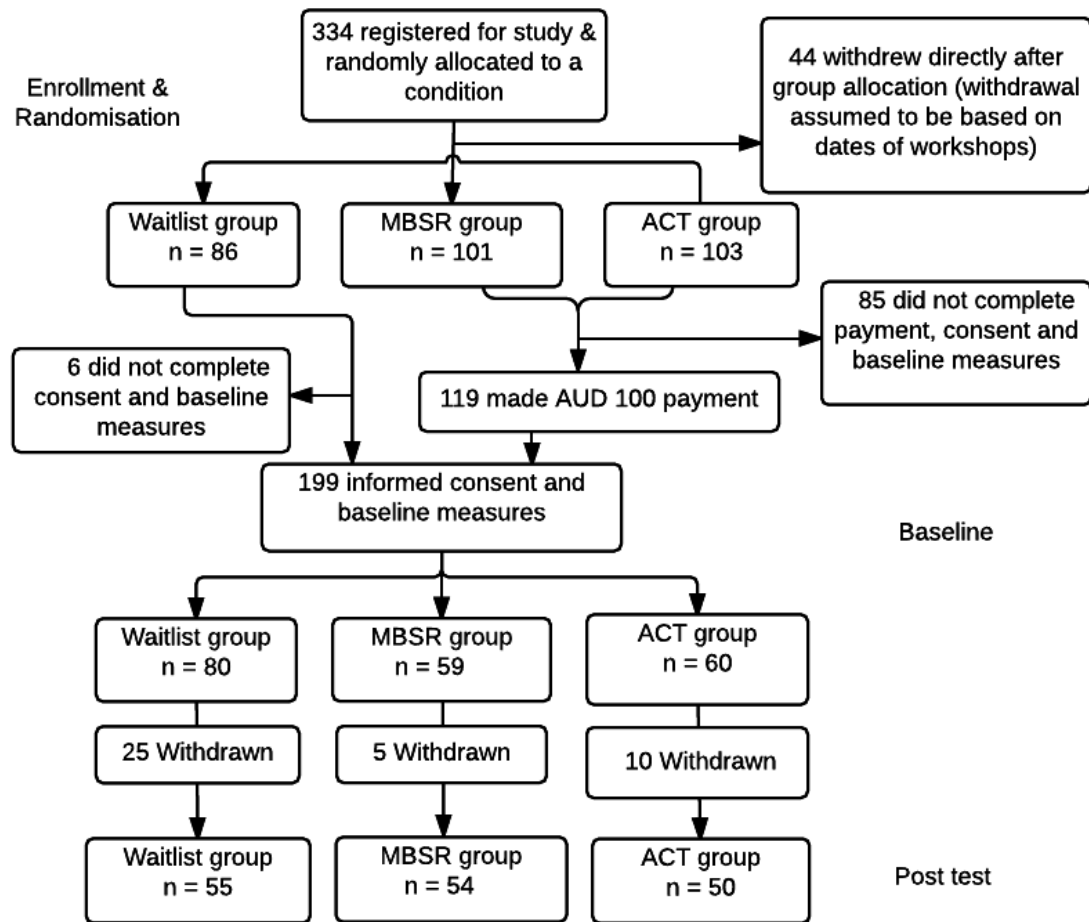


Figure 1. Flow of participants through the study.

Although 40 study participants (20% of the total) did not complete Time 2 measures, all participants were included in the analyses, a key advantage of the structural equation modelling approach used in this study. Participants who completed both surveys for the study and attended all three sessions of the interventions received an AUD 100 refund at the completion of the data-collection process. The interventions were administered at two university campuses in Sydney and one in Canberra, Australia, and are described next.

MBSR-adapted intervention

This intervention used MBSR-related activities and meditations in a reduced dosage format and was drawn from material in the *Mindfulness-based Stress Reduction Workbook* (Stahl & Goldstein, 2013). The 3 x 3 hour sessions were conducted in groups of 15-25 participants, and were led by a trained mindfulness teacher with 5 years' experience teaching mindfulness skills in groups. The intervention combined psycho-education, instruction in the practice of formal and informal mindfulness, written reflection, peer-to-peer discussion and home-practice that participants were encouraged to engage in between sessions. A summary of the topics, learning objectives, content and exercises used in each of the three sessions are in Appendix A.

ACT Intervention

The ACT intervention was based on the *Mindful & Effective Employee* protocol (Flaxman, Bond & Leventhal, 2013). The protocol was also 3 x 3 hour sessions, led by an ACT-trained facilitator with 5 years' experience facilitating ACT groups. The intervention combined psycho-education relating to mindfulness and values-clarification, instruction in mindfulness skills based on the psychological flexibility model (Hayes et al., 2006), written reflection, peer-to-peer discussion and home-practice. Descriptions of the topics, learning objectives, content and exercises used in this protocol appear in Appendix B.

Adherence

In order to ensure that the interventions were delivered in accordance with their respective protocols (see Appendices A and B for descriptions of each), audio recordings of all training sessions were made and checks for adherence to the protocols for each intervention were conducted on a randomly-selected portion of this content (approximately 30%; Öst, 2008). The checks were undertaken by a third year clinical psychology doctoral

student trained in MBSR and ACT, but not otherwise involved in any part of this research. The reviewer scored overall adherence to each protocol at 5/5.

In addition, both protocols were rated for their adherence to the core components of ACT and mindfulness interventions, respectively. A valid and reliable adherence scale developed for ACT therapy with obsessive compulsive disorder (Pierson, Bunting, Smith, Gifford, & Hayes, 2004) and subsequently used elsewhere (e.g., Twohig, Hayes, & Masuda, 2006; Twohig, Shoenberger, & Hayes, 2007) was adapted for the present training (rather than therapy) context for the ACT protocol. For the MBSR-adapted protocol, the same rating scale was adapted to reflect core mindfulness components, drawing on mindfulness-based relapse prevention (Chawla et al., 2010) and MBCT-based adherence rating scales (Segal et al., 2002). Each component of each adherence scale was rated on a five-point scale of 1 (*not at all: the variable never explicitly occurred*) to 5 (*extensively: the variable occurred with great frequency and was address in an in-depth manner*). Both adherence scales included, respectively, anti-ACT and anti-mindfulness items to rate for exclusion (e.g., challenging cognitions and experiential avoidance change strategies). The ACT intervention was rated as 33/35 on this scale, while the MBSR-adapted intervention was rated as 34/35.

Competence

The competence of trainer style and delivery was assessed using two scales adapted from (Chawla et al., 2010). The first assessed trainer style/approach (e.g., rating the trainer's "ability to elicit and respond to both verbal and nonverbal feedback"). Both trainers were rated as 18/20. The second scale assesses overall trainer performance (e.g., "How would you rate the ability of the trainer to keep the session focused and on topic?"). Both trainers received ratings of 20/20 on this scale.

Measures

Measures for the present study were administered at two time points: one in the week prior to the commencement of the experimental interventions; and another five weeks after the end of the intervention. Cronbach's alphas for each assessed variables are reported in Table 3.

Stress-related measures

On each measurement occasion, participants were asked to recall their most stressful experience of the past month and briefly describe it in writing. The following measures were then administered.

Stress appraisal: A single-item measure of momentary perceived stress during the recalled stressful event was adapted from Hodgins et al. (2010) and Tomaka et al. (1993), on a 1 (*not at all stressful*) to 100 (*extremely stressful*) slider scale: "At the time, how stressful did this experience feel to you?"

Approach coping comprised the active coping, planning and positive reinterpretation subscales of the COPE Inventory (Carver et al., 1989), following similar approaches elsewhere (e.g., Deisinger et al., 1996; Fontaine et al., 1993; Lyne & Roger, 2000; Stowell et al., 2001; Weinstein et al., 2009). Each subscale was composed of four items, rated on a five-point Likert scale (*I did not do this at all* to *I did this a lot*). Sample active coping items were "I did what had to be done, one step at a time" and "I took direct action to get around the problem"; sample planning items were "I made a plan of action" and "I thought about how I might best handle the situation"; and sample positive reinterpretation items were "I learned something from the experience" and "I looked for something good in what happened."

Avoidance coping was composed of the behavioural disengagement, self-distraction and denial subscales of the COPE Inventory (Carver et al., 1989), following similar

approaches by Cook & Heppner (1997), Deisinger et al. (1996), Lyne & Roger (2000) and Stowell et al. (2001). Each subscale contained four items rated on a five-point Likert scale (*I did not do this at all to I did this a lot*). Sample behavioural disengagement items were “I gave up the attempt to get what I want” and “I reduced the amount of effort I put into solving the problem”; sample self-distraction items were “I turned to work or other activities to take my mind of things” and “I went to the movies or watched TV to think about it less”; and sample denial items were “I acted as though it hadn’t happened” and “I pretended that it hadn’t really happened.”

Baseline covariates

Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006). The ‘act with awareness’ and ‘non-judgement’ factors of the FFMQ were respectively used to measure the present-moment-awareness and acceptance elements of trait mindfulness. These subscales contain 12 and 11 items respectively, each rated on a five-point Likert- scale (*never or rarely true to very often or always true*).

New general self-efficacy scale (Chen, Gully, & Eden, 2001). This scale is made up of eight items scored on a five-point Likert scale (*strongly disagree to strongly agree*). Sample items include “I will be able to achieve most of the goals that I have set for myself” and “Even when things are tough, I can perform quite well”.

K10 (Kessler et al., 2003) was used as a measure of baseline psychological distress. The K10 asks individuals to rate how they have felt over the past month on a one (*none of the time*) to five (*all of the time*) Likert scale. Sample items include “About how often did you feel nervous?” and “About how often did you feel worthless?”

Statistical analyses

Power analysis. Statistical power calculations were based on a medium effect size ($f = .25$), three experimental conditions, six covariates, a significance criterion of $\alpha = .05$, and statistical power ($1 - \beta$) of .90, producing a target sample of $N = 206$. Given the study in-fact recruited 199 participants, actual statistical power was .89, which is well above the generally-accepted minimum of .80 in the social sciences (Tabachnick & Fidell, 2013).

Missing data. Missing data was relatively low at Time 1, ranging from 0.5 to 1.5% of cases across study variables, but increased at Time 2, ranging from 1.5% (stress appraisal) to 20% (approach and avoidance coping) of cases across study variables. Students *t*-tests were used to examine differences between individuals who remained in the study at Time 2 compared with those who dropped out, on baseline approach and avoidance coping, psychological distress, gender and age. I did not find significant differences between the two groups on any of these variables, suggesting that dropping out was not associated with variables of interest in this study. As mentioned in Chapter 3, the FIML approach to missing data was used, which has been recognised in the social sciences as preferable to ad-hoc deletion methods, as it uses all the available information for parameter estimation (Baraldi & Enders, 2010). Using this approach, the sample size for all statistical analyses was $N = 199$ (see Figure 1).

Structural equation modelling. To measure the effects of the interventions on approach and avoidance coping, the two intervention conditions (as dummy variables) were regressed on coping responses at post-test, with the waitlist control condition as a reference group, following similar approaches elsewhere (e.g., Gaspard et al., 2015). This model is represented visually in Figure 3. A regression-based approach avoids problems with unequal cell sizes and missing data common in analyses of variance and covariance (Tabachnick & Fidell, 2013). In addition, I took a structural equation modelling approach that corrects for the measurement error of latent constructs and provides unbiased estimates

of path coefficients (Bollen, 1989). I ran two sets of five models for each of approach and avoidance coping as outcome variables. In each model, I controlled for the effects of baseline (Time 1) levels of coping (either approach or avoidance, depending on the model), so as to control for the autoregressive effects of coping across time (Gaspard et al., 2015). All analyses were conducted in the R program (R Core Team, 2015), using the ‘lavaan’, ‘lavaan.survey’ and ‘SEMTools’ packages.

Goodness of fit. In order to compare the fit of the above successively more restrictive models, the CFI, TLI, and RMSEA fit measures were used, as discussed in Chapter 3. In order to ensure that the latent coping variables remained invariant across time points, the longitudinal invariance of the factor loadings were tested (Millsap, 2011). I used the criterion of $CFI \Delta \leq .01$ for comparing the fit of successive models, as suggested by Cheung and Rensvold (2002), and used the same criterion for the TLI. For the RMSEA, I used the criterion of $RMSEA \Delta \leq .015$ for invariance between nested models, as suggested by Chen (2007). Although additional tests of invariance may be used, the models in the present study focused solely on the covariance between constructs, meaning the only real prerequisite to valid longitudinal comparisons is the invariance of the factor loadings over time (Millsap, 2011).

Results

Marginal means and standard errors for each of the three conditions on both approach and avoidance coping at baseline (Time 1) and post-test (Time 2) are shown in Table 2.

Table 2

Marginal means and standard deviations for the three conditions at both time-points

Time	Condition	Approach Coping		Avoidance Coping	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Time 1	MBSR	47.54	5.94	22.58	5.41
	ACT	47.18	6.59	23.77	6.00
	Waitlist	46.88	6.37	24.35	5.64
Time 2	MBSR	49.19	5.85	19.98	5.79
	ACT	49.28	6.34	22.12	5.59
	Waitlist	45.78	6.20	23.95	5.69

In order to assess the effects of both interventions on approach and avoidance coping, a series of CFA and structural models were ran. I first ran two sets of configural CFA models, in which all approach coping items loaded onto a single approach factor (Model 1) and all avoidance coping items loaded onto a single avoidance coping factor (Model 2). Next, I compared Models 1 and 2 with a second set of configural CFA models in which I allowed items pertaining to each of the three approach and avoidance subscales (see *Measures* section) to load onto their respective subscales as first-order factors, and each of the first-order factors to load in-turn onto higher order approach (Model 3) and avoidance (Model 4) coping factors, following similar approaches elsewhere (Cook & Heppner, 1997; Deisinger et al., 1996; Lyne & Roger, 2000; Stowell et al., 2001). As shown in Table 3, Models 1 and 2 displayed poor fit, while Models 3 and 4 displayed acceptable fit to the data.

Table 3 *Fit measures for Confirmatory Factor Analytic (CFA) and Structural Equations Models (SEM)*

Model	Description	χ^2	<i>df</i>	CFI	TLI	RMSEA
<i>Approach coping</i>						
CFA						
Model 1	First-order configural	734.588	287	.755	.723	.088
Model 3	Second-order configural	416.754	272	.921	.905	.052
Model 5	Time-invariant model	426.785	283	.921	.910	.050
SEM						
Model 7	Path model without covariates	426.785	283	.921	.910	.050
Model 9	Path model with covariates	562.663	415	.928	.914	.042
Model 11	Path model with covariates and interaction (intervention x stress)	480.600	343	.946	.936	.045
<i>Avoidance coping</i>						
CFA						
Model 2	First-order configural	562.517	283	.821	.795	.070
Model 4	Second-order configural	389.369	278	.929	.917	.045
Model 6	Time-invariant model	403.971	289	.926	.917	.045
SEM						
Model 8	Path model without covariates	391.315	285	.932	.922	.043
Model 10	Path model with covariates	581.580	417	.911	.900	.044
Model 12	Path model with covariates and interaction (intervention x stress)	456.470	349	.939	.929	.039

Note. ‘CFI’ = Comparative fit index; ‘TLI’ = Tucker-Lewis Index; ‘RMSEA’ = Root mean-squared error of approximation. In Models 5 and 6, only the factor-loadings were constrained to be equal between Times 1 and 2.

Third, I assessed correlations between study variables at baseline, with approach and avoidance included in a CFA as second-order factors (see Table 4). All relationships were in the expected direction, with trait mindfulness and general self-efficacy associated with greater approach and less avoidance coping, and psychological distress predicting less approach and more avoidance coping. Notably, age was positively related to acting with awareness and non-judgement, suggesting developmental changes in these variables, while gender was not correlated with any other variables. Cronbach's alphas are reported in Table 4.

I next ran CFA models for each of approach (Model 5) and avoidance coping (Model 6), in which I constrained the loading of each coping item onto its respective factor to be equal across time, in order to test whether both models retained acceptable fit to the data across time. Each of these models retained acceptable fit (see Table 3), suggesting that both the approach and avoidance coping models were time-invariant.

Table 4

Cronbach's alphas and bivariate correlations between study variables at baseline

	Approach coping	Avoidance coping	Act Aware (FFMQ)	Non-judge (FFMQ)	Psych. distress	General self-efficacy	Perceived stress	Age	Cronbach's alpha
Approach coping	-								.87
Avoidance coping	-.72**	-							.81
Act aware (FFMQ)	.25**	-.44**	-						.92
Non-judge (FFMQ)	.21**	-.44**	.53**	-					.94
Psychological distress	-.18*	.50**	-.41**	-.46**	-				.87
General self-efficacy	.46***	-.44**	.25**	.25**	-.52***	-			.91
Perceived stress	.10	.19*	-.14	-.25***	.36***	-.20**	-		-
Age	.13	-.15	.18*	.29***	-.09	-.04	-.13	-	-
Gender	.02	.08	.00	-.03	.03	.00	.13	.12	-

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

Main effects of both interventions on approach and avoidance coping

I next ran two structural models (Model 7 for approach coping and Model 8 for avoidance coping), in which I specified and estimated path coefficients. An illustration of these models is in Figure 3, noting that this figure is a generic representation of the structure of both Models 7 and 8. Models 7 and 8 both retained acceptable fit indices, as shown in Table 3. The effects of both interventions on approach and avoidance coping are shown in Table 5. Model 8 provides partial support for Hypothesis 1, with the MBSR-adapted intervention predicting less avoidance coping at Time 2 relative to the waitlist control, controlling for baseline levels of avoidance coping, $\beta = -.26 (.10)$, $t = -2.71$, $p = .007$. However, contrary to Hypothesis 1, the ACT intervention did not predict less avoidance coping at Time 2, controlling for baseline levels of avoidance coping, $\beta = -.11 (.09)$, $t = -1.27$, $p = .203$.

Regarding approach coping (Model 7), Table 5 shows that both interventions resulted in greater approach coping at Time 2 relative to the waitlist control, and controlling for baseline levels of avoidance coping, when this was not predicted in the hypotheses of this study. Effects for the MBSR-adapted intervention were $\beta = .26 (.09)$, $t = 2.86$, $p = .004$; and for the ACT intervention were $\beta = .27 (.10)$, $t = 2.82$, $p = .005$.

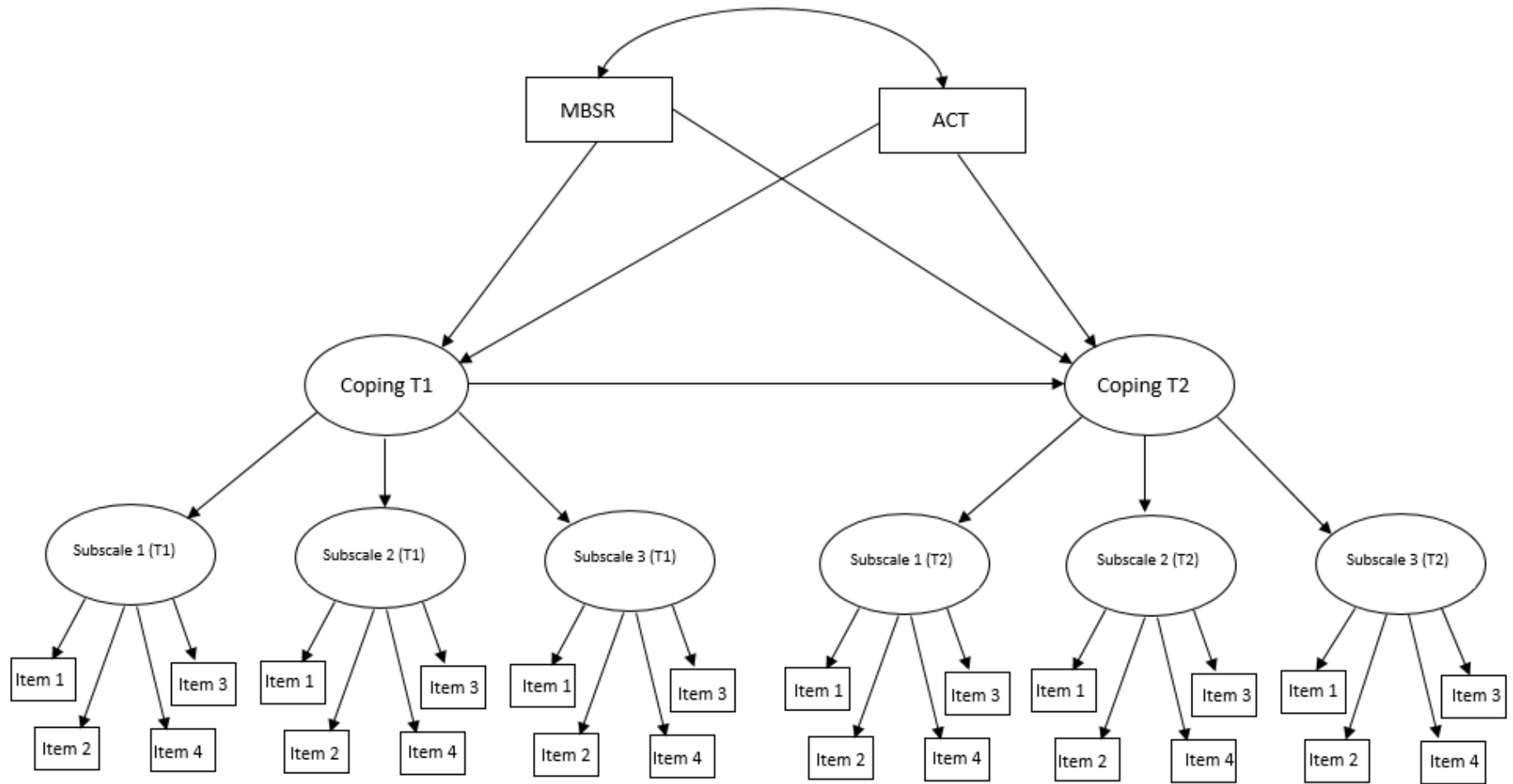


Figure 3. A path model illustrating Models 7 and 8, with experimental interventions predicting coping at Time 2, controlling for coping at Time 1. *Note.* Coping respectively refers to approach coping for Model 7 and to avoidance coping for Model 8.

Table 5

Effects of MBSR-adapted and ACT interventions on approach and avoidance coping (Models 7 and 8)

	Approach coping (Model 7)				Avoidance coping (Model 8)			
	β	SE	z-value	p-value	β	SE	z-value	p-value
Coping (Time 2)								
MBSR	.26**	.09	2.86	.004	-.26**	.10	-2.71	.007
ACT	.27**	.10	2.82	.005	-.11	.09	-1.27	.203
Coping (Time 1)	.32***	.09	3.54	< .001	.41***	.09	4.48	< .001
Coping (Time 1)								
MBSR	.02	.09	0.22	.826	-.15	.09	-1.62	.105
ACT	-.04	.09	-0.48	.630	-.07	.09	-0.77	.441

Note. All effects are in standardized form. Effects for MBSR and ACT are in comparison to the waitlist condition. ** $p < .01$, *** $p < .001$.

Models 9 and 10 extended models 7 and 8 by adding demographic (gender and age) and non-demographic covariates (baseline psychological distress, general self-efficacy, present-moment awareness and non-judgement). Both Models 9 and 10 displayed acceptable fit to the data (see Table 3). Path estimates for Models 9 and 10 are reported in Table 6. These results are almost identical to the findings reported above in Models 7 and 8, meaning that after including the additional demographic and non-demographic covariates in both models, the effects remained substantively the same. Specifically, the MBSR-adapted but not the ACT condition predicted significantly less avoidance coping at Time 2 than the waitlist control (for the MBSR-adapted condition, $\beta = -.28$ [.10], $t = -2.88$, $p = .004$; and for the ACT condition, $\beta = -.14$ [.09], $t = -1.54$, $p = .124$), while both interventions predicted more approach coping at Time 2 than the waitlist control (for the MBSR condition, $\beta = .25$ [.09], $t = 2.79$, $p = .005$; and for the ACT condition, $\beta = .30$ [.09], $t = 3.14$, $p = .002$).

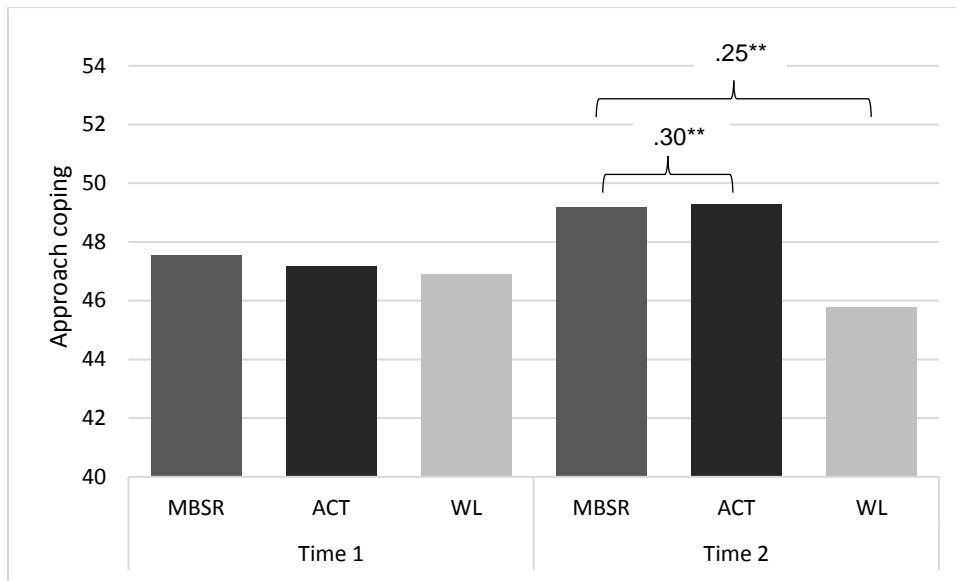
Table 6

Effects of MBSR-adapted and ACT interventions on coping, controlling for covariates

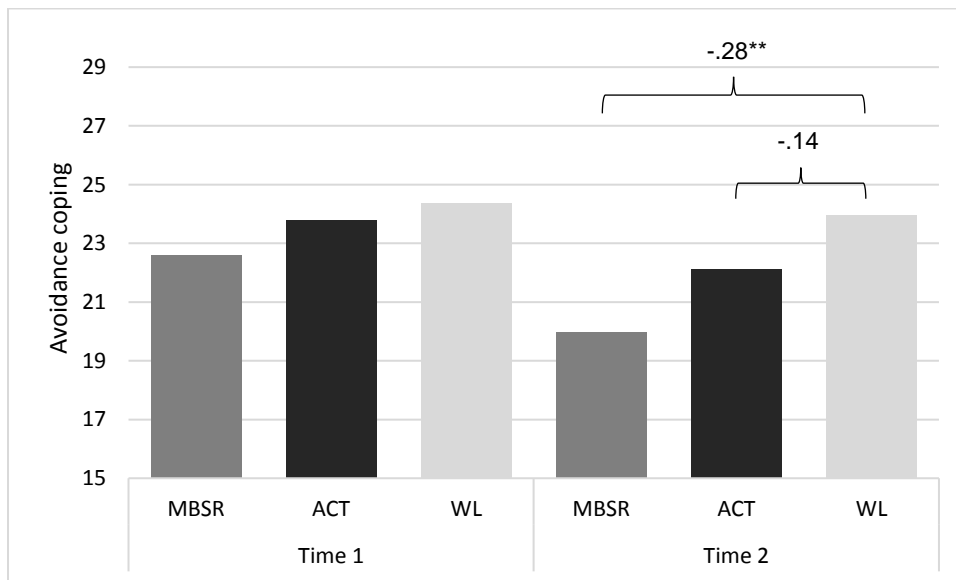
	Approach coping (Model 9)				Avoidance coping (Model 10)			
	β	<i>SE</i>	<i>z</i> -value	<i>p</i> -value	β	<i>SE</i>	<i>z</i> -value	<i>p</i> -value
Coping (Time 2)								
M-only	.25**	.09	2.79	.005	-.28**	.10	-2.88	.004
ACT	.30**	.09	3.14	.002	-.14	.09	-1.54	.124
Coping (Time 1)	.31**	.10	2.98	.003	.33**	.12	2.75	.006
Age	.00	.09	-0.04	.972	-.08	.08	-1.01	.311
Gender	-.10	.08	-1.29	.198	.16	.08	1.95	.051
Self-efficacy	.12	.10	1.18	.237	-.07	.09	-0.71	.478
Psych. distress	.01	.10	0.09	.926	.05	.11	0.42	.676
FFMQ (ActAware)	-.22*	.10	-2.26	.024	.14	.10	1.49	.137
FFMQ (Non-judge)	.14	.10	1.40	.163	-.13	.11	-1.22	.223

Note. All effects are standardized. Effects for MBSR and ACT are in comparison to the waitlist condition. Predictions of approach and avoidance coping at Time 1 by all independent variables and covariates are not shown here, but were included in the model. * $p < .05$, ** $p < .01$.

The means of approach and avoidance coping for each experimental condition, at both measurement-occasions, are displayed graphically in Figure 4. In addition, Figure 4 shows the standardized effect sizes between experimental conditions at Time 2 (i.e., differences between conditions at Time 2, controlling for differences in coping between conditions at Time 1).



(a)



(b)

Figure 4. Mean scores (indicated by vertical solid bars) by condition on (a) approach and (b) avoidance coping at Times 1 and 2; and standardized effect sizes (indicated by horizontal brackets) for the MBSR and ACT conditions compared with the waitlist control condition, controlling for covariates and baseline approach and avoidance coping at Time 2. Note. 'WL' = waitlist. ** $p < .01$.

Perceived stress as a moderator of intervention effects

I lastly tested Hypothesis 2 that the effects of both interventions on avoidance coping will be strongest among individuals reporting relatively high levels of stress. I found some support for this hypothesis. As shown in Table 7, as perceived stress at Time 2

increased between individuals, those in the MBSR-adapted condition reported significantly less avoidance coping than those in the waitlist condition (Model 12). A similar interaction effect was not obtained for the ACT condition, although the effect approached statistical significance, in the expected direction. The fit of Model 12 was acceptable, as shown in Table 3. There was not an interaction effect between either of the interventions and perceived stress on approach coping, however.

Table 7

Perceived stress moderating the effect of MBSR-adapted and ACT interventions on approach and avoidance coping

	Approach coping				Avoidance coping			
	β	SE	z-value	p-value	β	SE	z-value	p-value
Coping (Time 2)								
MBSR	.26**	.09	2.86	.004	-.27**	.09	-2.88	.004
ACT	.32**	.10	3.39	.001	-.15	.09	-1.72	.085
Coping (Time 1)	.28**	.10	2.71	.007	.34**	.12	2.83	.005
Age	.01	.09	0.16	.872	-.11	.08	-1.28	.201
Gender	-.11	.08	-1.37	.170	.16	.08	1.95	.051
General Self-efficacy	.13	.10	1.31	.191	-.06	.09	-0.64	.525
Psychological distress	-.01	.10	-0.05	.959	.05	.11	0.42	.675
FFMQ (Act-aware)	-.22*	.10	-2.27	.023	.14	.09	1.44	.150
FFMQ (Non-judge)	.16	.10	1.55	.121	-.14	.10	-1.31	.192
Perceived stress (T2)	-.08	.14	-0.53	.600	.19	.14	1.35	.178
Stress (T2) x M-only	.13	.11	1.24	.213	-.22*	.11	-2.04	.041
Stress (T2) x ACT	.14	.11	1.30	.192	-.19	.11	-1.72	.086

Note. Estimates for MBSR-adapted and ACT conditions plus their interactions with perceived stress are in relation to the waitlist condition. All estimates are standardized coefficients. * $p < .05$, ** $p < .01$.

A plot of each condition by stress on avoidance coping is in Figure 5, showing that perceived stress moderated the effect of the MBSR-adapted intervention upon avoidance coping. Although no interaction effect for the ACT condition was obtained, Figure 5 indicates a similar pattern of results.

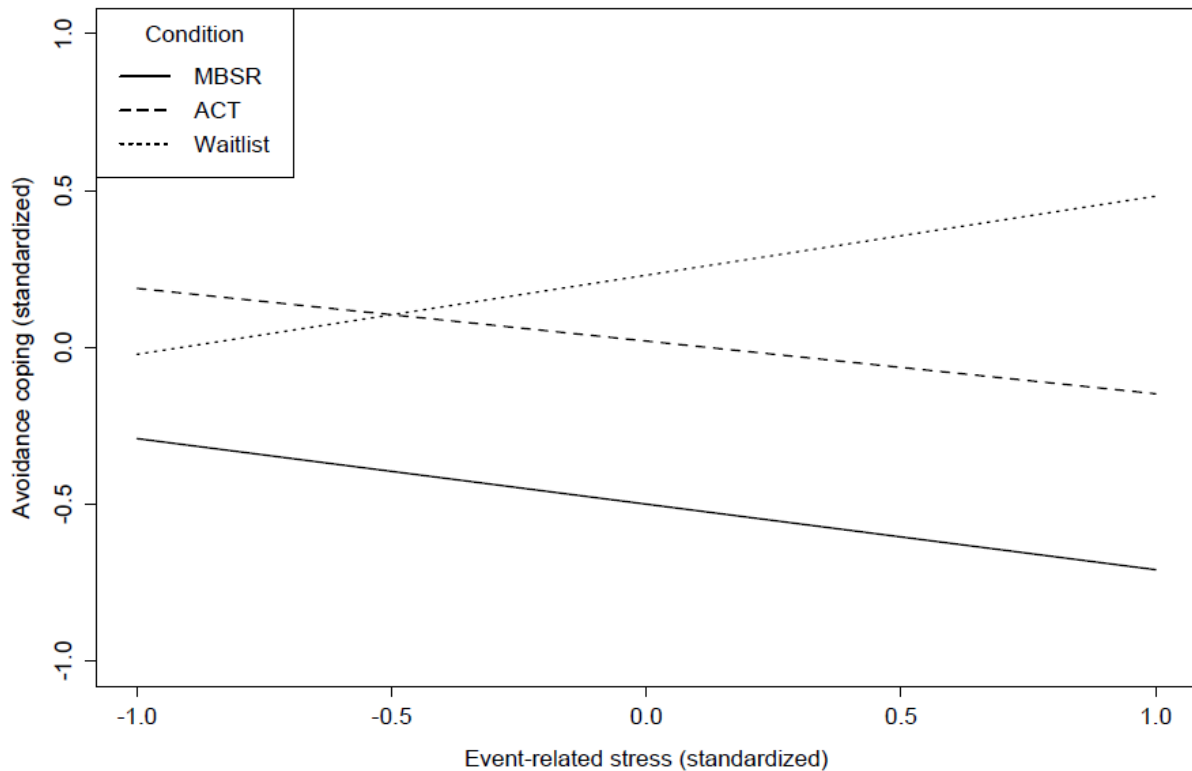


Figure 5. Standardized plot of event-related perceived stress moderating the effects of the MBSR-adapted and ACT conditions on avoidance coping, relative to the waitlist condition.

Discussion

Studies of multi-session mindfulness interventions and coping have to-date produced mixed findings, with some studies reporting significant effects on approach (e.g., Halland et al., 2015; Walach et al., 2007) and avoidance coping (e.g., Halland et al., 2015) and others not (e.g., Josefsson et al., 2012; Sears & Kraus, 2009). These have been mostly pilot studies (e.g., Sears & Kraus, 2009; Tacón et al., 2003; Walach et al., 2007), with small sample sizes and therefore limited statistical power to detect effects. In addition, the mixed findings from these interventions may also be because several of them included limited application of mindfulness skills to every-day challenges (e.g., Josefsson et al., 2012; Sears & Kraus, 2009). Lastly, extending Study 1, the present study tested the possibility that a mindfulness intervention would influence coping among relatively stressed individuals

(i.e., that perceived stress moderates the effects of a mindfulness intervention upon coping responses).

To explore these questions, a multi-session (3 x 3 hours) mindfulness intervention was administered and compared with the effects of an ACT intervention of the same length, against a waitlist control condition. So-called ‘mindfulness-only’ interventions focus solely on training mindfulness skills, including present-moment awareness, acceptance and curiosity (e.g., MBSR, Kabat-Zinn, 1990; and MBCT, Segal et al., 2002). On the other hand, ACT focuses on *applying* mindfulness to personally-held values, and using mindfulness skills to act in values-congruent ways (Hayes et al., 1999, 2006). In this sense, ACT teaches mindfulness primarily as a means of acting in values-consistent ways, whereas programs such as MBSR and MBCT focus explicitly on training mindfulness skills. However, the application of mindfulness skills to values-consistent behaviour in the latter is implicit. Although the primary goal of the present study was to test the effects of a mindfulness-only intervention (i.e., the MBSR-adapted intervention) on coping responses, the secondary aim was to compare the effects of the MBSR-adapted intervention with an ACT intervention, against a waitlist control. The author is not aware of any research to have done this, despite both approaches (i.e., ACT and MBSR) attracting substantial research interest in recent years (for a review see Keng et al., 2011).

Regarding Hypothesis 1, as predicted, the MBSR-adapted intervention resulted in less avoidance coping than the waitlist control at Time 2, controlling for baseline avoidance coping. These results remained after including relevant demographic and non-demographic covariates in the model. This finding is consistent with those of previous studies of mindfulness and coping (Halland et al., 2015; Weinstein et al., 2009), as well with other studies showing that mindful-acceptance interventions reduce avoidance of aversive stimuli such viewing distressing images (Arch & Craske, 2006), breathing CO₂ enriched air (Eifert

& Heffner, 2003; Levitt et al., 2004), and receiving an electric shock (Gutiérrez et al., 2004).

However, the finding of no difference between the ACT and waitlist conditions on any of the three avoidance coping subscales was unexpected. This null effect may have been due to the different foci of the two interventions. A central focus of mindfulness training lies in exposure and cultivating non-reactivity to unpleasant stimuli (Baer, 2003), and all three sessions of the MBSR-adapted intervention, as well as home-practice, explored this (see Appendix A). Although the ACT intervention included sessions on acceptance and defusion from difficult thoughts, it placed less emphasis on exposure to unpleasant experiences and more on values clarification and values-consistent action (Hayes et al., 2006; see Appendix B). In turn, this difference in emphasis may explain the pattern of results regarding avoidance coping.

Regarding effects on approach coping, unexpectedly, *both* interventions resulted in increased approach coping at Time 2 compared with the waitlist control, and controlling for Time 1 approach coping. These effects remained when demographic and non-demographic covariates were included in the models. The positive effect on approach coping for the ACT intervention provides novel evidence that using mindfulness to act in values-consistent ways does, on average, enhance approach forms of coping. Although values-consistent action may not enhance approach coping in all cases, this finding suggests that, on average, this is the case, consistent with previous research of the effects of autonomous motivation on coping (Weinstein et al., 2009) and persistence (Koestner & Zuckerman, 1994).

Regarding the effect of the MBSR-adapted intervention, the findings of this study suggest an unintended-but-positive consequence of mindfulness training: although the

intervention emphasized *not* seeking to change present-moment experience, when participants were faced with a stressful situation outside the training room, they were more likely to enact behaviours that involved directly engaging with, and in some cases seeking to change such situations. This replicates findings that the MBSR program enhances approach forms of coping such as problem-solving (Halland et al., 2015) and positive coping (Walach et al., 2007). It is also consistent with studies that have found a mindfulness induction enhances behaviours that are related to approach coping, such as increased willingness to view aversive images (Arch & Craske, 2006), breathe CO₂ enriched air (Eifert & Heffner, 2003; Levitt et al., 2004), and receive an electric shock (Gutiérrez et al., 2004). Each of these behaviours involves directly contacting a stressor, and so can be viewed as analogues of approach coping. The increases in approach coping among the MBSR-adapted condition in the present study may be because mindfulness enhances willingness to be exposed to unpleasant experiences (Shapiro et al., 2006) and this, in-turn, increases the range of possible responses to a threatening experience, making an approach response more likely (Halland et al., 2015). Such an explanation is consistent with theories of mindfulness (Brown et al., 2007; Hayes et al., 2006; Shapiro et al., 2006) which highlight its role in enhancing behavioural regulation in the presence of aversive experience.

Regarding Hypothesis 2, as predicted, the MBSR-adapted intervention interacted with perceived stress to predict less avoidance coping at Time 2; however there were not similar effects for approach coping. This finding is consistent with Study 1, which found a significant interaction effect of stress by a mindfulness induction on avoidance but not approach coping. It is also consistent with Weinstein et al., (2009), who found that dispositional and state mindfulness predicted avoidance coping more consistently than it did approach coping among individuals exposed to stress. Finally, there was no interaction effect found between perceived stress and the ACT intervention for either approach or

avoidance coping (though the effect for avoidance coping was close to significance and in the expected direction). These null results were unexpected and again may be because the MBSR-adapted intervention targeted exposure to aversive thoughts and feelings more than the ACT intervention did. It may be that this differential focus in-turn meant that the ACT intervention did not have a particular influence on coping behaviour for individuals experiencing high levels of stress, while for those in the MBSR-adapted condition, this effect was significant.

Although some of the findings from this study were unanticipated, they appear consistent with previous research on coping when the different emphases of both interventions are taken into account, and are generally consistent with theories of mindfulness. Together, the findings of this study suggest that mindfulness interventions that focus on present-moment awareness and acceptance skills (i.e., the MBSR-adapted intervention) may be more effective than interventions that apply mindfulness to values-consistent action (i.e., ACT) in enhancing coping responses – and particularly in reducing avoidant forms of coping among relatively stressed individuals. These findings may have been because of the particular focus in the MBSR-adapted intervention on acceptance of unpleasant experiences, which, in-turn, appears to facilitate less avoidant and more approach-focused coping responses. Given the growing interest in mindfulness in non-clinical group settings such as the workplace, these findings suggest that training mindfulness skills enhances how individuals cope with stress, and may be especially effective for individuals experiencing high levels of stress, for example military or other front-line service provision personnel, who perform some of society's most stressful roles.

This study has several limitations. First, I used adaptations of existing protocols (Stahl et al., 2013; Flaxman et al., 2013), rather than exact replications of these. This approach was unavoidable, as these two protocols have very different lengths (8 x 2.5 hour sessions

plus a full-day retreat for MBSR, as compared with 3 x 3 hour sessions in ACT), and was needed in order to compare like-with-like formats. However, it does limit the comparison of our findings with studies that have, for example, used the full MBSR protocol (e.g., Tacón et al., 2003; Walach et al., 2007). To minimise the drawbacks of this approach, I include descriptions of both protocols in Appendices A and B, so readers can identify similarities and differences with other protocols.

Another limitation of both this study and Study 1 was the use of self-report measures of coping. There is evidence that retrospective, self-report measures of coping are in some cases substantially different from more momentary measures of coping (Shikai et al., 2014; Stone et al., 1998). Although the present study sought to minimise the biases associated with such measures by making them context-specific (i.e., the most stressful event of the past month), rather than global (Ptacek et al., 1994; Stone et al., 1998), future studies of mindfulness and coping could improve on this approach by using ecological momentary assessments of coping responses, or, ideally, behavioural measures.

A third limitation was the use of a waitlist rather than an active control group. The majority of studies of MBSR and ACT interventions have used waitlist controls (Keng et al., 2011; Khoury et al., 2013; Öst, 2014). Several mindfulness researchers have argued for the use of active controls such as relaxation in studies of mindfulness (Jain et al., 2007; Manocha et al., 2011) and the author is aware of only one published study of mindfulness and coping to have done this (Josefsson et al., 2012). Although using a relaxation control was logistically impossible in the current study, future studies of mindfulness-based protocols and coping would be enhanced by the use an active condition such as a relaxation control or concentration task to control for other possible effects of mindfulness processes.

A final limitation of this study was the use of only two measurement occasions. Subsequent research would benefit from including measures of the longer-term effects of the interventions on coping, consistent with some previous studies of mindfulness and coping that have done this (e.g., Walach et al., 2007).

Notwithstanding these limitations, the present study adds to previous research on MBSR-based interventions and coping responses, and extends them by including an ACT comparison. The findings of this study suggest that interventions focused solely on mindfulness skills training such as MBSR may be particularly effective in enhancing coping responses relative to one that applies mindfulness to values-consistent behaviours, perhaps because of the emphasis in the former on exposure to and acceptance of unpleasant thoughts and feelings. This suggests an unintended-but-positive effect of mindfulness-focused interventions: despite their focus on merely noticing and accepting present-moment experience, when faced with a stressor, these skills translate to increased engagement with the stressful event, including more active forms of coping. Moreover, this study found novel evidence that mindfulness-focused interventions such as MBSR may have their biggest effects on coping responses among individuals experiencing high levels of stress. However, it is unclear which specific mindfulness components facilitated the changes in coping that were reported in this study. Based on the literature reviewed above (Chapter 2), I identified two possible ‘active ingredients’ of changes in mindfulness – acceptance and cognitive defusion – likely to have a particularly strong influence on coping responses. To compare the effects of these two mindfulness components on coping responses, Study 3 was conducted.

CHAPTER 6

STUDY 3

Introduction

This study extended Studies 1 and 2 by exploring the third research question of this thesis: whether acceptance and cognitive defusion (components of mindfulness as defined by Hayes et al., 2006) predict greater approach and less avoidance coping with stress. In addition, this study explored whether these effects are moderated by individual differences in perceived stress, as was done in Studies 1 and 2. As outlined in Chapter 2, acceptance and cognitive defusion are expected to have a particularly strong impact upon approach and avoidance coping responses. The present study tested this possibility in a laboratory setting, comparing brief inductions of both acceptance and cognitive defusion with two control inductions: self-affirmation and relaxation.

Acceptance involves not seeking to change the form or frequency of thoughts and feelings as they arise, so is likely to be associated with less avoidance of stress-related thoughts and feelings, and a greater willingness to directly contact such thoughts and feelings (Hayes et al., 1999; Hayes et al., 2006). As mentioned in Chapter 2, acceptance inductions have been found to reduce behavioural avoidance of an aversive stimuli such as exposure to CO₂-enriched air (Eifert & Heffner, 2003; Levitt et al., 2004) and an electric shock (Gutiérrez et al., 2004), and there is evidence that experiential avoidance (the opposite of acceptance) is associated with more avoidance and less approach coping (Karekla & Panayiotou, 2011). In addition, a study of self-compassion found that following academic failure, individual differences in self-compassion were negatively associated with

avoidant coping responses among university students (Neff et al., 2005). Self-compassion is closely related to acceptance in that it involves acknowledging difficult or unpleasant experiences and embracing such experiences with self-kindness (Neff et al., 2007, Yadavia et al., 2014). In the present study, a measure of trait self-compassion was used to measure individual differences in self-acceptance.

Regarding cognitive defusion, recall that this aspect of mindfulness describes the behaviour of noticing thoughts and distancing from them so that they are viewed with greater perspective and in-turn have less control over an individuals' behaviour (Gillanders et al., 2014). Individuals who cognitively defuse from stress-related thoughts are less likely to avoid situations where they experience such thoughts, as the content of stress-related thoughts has less 'reality' (Hayes et al., 2006). Greater cognitive defusion is also likely to result in more approach-focused behaviour following stress, as the behaviour-narrowing effect of stress-related thoughts is inhibited, making more constructive and approach-focused more likely (Gillanders et al., 2014). Support for the likely effect of cognitive defusion in enhancing approach and inhibiting avoidance coping with stress comes from several studies which reported reductions in emotional discomfort and negative thought believability among non-clinical samples following brief cognitive defusion manipulations that involved a word-repetition exercise (Masuda, Feinstein, et al., 2010; Masuda et al., 2004; Masuda, Twohig, et al., 2010; Watson et al., 2010). In turn, emotional discomfort and threat-activation have been associated with avoidant coping responses (Kessels, Ruiter, Brug, & Jansma, 2011; Kessels, Ruiter, & Jansma, 2010; Stowell et al., 2001), suggesting a link between cognitive defusion and reduced avoidance coping.

Another study administered the 'leaves on a stream' cognitive defusion protocol, used in the present study to induce cognitive defusion, prior to a cold-pressor task (designed to produce physical pain) and found that the cognitive defusion manipulation predicted

significantly more pain tolerance than those in pain-control and attention-placebo control conditions (Takahashi et al., 2002). Pain tolerance involves the non-avoidance of a potentially stressful experience and a willingness to experience it, and in this sense is related to approach coping. This evidence suggests that, by creating psychological distance from one's stress-related cognitions (as in cognitive defusion), individuals are less influenced by their stress-related thoughts, meaning they are less avoidant and are more likely to engage in approach coping behaviours following stressful events.

Evidence that inductions of acceptance and cognitive defusion enhance coping responses will extend previous studies of both defusion and acceptance inductions as core mindfulness components and also highlight the potential 'active ingredients' of more generic mindfulness inductions, such as that administered in Study 1 and elsewhere (e.g., Arch & Craske, 2006; Heppner et al., 2008; Reb & Narayan, 2014), in enhancing coping responses.

To strengthen the research designs used in Studies 1 and 2, behavioural measures of approach and avoidance coping were used in this study to avoid the recall and common-method biases associated with using retrospective, self-report coping scales (Schwartz, et al., 1999; Shikai et al., 2014; Stone et al., 1998). Also, this study included a more direct induction of stress than the one used in Study 1 (which was also a laboratory study). In the present study, stress was induced via a negative social comparison manipulation (adapted from Dweck & Elliott-Moskwa, 2010), as there is evidence that such comparisons are highly stressful (Klein, Blier, & Janze, 2001; Nussbaum & Dweck, 2008). In this study, a 'cognitive-ability' test was administered and all students' scores were artificially lowered relative to the student mean (adapted from Mueller & Dweck, 1998, and Nussbaum & Dweck, 2008). Students were then asked to share their (deflated) scores with the class and

discuss their performance with peers. This was used to measure approach and avoidance coping behaviourally, as described below.

A final innovation in this study was the inclusion of a self-affirmation induction in place of the filler task administered in Study 1, as a ‘treatment as usual’ condition. Self-affirmation theory and empirical evidence suggest that affirmation of one’s self-concept (e.g., writing about an important life-value), even via a brief induction, dampens defensive threat responses in general (Good & Abraham, 2007; McQueen & Klein, 2006) and avoidance coping in particular (Creswell et al., 2007). However, there is also growing evidence that changing one’s *relationship* with unwanted thoughts and feelings (e.g., via mindfulness) may be more effective than changing the *content* of thoughts (e.g., via self-affirmations) in improving mental health and behavioural outcomes (Bond et al., 2011; Eifert & Heffner, 2003; Gutiérrez et al., 2004; Levitt et al., 2004; Masuda et al., 2004; Masuda, Twohig, et al., 2010).

The present study therefore sought to test whether acceptance and defusion inductions enhanced coping responses more than self-affirmation, consistent with recent evidence suggesting they should. Lastly, I included a relaxation condition in the present study to control for the relaxation effects of mindfulness, as in Study 1 (Jain et al., 2007; Manocha et al., 2011). In addition, this study tested whether perceived stress moderated the effects of the acceptance and defusion inductions upon approach and avoidance coping responses, following evidence for such an interaction effect in Studies 1 and 2 (Chapters 4 and 5) in relation to avoidance but not approach coping. Specifically, the hypotheses for this study were:

Hypothesis 1: Acceptance and defusion inductions will result in more approach and less avoidance coping following a stressful experience, relative to self-affirmation and relaxation controls.

Hypothesis 2: Perceived stress will moderate the effects predicted in Hypothesis 1, resulting in more approach and less avoidance coping among individuals reporting relatively high (but not low) levels of perceived stress.

Method

Participants and Procedure

Participants were 202 undergraduate students (57% female; mean age = 22; age range = 20-26) in a management course at an Australian university. This study was approved by the Human Ethics Committee at the Australian National University. First, the 12 tutorial groups in the course were each randomly allocated to one of four experimental conditions.

Second, all participants completed baseline measures of self-compassion (which was the focus of the acceptance induction), cognitive defusion (the focus of the cognitive defusion induction) and general perceived stress, to control for baseline differences between individuals on these variables. This was followed by a 10-question ‘cognitive ability test’. The cognitive ability test was an unofficial test developed by the researchers using Mensa problem-solving questions. Piloting ($N = 15$) indicated that students rated (via simple rank-ordering) having a favorable cognitive ability score as more important than receiving positive evaluations on measures of social skill, future income earning capacity, cultural intelligence and writing about recent failures. On completion of the test, students received an automated email message reporting their score (a number between 0 and 10),

the fact that they had failed the test (reported as being out of 20), and were informed that the global student average for the test was 12/20.

Third, students attended their tutorial class and were informed that they would be asked to share their test score with their peers after completing the experimental inductions. Fourth, the experimental inductions were administered. In the acceptance induction, participants received guided instruction (adapted from Neff et al., 2007) in reflecting on the forthcoming class activity, noticing and naming the emotions they experienced in response to this, and cultivating an attitude of self-acceptance and self-kindness to oneself in the presence of these emotions.

The defusion induction was the ‘leaves on a stream’ protocol (see Hayes et al., 1999, p. 158 - 161), which has been used in several studies to induce cognitive defusion (e.g., Hartnett & Carr, 2013; Takahashi et al., 2002; Tapper et al., 2009). Participants were instructed to visualise a stream and each time they noticed a thought entering the mind, to place the thought on a leaf and watch it float down the stream. The instructions then asked participants to ‘return’ to watching the stream until another thought was noticed occupying the attention, at which point the same process was to be repeated. Participants were encouraged to not worry about how many thoughts they placed on leaves or the content of their thoughts, consistent with the protocol outlined in Hayes et al. (1999).

In the self-affirmation induction, students were asked to rank a list of values and then write about their highest ranked value for 10 minutes (following Crocker, Niiya, & Mischkowski, 2008 and Sherman et al., 2000). A writing task was used in this study as this is the most commonly-used manipulation of self-affirmation in the literature (see McQueen & Klein, 2006).

The relaxation induction was the progressive muscle relaxation exercise described in Study 1. All inductions were 10 minutes long, and were delivered by the same instructor using standard scripts.

Fifth, after the inductions, students were invited to share their test score with the class via an online learning tool, with scores projected on a screen. Following Mueller & Dweck (1998), students were told that they could anonymously report a false score if they wished, but that this would undermine the value of the subsequent peer review exercise. This was a measure of avoidance coping (i.e., avoiding negative social evaluation). Having reported their score, students received a copy of the test questions and discussed their performance on it with peers.

Finally, measures of approach coping, event stress, manipulation checks and items on suspicion and diffusion were administered. Students were then fully debriefed.

Measures

Cognitive defusion was measured with the 13-item Cognitive Fusion Questionnaire, rated on a one (*never true*) to five (*always true*) Likert scale (Gillanders et al., 2014; $\alpha = .77$; $ICC_1^\ddagger = .003$). This scale was reversed coded so that higher scores on the measure represented greater cognitive *defusion* (Gillanders et al., 2014).

Self-compassion ($ICC_1 = .008$) was measured with the 12 item Brief Self-Compassion scale (Raes, Pommier, Neff, & Van Gucht, 2011; $\alpha = .88$), on a one (*almost never*) to five (*almost always*) Likert scale.

[‡] The intra-class correlations (ICCs) reported in this section refer to the proportion of variance in each study variable that was accounted for by being in either of the twelve classrooms.

Perceived stress over the past month was measured with the four-item version of the Perceived Stress Scale (Cohen et al., 1983; $\alpha = .73$; $ICC_1 = .023$), as in Study 1.

Event-related stress ($ICC_1 = .007$) was measured using a single item: “Being told that I will have to reveal my cognitive ability test score to the rest of the class made me feel stressed and anxious”, rated on a one (*strongly disagree*) to five (*strongly agree*) Likert scale.

Avoidance coping ($ICC_1 = .027$) was measured behaviourally by whether a student reported an inflated cognitive ability test score to the class (coded as 0 = no inflation; 1 = inflation), adapted from Mueller & Dweck (1998). A total of 23.3 % of subjects in the sample (47 out of 202) reported an inflated score.

Approach coping ($ICC_1 = .012$) was measured by asking students to rate their willingness to engage in a remedial tutorial as a means of improving on their cognitive abilities, on a single item adapted from Hong et al. (1999) and Nussbaum & Dweck (2008): “Research has shown that with training, you can significantly increase your cognitive ability. How interested are you in signing up for a remedial tutorial (separate to this class), to strengthen your cognitive abilities?” The item was rated on a one (*not at all*) to five (*very much*) Likert scale.

Distraction ($ICC_1 = .012$): Two items measured distraction during the inductions as a manipulation check, on a one (*not at all*) to five (*very much*) Likert scale: “I was finding it difficult to stay focused on what was happening” and “I was preoccupied with the future or the past”. Scores on these items were added to create a total distraction score for each individual.

Statistical analyses

This study had statistical power of .73 (assuming $p = .05$; an intraclass correlation coefficient of $\rho = .01$ and an anticipated medium effect size of $f = .25$). Following tests for differences between conditions on baseline variables and covariates, I tested the study hypotheses using linear mixed models, given the nested nature of these data (i.e., individuals within classrooms within experimental conditions). In all models, ‘tutorial group’ was included as a random factor (as a random intercept term) and condition was treated as a fixed factor. All statistical analyses were conducted in the R 3.2.2 program (R Core Team, 2015), using the ‘lme4’ and ‘nlme’ packages.

Results

Preliminary analysis

The four conditions were first compared on the baseline measures, and there were no significant differences between them on trait cognitive defusion, $b = -.51 (.60)$, $t = -.85$, $p = .395$, trait self-compassion, $b = .11 (.27)$, $t = .41$, $p = .681$, monthly perceived stress, $b = -.17 (.24)$, $t = -.74$, $p = .478$, and gender, $b = .02 (.03)$, $t = .58$, $p = .574$. Nor were there significant differences between any of the conditions on cognitive ability test score, $b = .08 (.15)$, $t = .50$, $p = .626$. Bivariate correlations between study variables are in Table 8.

Table 8

Bivariate correlations between study variables

	1	2	3	4	5	6	7	8
1. Event stress	-							
2. Monthly stress	.184**	-						
3. Trait self-compassion	-.341**	-.410**	-					
4. Trait cognitive fusion	.342**	.390**	-.629**	-				
5. Distraction	.100	.223**	-.175*	.255**	-			
6. Test score	-.021	-.016	.001	.043	-.083	-		
7. Approach coping	-.306**	-.267**	.199**	-.240**	-.171*	.127	-	
8. Avoidance coping	.352**	.208**	-.183**	.194**	.116	-.125	-.231**	-
9. Gender (female)	.172*	.097	-.082	-.011	-.117	-.112	-.075	.089

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

I next tested for the possibility that a person's score on the cognitive ability test (i.e., the deflated score that they were told they received) predicted their coping behaviour. It may be that lower scores on the test predicted more avoidance and less approach coping, and therefore warrant inclusion in our analyses as a covariate. However, neither approach, $b = .05$ (.03), $t = 1.51$, $p = .133$, nor avoidance coping, $b = -.03$ (.02), $t = -1.85$, $p = .065$, were predicted by cognitive ability test scores and as a result, cognitive ability test score was not included as a variable in subsequent analyses.

A manipulation check tested how distracted participants were during the experimental inductions. Those in the cognitive defusion condition reported significantly higher distraction than the relaxation condition, $b = 1.68$ (.55), $t = 3.06$, $p = .010$, and marginally significantly more distraction than those in the acceptance, $b = 1.10$ (.52), $t = 2.11$, $p = .055$, and self-affirmation inductions, $b = 1.11$ (.55), $t = 2.00$, $p = .082$. I also

found that distraction during the inductions predicted significantly less approach, $b = -.08$ (.03), $t = -2.86$, $p = .005$, and nearly significantly more avoidance coping, $b = .02$ (.01), $t = 1.85$, $p = .067$. As a result, distraction was included as a covariate in subsequent analyses. Group means and standard deviations for study variables appear in Table 9.

Table 9

Group means and standard deviations for each study variable

	Defusion ($n = 43$)		Acceptance ($n = 62$)		Self-affirmation ($n = 48$)		Relaxation ($n = 49$)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	Female (%)	63%		59%		44%		61%
Age	21.61	2.48	22.43	2.16	22.62	2.51	21.28	2.89
Monthly stress	12.19	3.20	11.90	3.39	12.04	2.90	11.55	2.68
Event stress	2.93	1.08	2.66	1.23	3.17	1.12	2.90	1.18
Self-compassion	17.21	3.89	17.58	3.73	17.63	4.48	17.59	4.49
Cognitive fusion	36.44	9.37	35.77	8.13	35.15	9.71	34.94	9.71
Distraction	7.16	2.28	6.06	2.61	6.04	2.79	5.49	2.47
Test score	4.81	1.93	4.95	1.75	4.71	2.14	5.11	1.45
Approach coping	3.02	0.83	3.35	0.60	2.88	0.89	2.80	0.87
Avoidance coping	0.26	0.44	0.13	0.34	0.31	0.47	0.29	0.46

Main effects of mindfulness induction on coping

Next, Hypothesis 1 was tested, that both mindfulness inductions would produce more approach and less avoidance coping than the self-affirmation and relaxation inductions. There was partial support for this. With approach coping as an outcome variable, statistically significant (standardized) differences between the acceptance condition and the self-affirmation and relaxation conditions were found (acceptance vs. self-affirmation: $\beta = .66$ [.23], $t = 2.91$, $p = .023$; acceptance vs. relaxation: $\beta = .76$ [.21], t

= 3.48, $p = .007$), controlling for test score performance. In addition, there was a significant difference in approach coping between the acceptance and cognitive defusion inductions, $\beta = .52 (.22)$, $t = 2.30$, $p = .046$. These effects are shown in Figure 6, in unstandardized form.

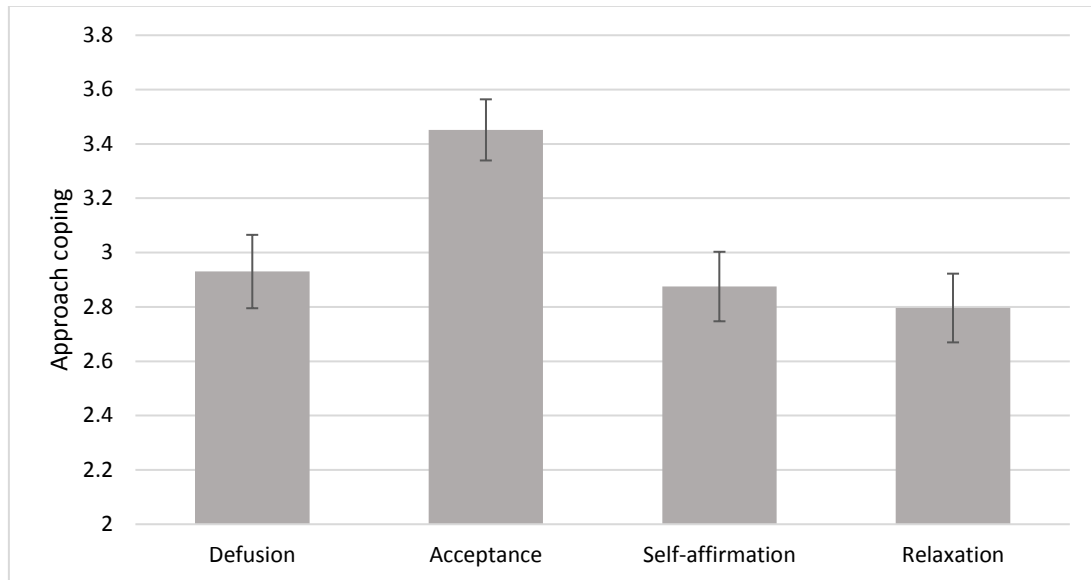


Figure 6. Estimated approach coping scores (unstandardized) for each experimental condition, with 95% confidence intervals around each estimate.

With avoidance coping as an outcome variable, there were statistically significant differences between the acceptance condition and the self-affirmation and relaxation conditions in the expected direction (acceptance vs. self-affirmation: $\beta = .39 [.19]$, $t = 2.03$, $p = .044$; acceptance vs. relaxation: $\beta = .39 [.19]$, $t = 3.00$, $p = .037$), controlling for test score. Unstandardized estimates are shown in Figure 7.

Estimate
Std. Error

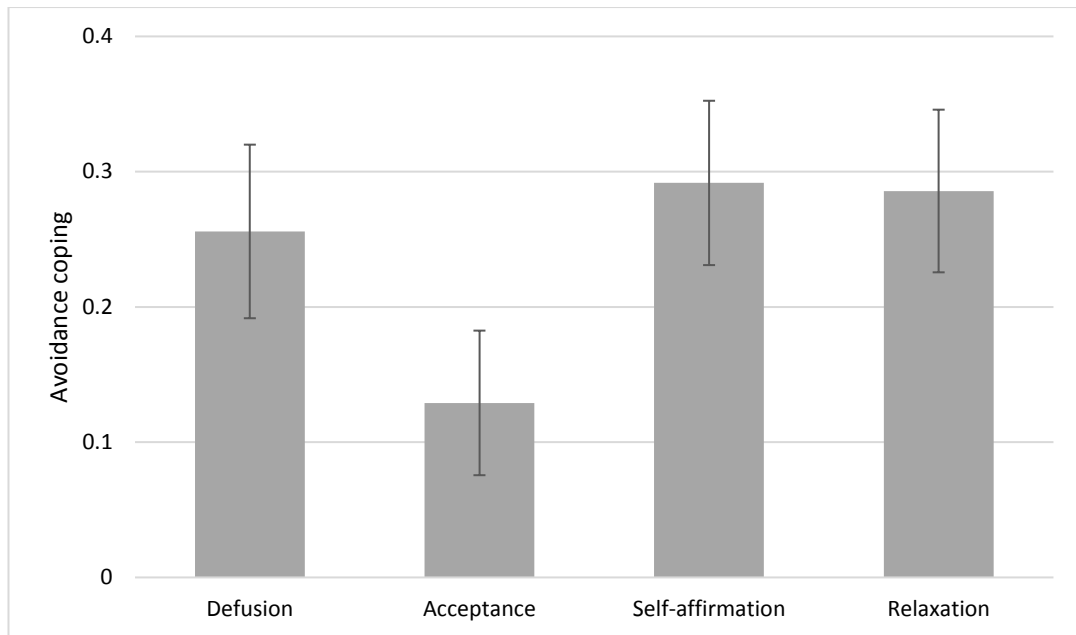


Figure 7. Estimated avoidance coping scores (unstandardized) for each experimental condition, with 95% confidence intervals around each estimate.

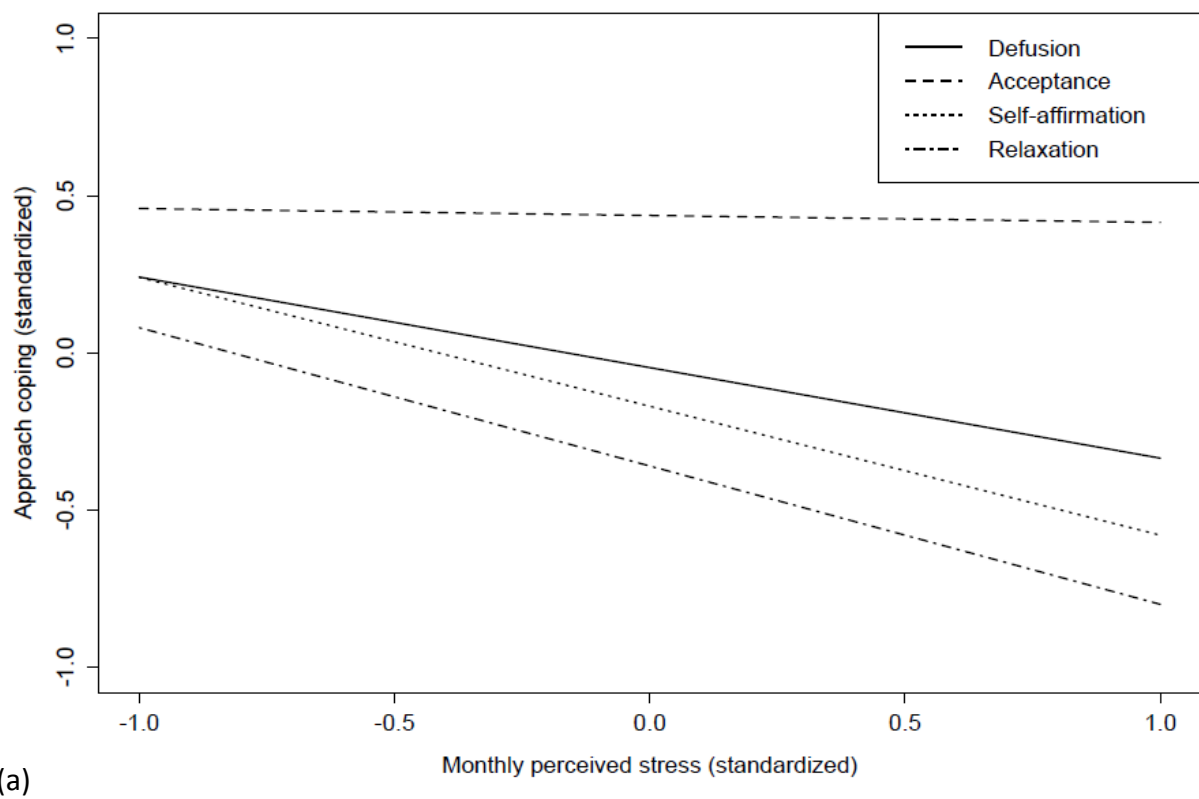
However as shown in both the above figures, differences between the cognitive defusion condition and the self-affirmation and relaxation conditions were not found for either approach or avoidance coping.

Perceived stress as a moderator

I next tested Hypothesis 2, that perceived stress would moderate the influence of both mindfulness inductions (acceptance and defusion) upon coping. This hypothesis was tested using two measures of perceived stress described above: monthly and event-specific perceived stress.

Monthly perceived stress as a moderator. The trend lines for the four conditions on approach coping, moderated by monthly perceived stress, appear in Figure 8(a). Linear mixed effects analysis indicated that the acceptance induction interacted with monthly perceived stress to predict significantly more approach coping than the self-affirmation, $\beta = .39 (.18)$, $t = 2.23$, $p = .027$, and relaxation inductions, $\beta = .44 (.18)$, $t = 2.40$, $p = .017$.

However there was not a similar moderation effect for the defusion induction by monthly stress, compared to either the self-affirmation, $\beta = .11 (.19)$, $t = 0.59$, $p = .560$, or relaxation conditions, $\beta = .16 (.19)$, $t = 0.81$, $p = .421$. Nor was there a difference between the acceptance and defusion conditions on approach coping as a function of perceived stress, $\beta = .27 (.17)$, $t = 1.62$, $p = .107$.



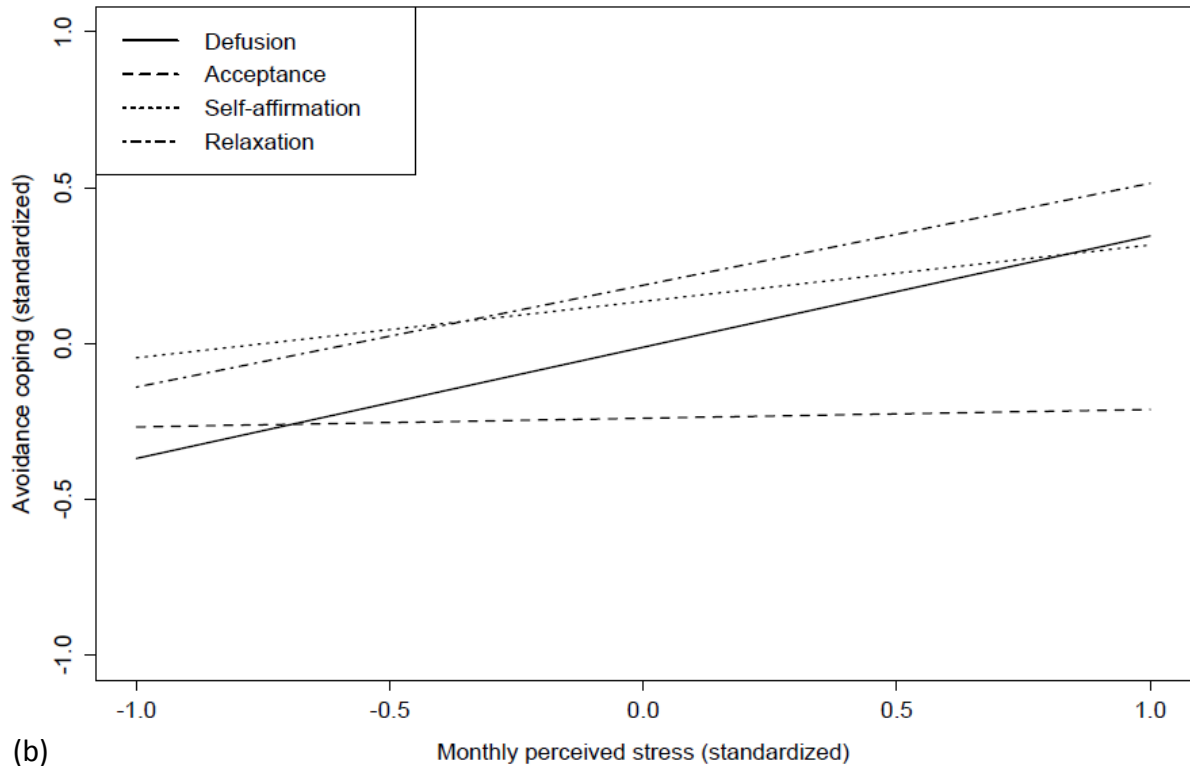


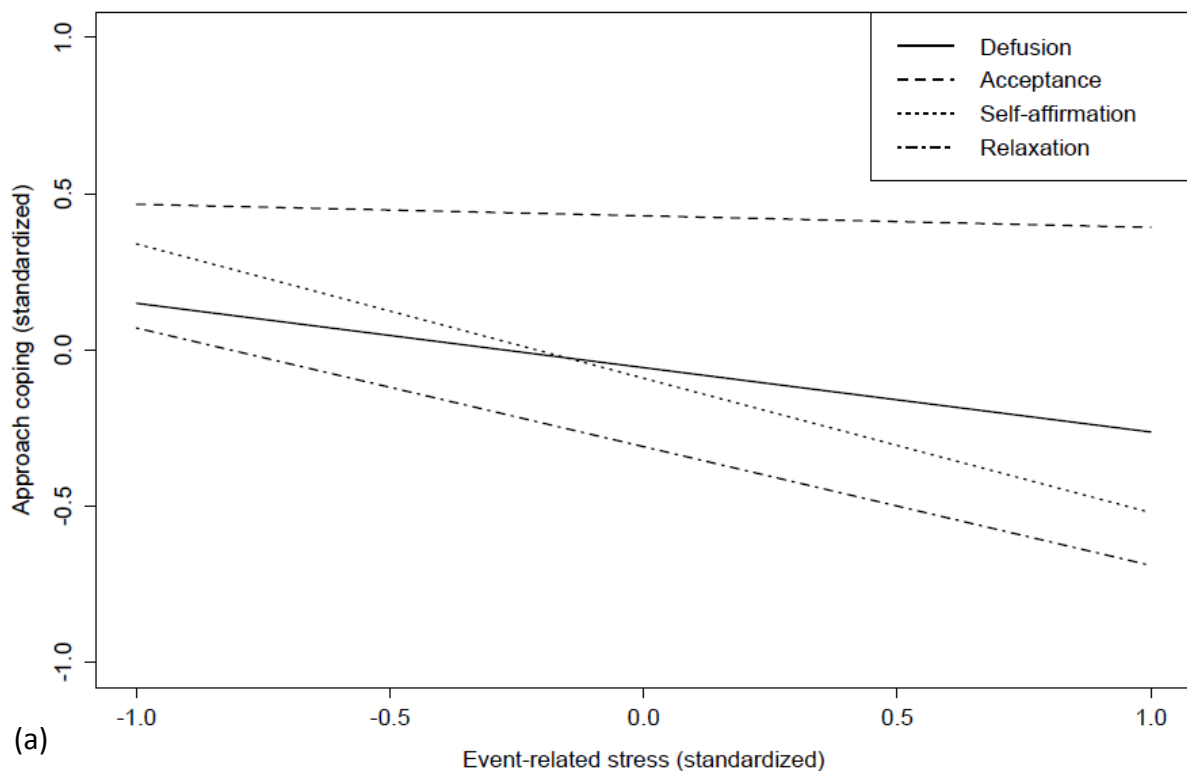
Figure 8. Experimental conditions interacting with monthly perceived stress to predict approach coping (a) and avoidance coping (b).

Next, differences between the four conditions on avoidance coping, moderated by monthly perceived stress, were tested for. As shown in Figure 8(b), as perceived stress increased, those in the acceptance condition reported less of an increase in avoidance coping, compared with the other three conditions, however these differences were not statistically significant. Together, these results suggest that as monthly stress increases between individuals, receiving an acceptance induction facilitates more approach coping responses, though not less avoidance coping, relative to receiving a self-affirmation or relaxation induction.

Event-related stress as a moderator. Recall that prior to the inductions, subjects were told they would be asked to report their (artificially deflated) cognitive ability test score to the class. After receiving this information, students were asked to rate how stressed

this made them feel, which was our measure of event-related perceived stress in this study. Figure 9(a) shows the approach coping scores for the four experimental conditions, moderated by event-related perceived stress.

Consistent with Hypothesis 2 and the above pattern of results with monthly stress as a moderator, the acceptance induction interacted with event-related stress to predict significantly more approach coping than the self-affirmation, $\beta = .39 (.18)$, $t = 2.22$, $p = .028$, and relaxation inductions, $\beta = .35 (.17)$, $t = 2.03$, $p = .044$. However, there were not similar effects for the defusion induction compared with the control conditions (relative to self-affirmation, $\beta = .12 [.20]$, $t = 0.60$, $p = .547$; relative to relaxation, $\beta = .08 [.20]$, $t = 0.38$, $p = .702$). Nor was there a significant difference between the acceptance and cognitive defusion conditions as a function of event-related stress, $\beta = .27 (.19)$, $t = 1.44$, $p = .152$.



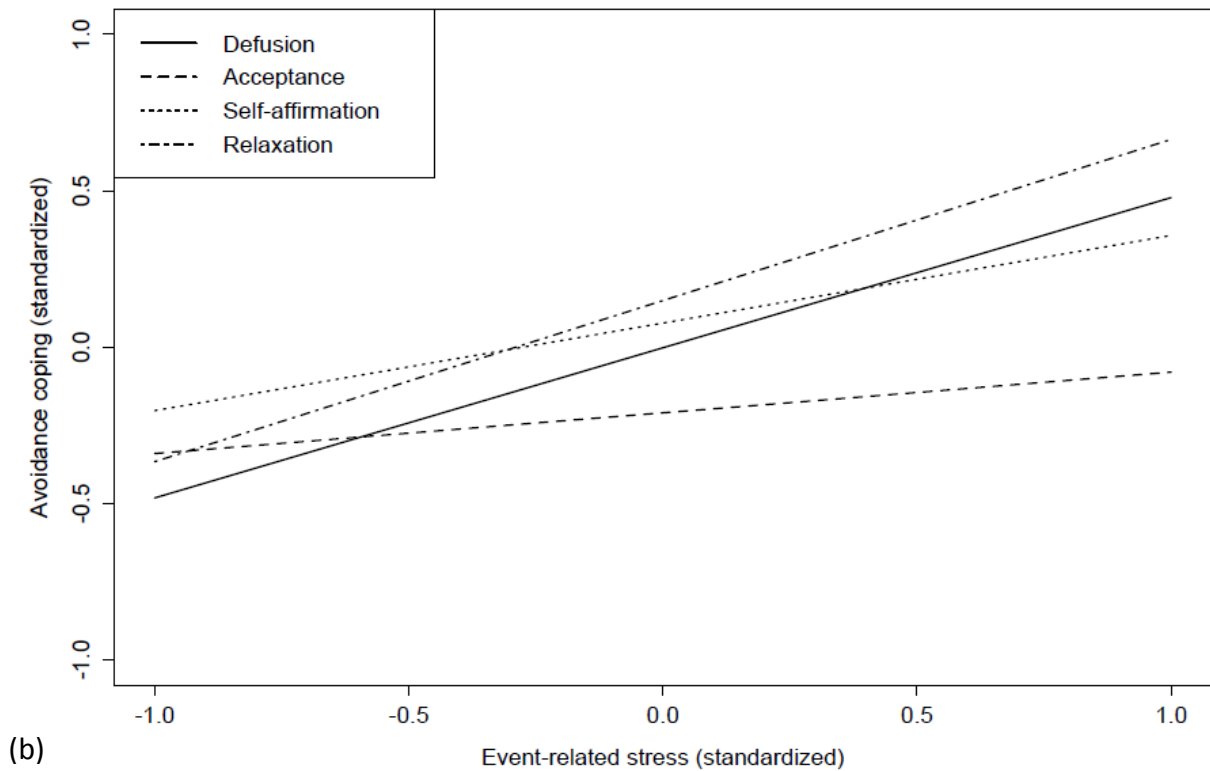


Figure 9. Experimental conditions interacting with event-related stress to predict approach coping (a) and avoidance coping (b).

Finally, the moderating effects of event-related stress on the four experimental conditions in predicting less avoidance coping were tested. Figure 9(b) shows the results for the four conditions. The acceptance induction interacted with event-related stress to predict significantly less avoidance coping, compared with the relaxation induction, $\beta = -.38 (.17)$, $t = -2.19$, $p = .030$; but not relative to the self-affirmation induction, $\beta = -.15 (.18)$, $t = -0.83$, $p = .409$, or the cognitive defusion induction, $\beta = -.35 (.19)$, $t = -1.85$, $p = .066$. This suggests that as levels of event-related stress increase between individuals, receiving an acceptance induction appears to increase approach coping relative to receiving a relaxation or a self-affirmation induction, and lower avoidance relative to a relaxation induction.

Discussion

Results of this study provided support for our first hypothesis. A mindful-acceptance induction resulted in significantly more approach and less avoidance coping following a stressful experience, relative to self-affirmation and relaxation controls. This finding adds to previous acceptance induction studies that found changes in behavioural responses to aversive experiences (Eifert & Heffner, 2003; Gutiérrez et al., 2004; Levitt et al., 2004), extending these findings to coping responses.

This significant main effect may have been due to the stronger stress manipulation administered in this study (reporting a poor cognitive ability test score to peers) compared with Study 1, where subjects were asked to recall the stress associated with their most recent university exams (though I did not formally compare the effects of the stress manipulations between studies). Another possibility is that an induction focused specifically on acceptance, rather than on general mindful-awareness (as in Study 1), has a bigger impact on individuals' coping responses. Recall that there is considerable evidence for the effects of brief acceptance inductions in increasing individuals' willingness to engage with an aversive experience, such as breathing in CO₂-enriched air (Eifert & Heffner, 2003; Levitt et al., 2004) and being exposed to an electric shock (Gutiérrez et al., 2004). However in this study it was not possible to isolate and test these different possibilities.

This study also found support for Hypothesis 2, replicating the findings in Studies 1 and 2 that perceived stress moderated the impact of a brief mindfulness induction (Study 1) and a longer intervention (Study 2) on coping responses. As levels of both event-related and general monthly stress increased between individuals, significant differences between the acceptance condition and both the relaxation and self-affirmation conditions were found on approach and avoidance coping. These findings suggest that mindful-acceptance enhances coping particularly among highly stressed individuals.

The differences in coping between the acceptance and self-affirmation conditions are particularly noteworthy as historically, a primary intervention reported in the literature to reduce defensiveness and enhance coping responses has been self-affirmations (for reviews, see McQueen & Klein, 2006; Sherman & Cohen, 2006). The present results are consistent with more recent evidence that changing one's *relationship* to aversive thoughts (i.e., engaging in mindful acceptance) may be more effective than changing the content of such thoughts (such as via self-affirmation) in supporting healthy behaviour (Bond et al., 2011) and this study extended this finding to demonstrating changes in coping behaviour.

It is notable that significant main and interaction effects for the acceptance induction were found in this study, but similar results were not found for the cognitive defusion induction. Although the cognitive defusion induction resulted in more approach and less avoidance coping than the relaxation and self-affirmation inductions (see Table 3), these effects were not statistically significant. It is possible that this result occurred because the cognitive defusion induction was more difficult for participants to engage with than the other inductions. As mentioned above, participants in the defusion induction group reported more distraction than those in the other three conditions. Although the defusion protocol used in this study has been successfully used in other studies of mindfulness and behaviour change (eg, Tapper et al., 2009), as have similar defusion exercises in other studies (e.g., Bach & Hayes, 2002; Bond & Bunce, 2000; Metzler, Biglan, Noell, Ary, & Ochs, 2000), it may have been difficult for participants to engage with outside the context of a broader intervention. Specifically, it is possible that the instructions to 'unhook' from thoughts may have been too complex or difficult to engage with for relatively young participants situated in a classroom environment. For some participants at least, the cognitive defusion induction may have paradoxically drawn participants further into their thoughts, rather than

distancing from them, thereby undermining the impact of the induction on coping behaviours.

Another limitation of this study was that I used the randomisation process to control for baseline differences in previous mindfulness experience. I did not collect this information directly from participants, representing a limitation of the present study that could be addressed in subsequent experimental studies of mindfulness.

A third limitation of this study is that the self-affirmation manipulation involved a different format (writing versus listening) to the other three manipulations in the study. The manipulations were selected to be consistent with the most commonly-used manipulations of each phenomenon, including self-affirmation (McQueen & Klein, 2006), however this difference is nonetheless an inconsistency in the induction format between the four conditions in this study.

A final limitation of this study was that it sought to artificially induce stress and measure behavioural responses in a laboratory setting. To assess the value of acceptance and cognitive defusion in enhancing coping responses in a more naturalistic context, and to overcome the potential problems associated with administering brief inductions of acceptance and especially cognitive defusion in a laboratory setting, Study 4 was conducted.

CHAPTER 7

STUDY 4

Introduction

This study further examined the third research question of this thesis: whether acceptance and cognitive defusion predict enhanced approach coping and reduced avoidance coping with stress. As discussed, the null result for the cognitive defusion induction in Study 3 may have been in part due to participants misunderstanding or not engaging with the induction. The present study examined whether either or both acceptance and cognitive defusion as intra- and inter-individual-difference constructs (rather than as inductions), influenced coping behaviour. To do this, Study 4 explored the effects of both these mindfulness components on how individuals cope with *every-day* stressors.

There is evidence that relatively minor daily hassles, such as being stuck in traffic, having arguments with family or a computer malfunctioning, undermine well-being more than significant life stressors (Almeida, 2005; Chamberlin & Zika, 1990; Lazarus & Folkman, 1987; Lu, 1991; Serido, Almeida, & Wethington, 2004). This is likely because significant life stressors are relatively rare, whereas daily stressors are more persistent and so have cumulative effects that, over time, may result in more serious stress-related symptoms such as depression and anxiety (Almeida, 2005; Serido et al., 2004). Therefore there is arguably value in studying whether mindfulness components influence coping with these every-day stressors.

In addition, this study sought to test whether acceptance and cognitive defusion predict coping behaviour independent of the influence of stress-related cognitive appraisals. As discussed in Chapter 2, the transactional theory of coping identifies two kinds of stress-related appraisals: a primary appraisal of how threatening or challenging a stressor is; and a secondary appraisals of the individual's level of self-efficacy and personal resources to address the stressor (Lazarus & Folkman, 1987). These two stress-related appraisals are said to shape an individual's coping behaviours following a stressful event (Lazarus & Folkman, 1987).

Although there is evidence that primary appraisals of threat result in avoidance coping responses (Stowell et al., 2001; Weinstein et al., 2009), and secondary appraisals of situational self-efficacy produce approach-focused responses to stress (Folkman & Moskowitz, 2004; Terry, 1994), these findings are not unequivocal. For example, threat appraisals have been associated with more problem-focused forms of coping and not more avoidance coping (Franks & Roesch, 2006). Also, lacking the resources to respond to a stressful situation has not always been associated with more emotion-focused and avoidant forms of coping as the transactional theory would predict (Folkman & Moskowitz, 2004; Park, Fenster, Suresh, & Bliss, 2006). Thus, there is value in comparing the predictive power of mindfulness-based processes, such as acceptance and cognitive defusion, with those based on the *content* of a person's stress-related thoughts (i.e., primary appraisals of threat or challenge and secondary appraisals of personal self-efficacy).

In several studies, primary appraisal has been measured as a persons' level of perceived self-threat in relation to a stressful encounter (e.g., Hodgins et al., 2010; Terry, 1994; Terry, 1991; Tomaka et al., 1993). The present study therefore used this as a measure of primary appraisal. Also, several studies have used stress-related self-efficacy as a

measure of secondary appraisal (e.g., Hodgins et al., 2010; Terry, 1994; Terry, 1991; Tomaka, et al., 1993) and the same was done in the present study.

Finally, this study tested whether both acceptance and cognitive defusion enhanced the fit between the level of control an individual has over a stressful event and their coping response, per the goodness-of-fit hypothesis (Folkman & Moskowitz, 2004; Park, et al., 2004). According to the goodness-of-fit hypothesis, when a stressor is controllable, problem-solving coping strategies are more likely, while when a stressor is difficult to control, more emotion-focused and avoidant strategies are likely. There is substantial evidence for the increase in problem-focused strategies (i.e., approach responses) when a stressor is controllable, but less evidence for the increase in avoidant responses to uncontrollable stressors (Park et al., 2004). This may be because even for uncontrollable stressors, for example receiving bad news about one's health, avoidance coping responses such as denial or self-distraction will very often not be adaptive (Folkman & Moskowitz, 2004; Park et al., 2004)

Based on the above evidence for the goodness-of-fit hypothesis, in the present study acceptance and cognitive defusion were hypothesised to predict active forms of approach coping behaviour (i.e., taking direct action to address the stressor) but only for relatively controllable stressors. On the other hand, event controllability was not hypothesised to moderate the relationship between acceptance or cognitive defusion and avoidance coping, consistent with previous research (see Folkman & Moskowitz, 2004).

This study tested whether both acceptance and cognitive defusion predicted more approach and less avoidance coping in three ways: a) as between-subjects effects; b) as within-subjects, within-day effects (i.e., whether acceptance and cognitive defusion in relation to a stressful event *today* was associated with enhanced coping responses to *the*

same event) and c) as within-subjects lagged effects (i.e., whether acceptance and cognitive defusion in relation to a stressful event *yesterday* predicted more effective coping responses to a stressful event that occurs *today*).

Although within-subjects analyses include both level 1 and level 2 information and so are nearly always the focus of multi-level longitudinal models (Bolger & Laurenceau, 2013), exploring between-subjects effects in longitudinal analyses enable researchers to examine relations between variables at multiple levels of analysis (Preacher et al., 2015). Between-subjects analyses enable individual differences in variables of interest to be assessed, independent of intra-individual differences in those variables (Preacher et al., 2015). In the context of this study, between-subjects analyses enabled one to examine relations between average levels of both acceptance and cognitive defusion between individuals and average coping responses between individuals. The following between-subjects predictions were made:

Hypothesis 1a: Greater-than-average acceptance between individuals during daily stressful events will be associated with less avoidance coping with such events, independent of the effects of average threat and self-efficacy appraisals in relation to daily stressors.

Hypothesis 1b: Greater-than-average levels of event control and acceptance between individuals during daily stressful events will interact with each other to predict higher average approach coping with such events, independent of the effects of average threat and self-efficacy appraisals in relation to daily stressors.

Hypothesis 2a: Greater-than-average acceptance between individuals during daily stressful events will be associated with less avoidance coping with such events, independent of the effects of average threat and self-efficacy appraisals in relation to daily stressors.

Hypothesis 2b: Greater-than-average levels of event control and acceptance between individuals during daily stressful events will interact with each other to predict higher average approach coping with such events, independent of the effects of average threat and self-efficacy appraisals in relation to daily stressors.

Regarding the within-subjects analyses, longitudinal studies have been criticised for estimating daily associations between variables across time and claiming intra-individual associations where these have in fact not been tested (Bolger & Laurenceau, 2013). This study sought to avoid this problem by isolating within-subjects variation in both acceptance and cognitive defusion from the between-subjects component of each variable. Within-subject, within-day analyses effectively involves treating each subject as his or her own control. As discussed in Chapter 3, this analyses essentially asks: on any given day, is being above one's own average score across days on a predictor associated with higher levels of an outcome variable on that same day? The hypotheses for the within-subjects, within-day analyses in this study were therefore:

Hypothesis 3a: Within-subjects variation in acceptance during a daily stressful event will predict less avoidance coping with daily stressors, independent of a person's threat and self-efficacy appraisals.

Hypothesis 3b: Event controllability will interact with within-subjects variation in acceptance to predict more approach coping with daily stressors, independent of a person's threat and self-efficacy appraisals.

Hypothesis 4a: Within-subjects variation in cognitive defusion during a daily stressful event will predict less avoidance coping with daily stressors, independent of a person's threat and self-efficacy appraisals.

Hypothesis 4b: Event controllability will interact with within-subjects variation in cognitive defusion to predict more approach coping with daily stressors, independent of a person's threat and self-efficacy appraisals.

Regressing predictors lagged by a meaningful time-period (e.g., one day) upon relevant outcome variables enables researchers to draw stronger inferences about the causal relations between variables than cross-sectional analyses (Kleiber, & Zeileis, 2008). This approach has been used in the study of daily stress previously (e.g., Affleck, et al., 1994; Caspi, Bolger, & Eckenrode, 1987; DeLongis & Holtzman, 2005), but not to the author's knowledge in relation to the effects of acceptance and cognitive defusion on responses to

stress. The present study also tested whether an individual's acceptance and cognitive defusion during a stressful event 'spilled over' to influencing their response to a separate stressful event on a subsequent day. Mindfulness skills such as acceptance and cognitive defusion have been shown to enhance responses to aversive experiences (Eifert & Heffner, 2003; Levitt et al., 2004; Masuda, Feinstein, et al., 2010; Masuda, Twohig, et al., 2010), which is expected to serve as a positive reinforcer for similar responses to subsequent aversive experiences (Hayes et al., 2011). Consistent with this idea, numerous studies have found practice effects that consistently show up over a period of one month following a mindfulness intervention (for a review, see Sedlmeier et al., 2012). In the context of a stressful event, I expected that greater cognitive defusion and acceptance in relation to a stressful event on one day is likely to influence the kind of response an individual has to a similar event on a subsequent day. The final set of hypotheses in this study were therefore:

Hypothesis 5a: An individual's levels of acceptance during a stressful event *yesterday* will predict less avoidance coping in relation to a stressful event *today*, independent of a person's threat and self-efficacy appraisals *yesterday*.

Hypothesis 5b: Event controllability *today* will interact with an individual's levels of acceptance during a stressful event *yesterday* to predict greater approach coping in relation to a stressful event *today*, independent of a person's threat and self-efficacy appraisals *yesterday*.

Hypothesis 6a: An individual's levels of acceptance during a stressful event *yesterday* will predict less avoidance coping in relation to a stressful event *today*, independent of a person's threat and self-efficacy appraisals *yesterday*.

Hypothesis 6b: Event controllability *today* will interact with an individual's levels of cognitive defusion during a stressful event *yesterday* to predict greater approach coping in relation to a stressful event *today*, independent of a person's threat and self-efficacy appraisals *yesterday*.

Although the same predictions were made for both acceptance and cognitive defusion in the above hypotheses, separate sets of models were run with each of acceptance and cognitive defusion as predictors (and therefore separate hypotheses were created for

each) for two main reasons: first, the focus of this study was in assessing the effects of each mindfulness component on coping, relative to the effects of primary and secondary stress appraisals, rather than comparing the effects of the two mindfulness components directly with each other; and second, combining both predictors into a single model makes the analyses complex, given that both predictors were examined as interacting with event control (i.e., Hypotheses 1b and 2b), and the relatively small sample size in this study ($N = 141$).

Method

Participants and procedure

Participants were a subset of 141 of the 201 participants in Study 2 (76% female; mean age 34). Around 74% identified as Caucasian, 14% as East or South Asian and 11% as 'other'. Ninety-five percent of participants held an undergraduate diploma or degree, and 37% held a master's or Ph.D. degree.

Participants in this study were recruited and randomly allocated to three experimental conditions, for the separate randomised controlled study reported in Study 2. Participants in the mindfulness ($n = 59$) and mindfulness and values ($n = 60$) conditions paid AUD 100 to participate in the interventions, and received an AUD 100 refund upon completion of the pre- and post-intervention surveys described and used in Study 2 (Chapter 5), as well as 20 daily surveys described below and used in the present study. Individuals in the waitlist condition ($n = 80$) were given the option of completing the daily surveys but were not provided a financial incentive to do so. Twenty-two participants from the waitlist condition volunteered to complete the daily surveys.

Participants completed four sets of five daily surveys (either via email or SMS): five daily surveys over the five working days in the week preceding their first training session; five daily surveys over the five working days in the week immediately following their second training session (four weeks after the first set of daily surveys); five over the five working days in the week following their third and final training session (four weeks after the second set of daily surveys); and a final set of five surveys over five working days four weeks after their final training session. Participants received each daily survey, which took approximately two minutes to complete, at 4 pm and were given until 10 am the following morning to complete it. Each daily survey included eleven items, six of which were for the present study and are described next.

Measures

Single-item measures were used in this study in order to minimise the time participants spent completing each of the 20 daily surveys. Informal interviews with a convenience sample of university students and working professionals ($N = 15$) indicated that a longer survey (e.g., 20-40 items) would substantially increase the likelihood of missing data and inaccurate responding in the context of the present study, relative to a shorter survey (e.g., 10-12 items). However, the use of single-item measures has several short-comings, often increasing measurement error and so weakening results (Cohen, Cohen, Aiken, & West, 2003). To address this issue, several steps were taken. First, wherever possible, single-item measures were used that had been validated in previous research (i.e., the measures of threat-appraisal and coping self-efficacy). Second, where such measures did not exist, I adapted single-item measures from multi-item scales that have displayed good validity and reliability (i.e., cognitive defusion, Gillanders et al., 2014; acceptance, Bond et al., 2010; coping, Carver, 1989). Third, the constructs measured in this study were relatively concrete, conceptually simple and unidimensional in nature, making

them well-suited to single-item measurement (Fuchs & Diamantopoulos, 2009). Finally, all single-item measures were validated against multi-item versions of each construct, and the internal as well as the test-retest reliability of each single-item measure was assessed (see Appendix C).

All variables were measured on a daily basis so as to reduce the recall biases common in retrospective measures of coping (Shikai et al., 2014). For each of the 20 daily surveys, participants were asked to first reflect on their most stressful or challenging situation of the past 24 hours (i.e., “Take a moment to think about your most stressful or challenging experience or event of the last 24 hours”). Participants then responded to the following items:

Threat appraisal: A single-item measure of stress appraisal was adapted from Hodgins et al. (2010) and Tomaka et al. (1993), on a one (*not at all*) to five (*extremely*) Likert scale: “How threatening was this experience for you?”

Self-efficacy appraisal: A single item measure of perceived self-efficacy was taken from Chwalisz et al., (1992): “How confident did you feel about your ability to deal with this situation?” Subjects rated themselves on a 1 (*not at all*) to 5 (*extremely*) Likert scale.

Event controllability: A single-item measure of event controllability was taken from Park, et al. (2006): “To what degree was it possible to control this stressful situation?”, on a one (*not at all*) to five (*a great deal*) Likert scale.

Cognitive defusion: A single item was adapted from the Cognitive Fusion Questionnaire (Gillanders et al., 2014): “How much were you caught up in your thoughts and feelings about this situation?”, on a one (*not at all*) to five (*completely*) Likert scale. To generate a measure of cognitive defusion, scores on this item were reversed.

Acceptance: A single item was adapted from the Acceptance and Action Questionnaire II (Bond et al., 2011): “How much did you try to control or change thoughts

and feelings associated with this situation?”, on a one (*not at all*) to five (*completely*) Likert scale. To generate a measure of acceptance, scores on this item were reversed.

Approach coping: A measure of approach coping was adapted from the active coping subscale of the Brief COPE Inventory (Carver, 1997): “To what degree did you try to resolve this situation?” on a one (*not at all*) to five (*completely*) Likert scale.

Avoidance coping: Avoidance coping was measured using the item: “To what degree did you avoid engaging with this situation?” on a one (*not at all*) to five (*completely*) Likert scale. The item was adapted from the behavioural disengagement subscale of the Brief COPE Inventory (Carver, 1997).

Statistical analyses

Given the nested nature of these data (time points within individuals within conditions), multilevel modelling was used for all analyses in this study, using the ‘lme4’, ‘lme.Test’ and ‘Hmisc’ packages in the R program (version 3.2.2; R Core Team, 2015). As discussed, relations between daily acceptance and cognitive defusion and daily coping responses were examined in three ways. In a first set of models, individual differences in acceptance and cognitive defusion (averaged over the 20 time-points) were regressed upon coping responses. In a second set of models, the within-subjects variation in each mindfulness sub-process was regressed upon approach and avoidance coping, to assess the predictive power of the intra-individual variation in acceptance and defusion, as distinct from individual-difference effects. Finally, a third set of ‘lagged’ models, tested whether individuals’ levels of acceptance and cognitive defusion *yesterday* predicted their coping responses today, so as to make stronger inferences regarding the causal relations among these variables (Kleiber, & Zeileis, 2008). Each of these approaches is now briefly explained.

Between-subjects analyses. In between-subjects analyses, the between-subjects component of each level 1 predictor is first calculated as the mean score on that variable for each individual, across time-points. As discussed in Chapter 3, the between-subjects component of relevant predictors is simply regressed on the relevant outcome variable(s), controlling for other relevant covariates (Preacher et al., 2015).

Within-subjects, within-day analyses. First, the within-subjects component of each predictor variable is generated by subtracting each raw score (at each time-point, for each individual) from that individual's mean score on the variable of interest, to generate a *within-subjects* component of the variable at each time-point and across all individuals. As outlined in Chapter 3, the within-subjects component of acceptance and cognitive defusion was regressed on coping, controlling for time, time-wave, and other covariates. In addition, the random effects component of the model involved modelling intercepts and slopes for each individual on the relevant predictor, as well as an error component (Bolger & Laurenceau, 2013).

Lagged analyses. In order to draw stronger causal inferences about the relations between both IVs (acceptance and cognitive defusion) and coping, a series of lagged models were run (Kleiber & Zeileis, 2008), testing whether acceptance and defusion in relation to *yesterday's* most stressful experience predicted greater approach and less avoidance coping with the *today's* most stressful experience. This modelling approach was described in some detail in Chapter 3. In essence, it involves lagging relevant IVs by a theoretically-valid time-period (one day in the present study) and regressing these on relevant DVs (Kleiber & Zeileis, 2008). Importantly, this modelling approach involves controlling for the autoregressive effects of the DV across time, by including a lagged version of the DV as a time-varying covariate in these models (Kleiber & Zeileis, 2008). In the present study, the two other time-varying covariates of interest, threat appraisal and

self-efficacy appraisal, were included as lagged variables (i.e., lagged by one day), so as to compare like-with-like effects between these covariates and each of acceptance and cognitive defusion, which were also lagged by one day. Lastly, when modelling lagged effects of acceptance and cognitive defusion on approach coping in this study, event controllability was treated as a ‘current day’ variable (rather than a lagged variable). This enabled the goodness-of-fit hypothesis (Park et al., 2004) to be tested (i.e., whether approach coping was more likely in relation to controllable stressors), and whether either mindfulness components supported the fit between a person’s coping response and how controllable the stressor was.

Missing data

Missing data were minimal in this study, ranging from 0.59% for threat appraisal to 0.97% for self-efficacy appraisal. The FIML approach to missing data was used in all models in this study. As discussed in Chapter 3, this approach has been shown to be superior to ad-hoc approaches to missing data, as it produces unbiased estimates when data are missing at random (as opposed to missing completely at random), is robust to instances of non-normality in error distribution and provide adequate results even for low sample sizes and high rates of missing data (Baraldi & Enders, 2010; Graham, 2009; Graham et al., 2007).

Results

I first tested for differences in approach and avoidance coping between individuals who volunteered to participate in this study and those who received a financial incentive to do so, using the Welch Two Sample t-test. There were no differences between these two groups for approach, $t = 0.94$, $df = 358.6$, $p = 0.349$, or avoidance coping, $t = -0.63$, $df = 350$, $p = 0.531$, or any of the other variables in this study. Nor were there significant effects

of either experimental condition (mindfulness vs. mindfulness-plus-values) on coping responses across time, using multi-level modelling. With approach coping as the outcome, the effect of the mindfulness condition was $\beta = -.003$ (.013), $t = -.230$, $p = .818$, while the effect of the mindfulness-plus-values condition was $\beta = .007$ (.006), $t = 1.117$, $p = .264$. With avoidance coping as the outcome, the effect of the mindfulness condition was $\beta = -.012$ (.013), $t = -.916$, $p = .360$, while the effect of the mindfulness-plus-values condition was $\beta = .000$ (.006), $t = -.105$, $p = .916$. Experimental effects were therefore not examined any further in this study, though ‘experimental condition’ was included as a covariate in all multi-level models. Descriptive statistics and bivariate correlations for study variables appear in Table 10.

Table 10

Descriptive statistics and bivariate correlations between study variables

	<i>M</i>	<i>SD</i>	Acceptance	Cognitive Defusion	Avoidance coping	Approach coping	Threat appraisal	Self-efficacy appraisal
Acceptance	3.58	1.1	-					
Cog. Defusion	3.56	1.09	.311**	-				
Avoidance	3.22	1.19	-.161**	-.314**	-			
Approach	1.93	1.07	-.176**	.040	-.243**	-		
Threat appraisal	2.47	1.01	-.242**	-.558**	.185**	.086**	-	
Self-efficacy	3.2	0.99	.073**	.425**	-.272**	.262**	-.399**	-
Event control	3.21	1.17	-0.04	.110**	-.045*	.344**	-.151**	.295**

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

Between-subjects analyses

Hypotheses 1(a) and (b): Between-subjects acceptance as a predictor of coping responses

Hypothesis 1(a) was that having high average levels of acceptance in relation to daily stressful events would be associated with lower average avoidance coping, controlling for average levels of threat and self-efficacy appraisal in relation to daily stressors. As shown in Table 11, I found support for this, with between-subjects acceptance predicting less avoidance coping, $\beta = -.12$ (.02), $t = -5.80$, $p < .001$.

Table 11

Between-subjects acceptance predicting avoidance coping

	β	<i>SE</i>	<i>t</i> -value	<i>p</i> -value
Intercept	.00	.02	-0.07	.948
Condition	.02	.04	0.60	.548
Wave (centred)	-.01	.07	-0.10	.920
Time (centred)	-.01	.01	-0.41	.680
Threat-appraisal (between)	.06**	.02	2.75	.006
Self-efficacy appraisal (between)	-.13***	.02	-6.21	< .001
Acceptance (between)	-.12***	.02	-5.80	< .001

Note. All effects are standardized. ** $p < .01$, *** $p < .001$.

Hypothesis 1(b) was that individuals' average levels of event-controllability would interact with their average acceptance in relation to daily stressful events to predict lower average avoidance coping, controlling for average levels of threat and self-efficacy appraisal in relation to daily stressors. Support for this hypothesis was found, as shown in Table 12, with a significant interaction between event control and acceptance, $\beta = .09$ (.02), $t = 5.72$, $p < .001$. These findings suggest that higher acceptance on average is associated with approach coping in situations of relative control over the stressor.

Table 12

Between-subjects acceptance interacting with event control to predict approach coping

	β	SE	t-value	p-value
Intercept	.01	.02	.49	.626
Condition	-.24***	.03	-7.37	< .001
Wave (centred)	-.06	.06	-1.03	.302
Time (centred)	.01	.01	1.23	.217
Threat-appraisal (between)	.23***	.02	13.84	< .001
Self-efficacy appraisal (between)	.32***	.02	18.16	< .001
Acceptance (between)	-.10***	.02	-6.11	< .001
Event control (between)	.40***	.02	23.56	< .001
Acceptance*Ev. Control (between)	.09***	.02	5.72	< .001

Note. All effects are standardized. *** $p < .001$.

Hypotheses 2(a) and (b): Between-subjects cognitive defusion as a predictor of coping responses

Hypothesis 2 was identical to Hypothesis 1, but was in relation to cognitive defusion rather than acceptance as a predictor. Regarding relations between average cognitive defusion and less avoidance coping, Table 13 illustrates these results, showing that higher average cognitive defusion predicted less avoidance coping, with a small-to-medium effect-size, $\beta = -.22(.03)$, $t = -8.347$, $p < .001$, controlling for between-subjects threat and self-efficacy appraisals.

Table 13

Between-subjects cognitive defusion predicting less avoidance coping

	β	<i>SE</i>	<i>t</i> -value	<i>p</i> -value
Intercept	.00	.02	-0.086	.931
Condition	.04	.04	1.107	.268
Wave (centred)	.00	.07	0.038	.970
Time (centred)	-.01	.01	-0.54	.589
Threat-appraisal (between)	-.04	.03	-1.513	.130
Self-efficacy appraisal (between)	-.08***	.02	-3.747	< .001
Cognitive defusion (between)	-.22***	.03	-8.347	< .001

Note. All effects are standardized. *** $p < .001$.

Regarding the interaction between average cognitive defusion and average event control in predicting enhanced approach coping (Hypothesis 2b), Table 14 illustrates these results, showing that higher cognitive defusion between individuals interacted with event control to predict more approach coping on average, $\beta = .05(.01)$, $t = 4.20$, $p < .001$.

Table 14

Between-subjects cognitive defusion interacting with event control to predict enhanced approach coping

	β	<i>SE</i>	<i>t</i> -value	<i>p</i> -value
Intercept	.00	.02	-.07	.945
Condition	-.23***	.03	-7.03	< .001
Wave (centred)	-.06	.06	-1.06	.291
Time (centred)	.01	.01	1.15	.249
Threat-appraisal (between)	.21***	.02	9.80	< .001
Self-efficacy appraisal (between)	.33***	.02	17.76	< .001
Cognitive defusion (between)	-.02	.02	-1.15	.252
Event control (between)	.42***	.02	23.91	< .001
Cog. defusion*Ev. control (between)	.05***	.01	4.20	< .001

Note. All effects are standardized. *** $p < .001$.

Within-subjects analyses

Hypotheses 3(a) and (b): Within-subjects acceptance as a predictor of coping responses

Consistent with Hypothesis 3(a), I found that individuals who were above their own mean on acceptance on any given day reported significantly less avoidance coping on that day, controlling for time, wave, experimental condition, as well as within-subjects variation in threat and self-efficacy appraisals (see Table 15). Although the standardized size of this effect was relatively modest ($\beta = -.08$ (.02), $t = -4.04$, $p < .001$), it is consistent with the between-subjects findings reported above.

Table 15

Standardized fixed effects of within-subjects acceptance on avoidance coping

	β	SE	df	t-value	p-value
Intercept	-0.01	0.02	2324	-0.50	0.617
Condition	0.00	0.04	2324	-0.05	0.963
Wave (centred)	0.11	0.07	2324	1.51	0.131
Time (centred)	-0.03*	0.01	2324	-1.98	0.047
Threat-appraisal (within)	0.05*	0.02	2324	2.17	0.030
Self-efficacy-appraisal (within)	-0.24***	0.02	2324	-10.73	< 0.001
Acceptance (within)	-0.08***	0.02	2324	-4.04	< 0.001

Note. All effects are standardized. * $p < .05$, *** $p < .001$.

I next examined the effects of acceptance interacting with event controllability in predicting greater approach coping (Hypothesis 3b). As Table 16 shows, the interaction between event control and within-subjects acceptance (i.e., being above one's own mean on acceptance on any given day) did not predict significantly greater approach coping on that day, $\beta = .01$ (.02), $t = -.20$, $p = .844$.

Table 16

Standardized fixed effects of within-subjects acceptance interacting with event control to predict approach coping

	β	SE	df	t-value	p-value
Intercept	0.08	0.16	2314.00	0.48	0.630
Condition	-0.11	0.06	137.70	-1.74	0.083
Wave (centred)	-0.03	0.06	2234.00	-0.50	0.619
Time (centred)	0.01	0.01	2228.00	0.68	0.500
Threat-appraisal	0.19***	0.02	2238.00	9.15	< 0.001
Self-efficacy-appraisal	0.25***	0.02	2228.00	11.61	< 0.001
Event controllability	0.26***	0.02	2227.00	13.06	< 0.001
Acceptance (within)	-0.10***	0.02	136.00	-4.52	< 0.001
Acceptance (within)*Event control	0.01	0.02	1140.00	-0.20	0.844

Note. All effects are standardized. *** $p < .001$.

Hypotheses 4(a) and (b): Within-subjects cognitive defusion as a predictor of coping responses

Hypothesis 4 was next tested, that within-subjects cognitive defusion a) will predict less avoidance coping on the same day, and b) will interact with event control to predict more approach coping on the same day. As displayed in Table 17, within-subjects variation in cognitive defusion predicted significantly less avoidance coping, controlling for time, the four measurement waves, experimental condition, as well as controlling for within-subjects variation in threat and self-efficacy appraisals, $\beta = -.19 (.02)$, $t = -7.82$, $p < .001$. This result indicates that when a subject's level of cognitive defusion in relation to any given stressful event was above their own mean cognitive defusion score, this was associated with significantly less avoidance coping, and is consistent with the between-subjects effects reported above.

Table 17

Standardized within-subjects cognitive defusion predicting avoidance coping

	β	<i>SE</i>	<i>df</i>	<i>t</i> -value	<i>p</i> -value
Intercept	-0.01	0.02	2327	-0.46	0.643
Condition	0.00	0.04	2327	-0.03	0.978
Wave (centred)	0.10	0.07	2327	1.40	0.162
Time (centred)	-0.02	0.01	2327	-1.74	0.083
Threat-appraisal (within)	-0.01	0.02	2327	-0.37	0.712
Self-efficacy-appraisal (within)	-0.19**	0.02	2327	-8.07	< 0.001
Cognitive defusion (within)	-0.19**	0.02	2327	-7.82	< 0.001

Note. All effects are standardized. ** $p < .01$.

Next, the interaction between event controllability and within-subjects cognitive defusion was regressed upon approach coping, controlling for time, wave, experimental condition, and within-subjects variation in threat and self-efficacy appraisals. Results of this analysis are reported in Table 18. Event controllability interacted with within-subjects cognitive defusion to predict significantly greater approach coping, $\beta = .09$ (.02), $t = 4.61$, $p < .001$, beyond the effects of threat and self-efficacy appraisals on approach coping.

Table 18

Standardized within-subjects cognitive defusion interacting with event control to predict approach coping

	β	<i>SE</i>	<i>df</i>	<i>t</i> -value	<i>p</i> -value
Intercept	-0.01	0.02	2324.00	-0.58	0.560
Condition	-0.01	0.04	2324.00	-0.24	0.807
Wave (centred)	0.01	0.07	2324.00	0.15	0.883
Time (centred)	0.00	0.01	2324.00	-0.20	0.843
Threat-appraisal (within)	0.25***	0.02	2324.00	10.58	< 0.001
Self-efficacy-appraisal (within)	0.25***	0.02	2324.00	10.69	< 0.001
Event controllability	0.21***	0.02	2324.00	10.54	< 0.001
Defusion (within)	0.07**	0.02	2324.00	3.04	0.002
Defusion (within)*Event control	0.09***	0.02	2324.00	4.61	< 0.001

Note. ** $p < .01$, *** $p < .001$.

The moderating effect of event control on the relationship between within-subjects cognitive defusion and approach coping is displayed in Figure 10. Among individuals reporting high and very high levels of event control, greater intra-individual cognitive defusion was associated with significantly more approach coping. As levels of event control reduced, this effect diminished, such that among individuals reporting very low levels of event control, greater within-subjects cognitive defusion was associated with statistically significant *reductions* in approach coping. This suggests a contextual effect whereby individuals' who are relatively high in cognitive defusion are more responsive to the kinds of stressors they face – engaging in more approach coping in situations of relatively high control; but not in situations where they have low levels of control over the stressful event.

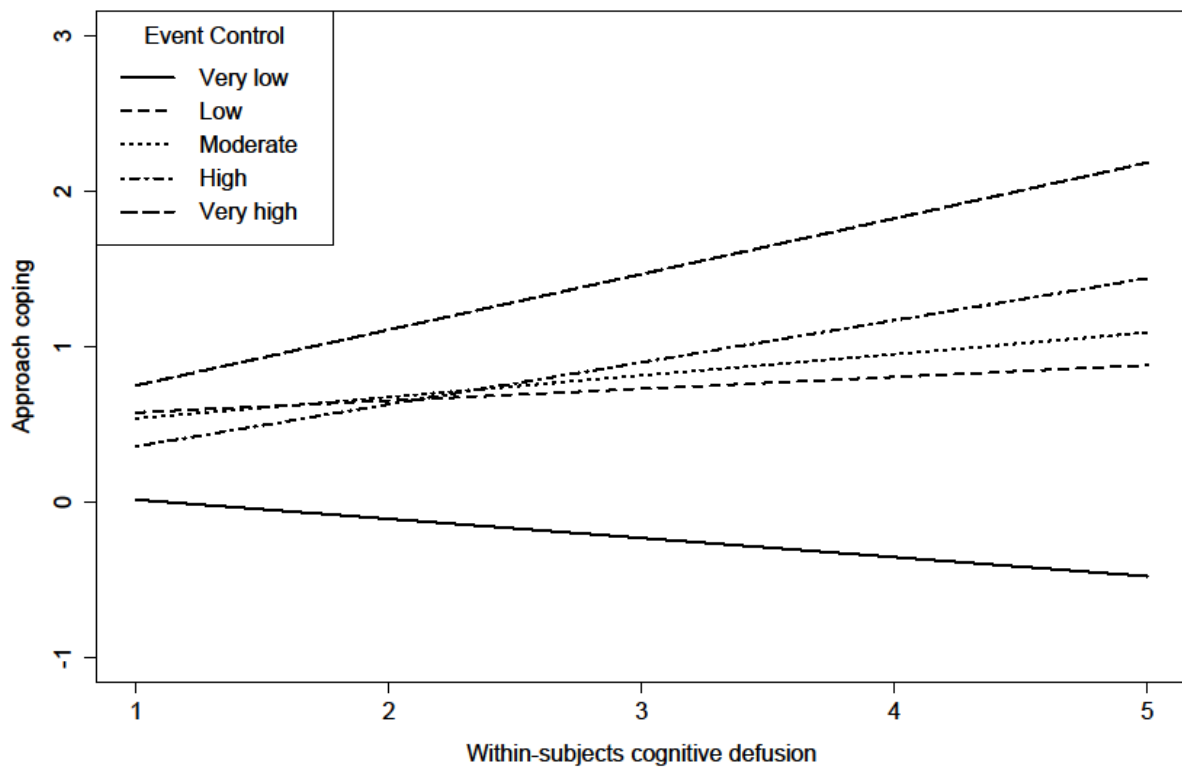


Figure 10. Within-subjects cognitive defusion interacting with levels of event control (very low – very high) in predicting approach coping. Note: Approach coping and cognitive defusion are in their unstandardized form.

Lagged analyses

Having examined within-subjects, within-day effects, I moved to examine within-subjects, lagged effects. Results for lagged acceptance and defusion in predicting each of approach and avoidance coping, are reported next.

Hypotheses 5(a) and (b): Lagged acceptance as a predictor of coping responses

Yesterday's acceptance was regressed on the present day's avoidance coping (Hypothesis 5a), and as an interaction with event controllability in predicting approach coping (Hypothesis 5b). However, significant effects were not found for either dependent variable: the standardized effect of lagged acceptance on avoidance coping was $\beta = -.003$ (.003), $t = -.116$, $p = .908$, and the interaction of lagged acceptance and today's event control on approach coping was $\beta = .03$ (.02), $t = 1.62$, $p = .105$.

Hypotheses 6(a) and (b): Lagged cognitive defusion as a predictor of coping responses

Finally, I tested Hypothesis 6 that lagged cognitive defusion will predict (a) less avoidance coping today, and (b) as an interaction with event controllability, will predict more approach coping today. I found support for both hypotheses. As shown in Table 19, yesterday's cognitive defusion predicting significantly less avoidance coping today, controlling for yesterday's threat and self-efficacy appraisals, $\beta = -0.08$ (.03), $t = -2.55$, $p = .011$. That is, being relatively cognitively defused during a stressful event yesterday predicted less avoidance coping with a stressful event today, suggesting a spill-over effect of cognitive defusion on coping, across stressful events, though this effect was modest in size.

Table 19

Lagged cognitive defusion predicting avoidance coping

	β	<i>SE</i>	<i>df</i>	<i>t</i> -value	<i>p</i> -value
(Intercept)	0.04	0.07	223.30	0.61	0.541
Avoidance coping (lagged)	0.04	0.02	2145.70	1.71	0.088
Condition	0.03	0.08	120.40	0.34	0.737
Threat appraisal (lagged)	-0.06*	0.03	2156.40	-2.43	0.015
Self-efficacy appraisal (lagged)	-0.04	0.02	2155.20	-1.46	0.145
Cognitive defusion (lagged)	-0.08*	0.03	228.20	-2.55	0.011

Note. All effects are standardized. * $p < .05$.

I next tested whether yesterday's cognitive defusion interacted with event controllability today to predict greater approach coping today (consistent with the goodness-of-fit hypothesis), and controlling for yesterday's threat and self-efficacy appraisals. I found support for this interaction effect, as shown in Table 20.

Table 20

Lagged cognitive defusion interacting with event control to predict approach coping

	β	<i>SE</i>	<i>df</i>	<i>t</i> -value	<i>p</i> -value
Intercept	0.04	0.06	290.80	0.64	0.525
Approach coping (lagged)	0.06**	0.02	2158.50	2.79	0.005
Condition	-0.11	0.07	120.30	-1.58	0.117
Threat appraisal (lagged)	0.03	0.03	2155.00	1.22	0.221
Self-efficacy appraisal (lagged)	0.04	0.02	2092.10	1.77	0.077
Defusion (lagged)	-0.04	0.03	2113.10	-1.59	0.112
Event control	0.30***	0.02	2089.10	14.45	< 0.001
Defusion (lagged)*Event control	0.05**	0.02	2154.00	2.74	0.006

Note. All effects are standardized. ** $p < .01$. *** $p < .001$.

The moderating effect of event control on the relationship between lagged cognitive defusion and approach coping is shown visually in Figure 11. Consistent with the within-subjects, within-day analysis reported above, this figure suggests that cognitive defusion yesterday predicted more context-sensitive coping today, such that for individuals reporting

very high levels of event control, there is greater approach coping, while in low control settings there is less approach coping.

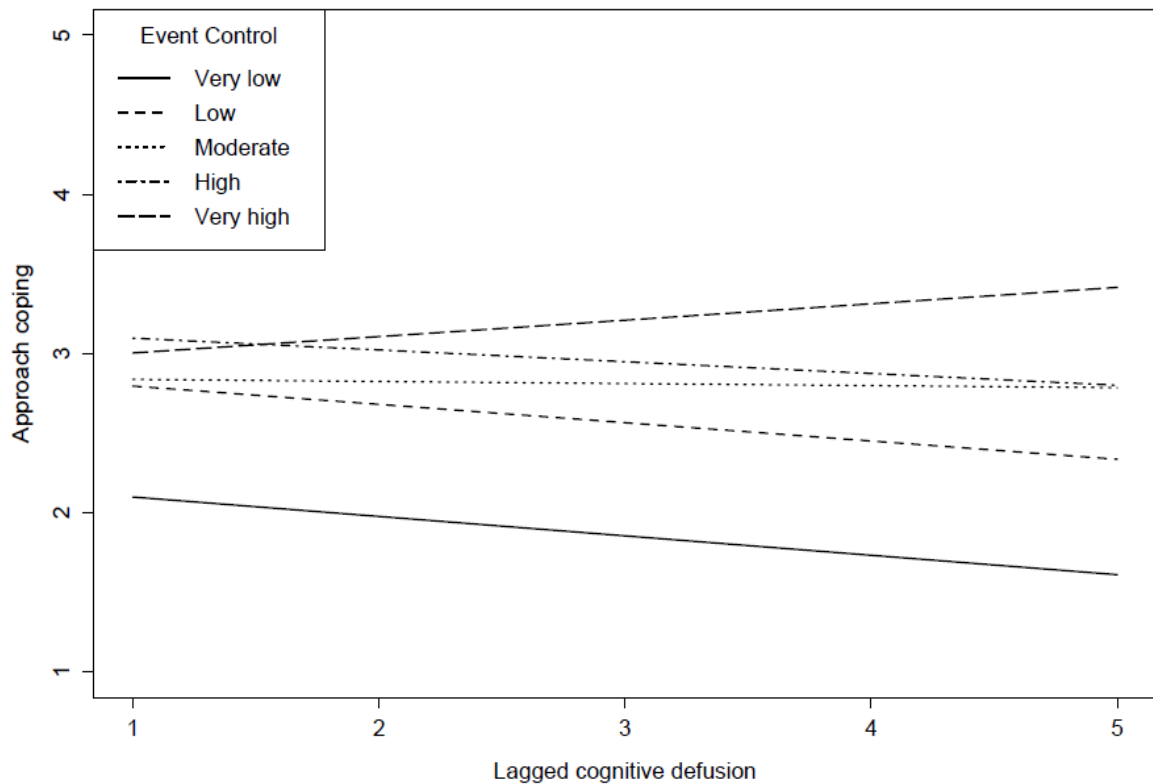


Figure 11. Lagged cognitive defusion interacting with levels of event control (very low – very high) in predicting approach coping. *Note.* Lagged cognitive defusion and approach coping are in unstandardized form.

Discussion

This study sought to test whether acceptance and cognitive defusion predicted enhanced coping with daily stressors, measured in close proximity to their occurrence (i.e., on a daily basis). In addition, this study tested whether the effects of both mindfulness processes occurred independent of the influence of stress-related cognitive appraisals (i.e., threat and self-efficacy appraisals) upon approach and avoidance coping. Support for such effects would provide evidence that the way individuals *relate* to their stress-related cognitions (i.e., acceptance and cognitive defusion) predicts coping behaviour

independently of the form or acuity of such appraisals (i.e., threat and self-efficacy appraisals), consistent with the predictions of third-wave behaviour therapies (Hayes et al., 2006). Finally, this study tested whether both acceptance and cognitive defusion enhanced individuals' ability to match their coping response with the opportunities afforded to them in specific stressful situations – specifically testing whether both acceptance and cognitive defusion facilitated more approach coping in situations involving relatively high levels of control over the stressor. To address these questions, this study employed state-of-the-art multi-level modelling techniques to assess a) between-subjects effects; b) within-subject, within-day effects (i.e., the co-occurrence of mindfulness components and coping responses in relation to the same stressor) and b) within-subjects lagged effects (i.e., the effects of mindfulness components upon coping responses over a one-day lag).

Results supported several but not all of the hypotheses in this study. Regarding the effects of cognitive defusion on coping, there was strong support for this from within-subjects within-day analyses, within-subjects lagged analyses and between-subjects analyses. Within-subjects cognitive defusion predicted less avoidance coping both on the same day and on a subsequent day. Also, between-subjects analyses showed that higher average cognitive defusion predicted less average avoidance coping, with a similar-sized effect to the within-subjects within-day analyses.

Further, cognitive defusion interacted with stressor control to predict greater approach coping with a stressor within the same day and on a subsequent day. In addition, higher cognitive defusion between individuals interacted with event control to predict greater average approach coping. While these effects were not as large as those for avoidance coping, they were statistically significant for all three forms of analyses in this study.

The finding of an interaction effect between cognitive defusion and stressor control in predicting greater approach coping both within and across days suggests that cognitive defusion helps individuals enhance the ‘fit’ between the opportunities available in any given stressful situation and the individual’s coping response, consistent with the goodness-of-fit hypothesis (Park et al., 2004). Specifically, cognitive defusion appears to have predicted more context-sensitive responding to stressful events occurring on the same day, such that more approach coping occurred in controllable situations, but *less* approach coping in uncontrollable settings (see Figure 10). This study also found evidence for this effect in the lagged analyses with cognitive defusion: greater cognitive defusion with a stressful event yesterday predicted an enhanced fit between how much control one had over a stressor today and the extent to which an active coping response was used (see Figure 11). These results suggest that cognitive defusion may increase individuals’ situational awareness, meaning that the person is better able to match their coping response to the opportunities afforded to them by the particular stressful experience, and is consistent with the predictions of the psychological flexibility model (Hayes et al., 2006). Lastly, the between-subjects effects follow the very same pattern, suggesting that cognitive defusion enhances the environment-coping response fit on average, across days, as well as in relation to a specific stressors on a given day.

The above effects of cognitive defusion on coping were independent of stress-related appraisals (i.e., primary appraisals of threat and secondary appraisals of self-efficacy). While cognitive defusion predicted enhanced approach and less avoidance coping on the subsequent day, self-efficacy appraisal did not have these effects, nor did threat-appraisal predict less avoidance coping on the subsequent day. This suggests that the *relationship* an individual has with his or her stress-related thoughts (i.e., being cognitively defused) predicts coping responses across time more than the content of such thoughts (i.e.,

appraisals of self-efficacy and threat). In turn, this suggests that cognitive defusion acts as a kind of ‘buffer’ against the negative effects of a stressor on a subsequent day, where appraisals of self-efficacy and threat do not. These findings are consistent with both theoretical claims and recent evidence from third-wave behaviour therapy research that emphasises the importance of *context* in which thoughts and feelings are experienced as much as it does their content (Bond et al., 2011; Hayes et al., 2006).

Regarding the effects of acceptance on coping, I found less support for this. Within-subjects acceptance (i.e., being above one’s own mean level of acceptance on any given day) predicted less avoidance coping with a stressor on the same day. Also, higher between-subjects acceptance predicted less avoidance coping on average. These findings are consistent with the results for cognitive defusion and avoidance coping above, and suggest that higher acceptance on any given day (within-subjects), as well as across days (between-subjects) is associated with less avoidance coping. However, there was no evidence in this study that acceptance predicted less avoidance coping on a subsequent day. Nor was there evidence that acceptance interacted with stressor control to predict greater approach coping either on the same day or on a subsequent day.

These findings suggest that variation in acceptance within subjects has limited effects on either approach or avoidance coping across days, or indeed on approach coping on the same day. In contrast, higher acceptance *between* subjects interacted with event control to predict greater approach coping on average. This further suggests that acceptance may have more general effects on coping responses, rather than having proximal effects on coping either on the same or on a subsequent day. However, based on previous research of acceptance manipulations (e.g., Bowen & Marlatt, 2009; Eifert & Heffner, 2003; Gutiérrez et al., 2004; Levitt et al., 2004), and the findings of Study 3, this is a surprising finding. Indeed, one would have expected acceptance to be a protective factor which, when applied

to specific stressful situations, enhances responses to those very situations, rather than just on average across time.

One explanation for these unexpected findings is that some participants misinterpreted the acceptance item. It is possible that some participants interpreted “seeking to control or change thoughts and feelings” as not necessarily non-acceptance (recall this item was reverse-coded to generate a measure of acceptance). For example, thinking positive thoughts or trying to generate solutions to a daily stressor may not necessarily involve non-acceptance, but could still involve “seeking to change thoughts”. This potential inconsistency with the measure of acceptance is illustrated in the validation of the single-item measures used in this study (see Appendix C) where the single-item measure of acceptance did not predict unique variance in the trait measure. On the other hand, the cognitive defusion measure (also reverse coded) which asked participants to rate how “caught up with your thoughts and feelings about this situation” may have more clearly implied rumination and literally believing stress-related thoughts, which is what the item targeted. These differences may in-turn explain the differences between the effects of cognitive defusion and acceptance in this study.

Despite questions regarding the acceptance measure in this study, the general pattern of results suggests that both cognitive defusion and acceptance are consistently associated with reduced avoidance coping. The standardized effect sizes for these relationships ranged from $-.08$ to $-.19$, with cognitive defusion consistently showing larger effects than acceptance. The between-subjects effects were slightly larger, at $-.12$ and $-.22$ for acceptance and cognitive defusion, respectively. These findings are also consistent with Studies 1 to 3 of this thesis, which generally found stronger effects of mindfulness on avoidance than approach coping.

This study has several limitations. First, in this study, I sought to measure individuals' mindfulness, affect and coping responses as close to the time of the stressor as possible, in order to reduce the well-reported bias associated with retrospective and global measures of stress-related constructs (Schwartz, et al., 1999; Shikai et al., 2014; Stone et al., 1998). In order to reduce participant burden and minimise missing data, the present study used single-item measures. Several of the single-item measures used in this study were taken from single-item measures used in previous research, while other measures used in this study were drawn from longer, psychometrically-valid scales. Although studies have found that single-item measures can perform as well as multiple-item scales on a range of constructs (Gardner, Cummins, Dunham, & Pierce, 1998), there are limitations to their use, including in relation to reliability, convergent validity and discriminant validity (Fuchs, & Diamantopoulos, 2009). To address these concerns, the present study validated the single-item measures used against trait versions of each construct (see Appendix C). However future studies of mindfulness processes and daily stress responses would benefit from using multi-item scales that are psychometrically reliable and valid *ex ante*.

Second, the standardized effect sizes for acceptance and cognitive defusion in this study at the within-subject level were relatively small (ranging from .05 to .19), suggesting that both mindfulness processes may be relatively modest predictors of coping responses. Having said this, the effect sizes for cognitive defusion were about the same as those of threat and self-efficacy appraisals in the present studies, suggesting that the predictions of third-wave behaviour therapies add about as much value in predicting coping responses as much more established theories of coping, such as Lazarus and Folkman's (1987) transactional theory.

Despite the exploratory nature of this study and its limitations, this is the first study to examine whether acceptance and cognitive defusion enhance how individuals' cope with

daily stressful events, and as such it adds value to both the coping literature and the more recent evidence emerging from third wave behaviour therapies (Hayes et al., 2006). The current findings suggest that an individual's relationship to his or her stress-related appraisals predicts coping responses to a similar, and in some cases larger, degree as the form and intensity of such appraisals. This finding adds to the transactional theory of coping, suggesting that a person's relationship to stress-related thoughts (for example, through a construct such as cognitive defusion) could usefully be included in studies aiming to predict or influence how individuals cope with stress in daily life.

CHAPTER 8

DISCUSSION & CONCLUSION

In this final chapter, I draw together and discuss the main themes that emerged from the four substantive chapters of this thesis. Following this, I discuss the implications of this research for both mindfulness-based theories and coping theory, as well as exploring the practical implications of this research. Finally, I outline several limitations of this body of work, before discussing the main conclusions that can be drawn from it.

Although the coping literature is vast, the research on mindfulness as a predictor of enhanced coping responses is relatively immature. Theories of mindfulness claim it enhances self-regulation (Brown et al., 2007; Hayes et al., 2006) but surprisingly little research has explored whether this is the case in the context of coping with stressful events. In this thesis, I sought to add to the research on mindfulness and coping by testing the effects of mindfulness manipulations and individual differences in mindfulness upon approach and avoidance coping responses. Specifically, I sought to examine three main research questions in this thesis. First, I examined whether mindfulness manipulations enhance approach and inhibit avoidance coping responses in the context of naturally-occurring (Studies 1 and 2) and laboratory-induced stress (Study 3). Second, I tested whether perceived stress moderated the effects of a mindfulness manipulation upon approach and avoidance coping responses (Studies 1 to 3). Finally, I examined whether acceptance and cognitive defusion, as two mindfulness component, enhanced approach and inhibited avoidance coping (Studies 3 and 4), and whether these effects were independent of stress-related appraisals (Study 4).

A summary of the main findings from the four studies in this thesis is shown in Figures 12 and 13. Figure 12 shows standardized effects (β) for approach coping, while Figure 13 shows standardized effects for avoidance coping. As both figures show, mindfulness more consistently predicted less avoidance than it did more approach coping. In particular, there was a consistent small-to-medium-sized interaction effect between mindfulness and perceived stress on less avoidance coping across Studies 1 to 3, whereas this effect did not consistently occur on approach coping. Lastly, the experimental effects of mindfulness on coping (Studies 1 to 3) were generally larger than the intra-individual longitudinal effects (Study 4). Each of these issues is discussed next.

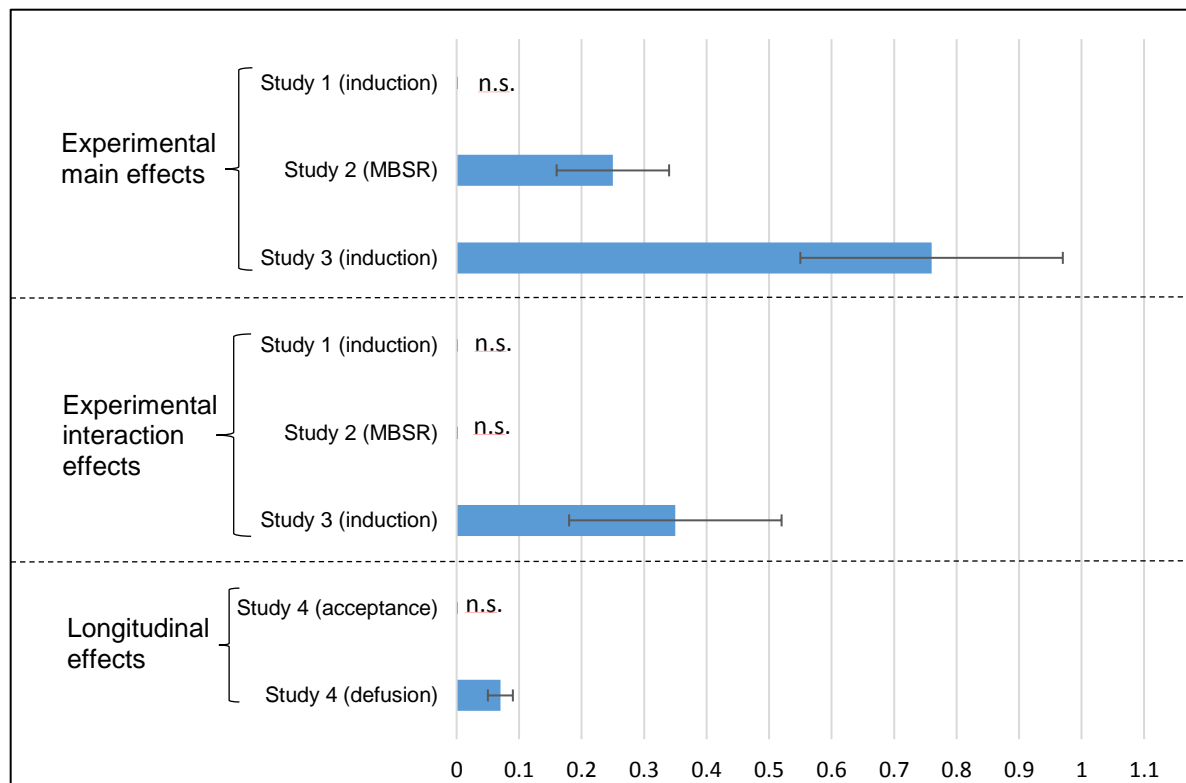


Figure 12. Standardized effects of mindfulness manipulations and intra-individual differences in mindfulness on approach coping. *Note.* Effects reported from Study 2 were the MBSR-adapted intervention relative to the wait-list control; effects reported from Study 3 were for the acceptance induction relative to both the self-affirmation and relaxation inductions (as an average effect-size); while effects from Study 4 were intra-individual differences in both acceptance and defusion on approach coping within the same day.

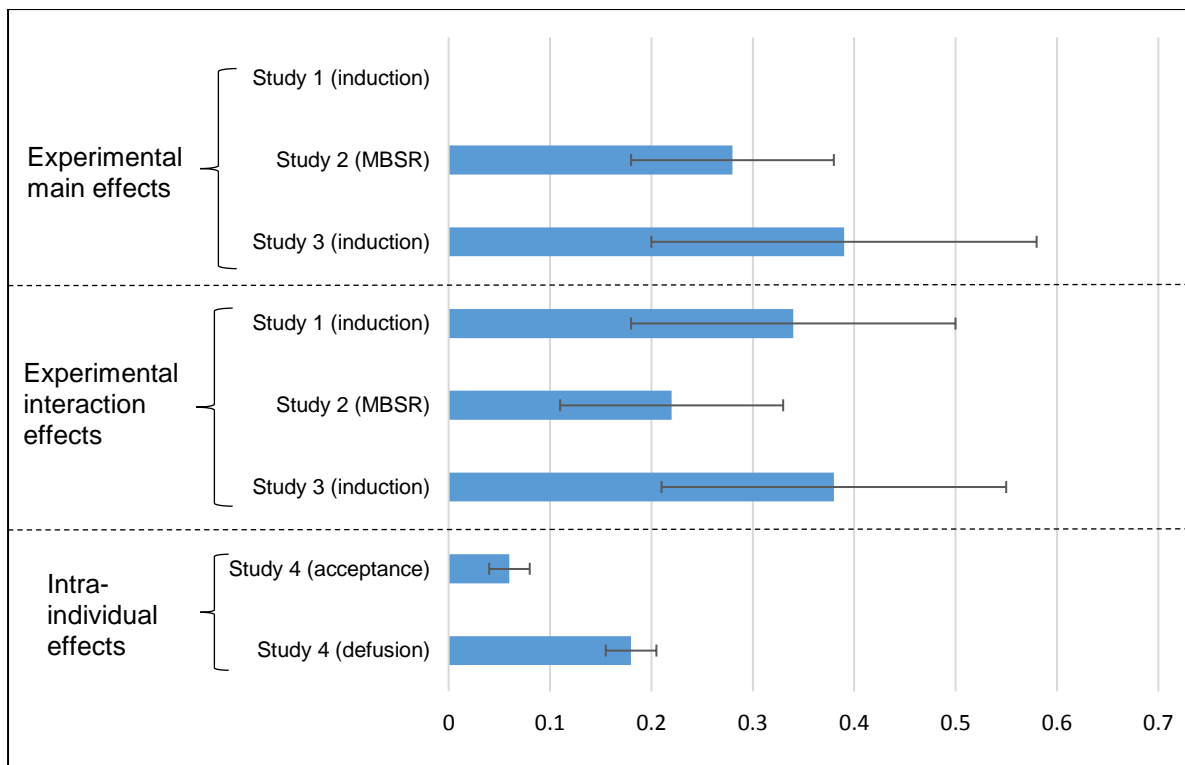


Figure 13. Standardized effects of mindfulness manipulations and intra-individual differences in mindfulness on approach coping. *Note.* Effects reported from Study 2 were the MBSR-adapted intervention relative to the wait-list control; effects reported from Study 3 were for the acceptance induction relative to both the self-affirmation and relaxation inductions (as a mean effect-size); while effects from Study 4 were intra-individual differences in both acceptance and defusion on avoidance coping within the same day.

Main effects of mindfulness on coping

There were significant main effects of mindfulness manipulations in enhancing approach and inhibiting avoidance coping in both Studies 2 and 3, but not Study 1. In Study 2, these effects were obtained following a brief acceptance manipulation, while in Study 3 these effects occurred following a multi-session MBSR-adapted intervention (9 hours of instruction in total). Although the MBSR-adapted program included a range of mindfulness exercises and psycho-education (see Appendix A), there was considerable emphasis in the protocol on accepting difficult or unpleasant experiences and willingly engaging with them. In addition, the third and final session of the protocol included a segment on self-compassion, with an emphasis on being accepting and kind to oneself in the face of stress

and knowing that such experiences are common to all people (Neff et al., 2007). Although the interventions were very different in length and format between Studies 2 and 3, a common element in both was the teaching of acceptance skills – particularly self-acceptance and self-compassion. On the other hand, mindfulness was manipulated in Study 1 via a raisin-eating exercise, which emphasized present-moment awareness and curiosity toward novel experiences, rather than self-acceptance. It may be, therefore, that self-acceptance is a key ‘active ingredient’ of mindfulness that enhances approach and inhibits avoidance coping.

These findings are consistent with a body of research showing that manipulations designed to increase psychological acceptance serve to enhance responses to aversive experiences, such as breathing in CO₂-enriched air (Eifert & Heffner, 2003; Levitt et al., 2004), receiving an electric shock (Gutiérrez et al., 2004) and quitting smoking (Bowen & Marlatt, 2009; Gifford et al., 2004). In addition, self-compassion has been found to predict less avoidant coping responses among university students following academic failure (Neff et al., 2005). In contrast, there is mixed evidence that present-centred attention (as manipulated in Study 1) enhances stress responses, with several studies finding that heightened attention to and awareness of internal states, in the absence of an attitude of acceptance, can enhance negative affect, anxiety and depression (for a review of this research, see Cardaciotto et al., 2008).

Perceived stress as a moderator of the effects of mindfulness on coping

In addition to the above main effects of mindfulness manipulations on coping responses, this thesis explored whether perceived stress moderates these effects. It has been suggested that mindfulness may only enhance coping responses among relatively stressed individuals (Josefsson et al., 2012). There is evidence that increased perceived stress

predicts more avoidance and less approach coping behaviour (Stowell et al., 2001), such that in relatively low-stress contexts mindfulness is unlikely to enhance coping responses as individuals are likely to cope relatively well, whereas in relatively high-stress settings, mindfulness should positively influence individuals' coping responses. This possibility has not been tested to-date, and Studies 1 to 3 of the present thesis are the first studies the author is aware of to do so. As shown in Figures 12 and 13, mindfulness manipulations interacted with perceived stress to predict less avoidance coping more consistently than they predicted greater approach coping.

These findings suggest that being mindful has differential effects in lowering avoidance coping as a function of individuals stress perceptions, whereas these moderation effects may not occur for approach coping – or at least not as consistently. Mindfulness – and particularly mindful-acceptance, for which the largest interaction effects were observed across Studies 1 to 3 – involves noticing and accepting present-moment experiences, whether pleasant, unpleasant or neutral in tone (Kabat-Zinn et al., 1992). In the context of stressful or aversive experiences, being mindful involves not seeking to psychologically avoid unpleasant experiences as they occur (Hayes et al., 2006). In-turn, a greater willingness to experience unpleasant experiences involves, almost by definition, fewer efforts to avoid contacting them, which is likely to involve reduced self-distraction and behavioural disengagement (i.e., avoidance coping behaviours). Support for these interaction effects on avoidance coping were found with both event-specific perceived stress (Studies 2 and 3) as well as general monthly perceived stress (Studies 1 and 3) as moderators, suggesting this effect is robust across both situation-specific stress and general perceived stress.

On the other hand, the effects of mindfulness on approach coping appear to be less consistently a function of perceived stress. Manipulations of mindfulness – and particularly mindful-acceptance – predicted greater approach coping *across* levels of perceived stress (i.e., main effects in Studies 2 and 3), but not consistently as a function of it (i.e., as a moderation effect). This suggests that in relatively high-stress contexts, being more mindful does not necessarily function to enhance approach coping. This may be because approach coping is a more distal outcome of mindfulness than avoidance coping: One may be in the presence of unpleasant experiences and, by being mindful, not seek to avoid them (i.e., less avoidance coping), but this does not necessitate taking additional actions to directly remove the stressor, such as making plans or strategies to deal with the stressor or taking direct actions to remove it or attenuate its effects (i.e., approach coping).

Taken together, these findings suggest that as levels of perceived stress increase between individuals, the effects of mindfulness on coping responses narrow in scope but strengthen in intensity: as stress levels increase, mindfulness has increasingly large effects on proximal outcomes such as avoidance coping, but this is less the case for more distal outcomes such as approach coping. Several studies have reported results that are consistent with this interpretation. For example, Halland et al. (2015) found that a shortened form of the MBSR program enhanced approach coping (as a main effect), and interacted with neuroticism to predict less avoidance coping. The tendency toward being neurotic has been shown to be strongly correlated with greater perceived stress and negative emotion (Mohiyeddini et al., 2015). Consistent with the findings of the present thesis, Halland et al. (2015) found that as levels of neuroticism increase, the effects of mindfulness become increasingly large in reducing avoidance coping, but this was not the case for approach coping.

Further evidence for the differential effects of mindfulness on approach and avoidance coping come from Weinstein et al. (2009), who found that individual differences in mindfulness predicted less avoidance coping but not more approach coping in relatively high-threat situations (laboratory-induced social threat and threat associated with academic performance), while they found significant effects on *both* approach and avoidance coping following more benign daily and monthly naturally-occurring stress. Lastly, Tacón et al. (2003) found that among women suffering from heart disease (and likely to be relatively stressed) a mindfulness intervention resulted in less reactive and impulsive responses to stress, but not more approach-oriented responding.

In sum, the findings of this thesis provide valuable insights into the function of individual stress-perceptions in moderating the effects of mindfulness interventions on coping responses. They suggest that as levels of perceived stress (both situation-specific and general stress) increase between individuals, being more mindful is likely to inhibit avoidant forms of responding, such as conflict avoidance, blame shifting, distraction and even denial. On the other hand, effects on approach coping appear to be less reliably a function of individual differences in stress.

Mindfulness components (acceptance and cognitive defusion) as predictors of enhanced coping

In Studies 3 and 4, the effects of acceptance and cognitive defusion on enhanced coping responses were tested for. As discussed in the *Main effects of mindfulness on coping* section above, there is substantial experimental evidence that acceptance enhances individuals' willingness to engage with aversive experiences. Similar experimental evidence has been found for cognitive defusion, with cognitive defusion manipulations resulting in less emotional discomfort and believability of aversive self-relevant thoughts

(Mandavia et al., 2015; Masuda, Feinstein, et al., 2010; Masuda et al., 2004; Masuda, Twohig, et al., 2010). In the context of stressful events, I therefore expected that both acceptance and cognitive defusion would inhibit the tendency to avoid engaging with a stressor (avoidance coping) and increase individuals' willingness to directly engage with and seek to resolve it (approach coping). Notably, the effect-sizes for other components of mindfulness, such as present-centered awareness and experiencing the self as the observer of experience, on related outcomes are smaller than for acceptance and cognitive defusion (Levin et al., 2012), justifying the focus on these two mindfulness components in Studies 3 and 4 of this thesis. The findings from this thesis for the effects of both acceptance and cognitive defusion on coping responses are now discussed in-turn.

Acceptance and coping responses

In Study 3, the acceptance manipulation predicted both enhanced approach and reduced avoidance coping following a social comparison stress manipulation, with medium-sized effects. The findings from the MBSR-adapted intervention in Study 2, which emphasized acceptance and self-compassion, are also consistent with these results, showing increases in approach and reductions in avoidance coping following the intervention. Further evidence for this was found in Study 4, where greater between-subjects acceptance predicting less avoidance and greater approach coping (as an interaction with stressor control), in the context of daily stressful events. Similar effects were also found in Study 4 from within-subjects, within-day analyses, though only on avoidance coping and not with approach coping.

These findings suggest that acceptance plays an important role in reducing avoidance coping following both relatively acute (Study 3) and more benign stressors (Study 4). As discussed above, acceptance enhances an individuals' willingness to be in the

presence of unpleasant thoughts and feelings (Bishop, et al., 2004; Hayes et al, 2006). In turn, greater willingness to experience aversive experiences opens up the person's options for responding, making avoidant responses less likely (Studies 3 and 4) and making approach-type responses more likely (Study 3).

An explanation for the lack of effects of acceptance on approach coping in Study 4, as well as the relatively small effects for acceptance on avoidance coping in that study, relates to the measurement of acceptance. The single-item measure of acceptance used in Study 4 did not predict the trait measure of acceptance used as a validation measure (see Appendix C). This suggests that the measure of acceptance in this study was psychometrically problematic. The reason for the non-correlation between state and trait acceptance may have been that participants misinterpreted the negatively-worded measure of state acceptance in this study. The acceptance item, "To what degree did you seek to control or change thoughts and feelings associated with this experience" (i.e., a measure of non-acceptance), may not have been perceived as non-acceptance of thoughts and feelings for some participants. Instead, some individuals may have tried to positively reframe the stressful experience or made a plan for how to resolve it, both of which involve changing thoughts relating to the stressful experience, but may not have been non-accepting in nature. Subsequent studies of acceptance via a single-item measure would benefit from using a more valid and reliable measure of the construct. This methodological short-coming in Study 4 in-turn likely weakened the otherwise consistent pattern of results in this thesis suggesting that acceptance, and in particular self-acceptance and self-compassion, enhances approach and inhibits avoidance coping responses.

Cognitive defusion and coping responses

In Study 4, cognitive defusion predicted less avoidance and more approach coping (as an interaction with stressor control) – as between-subjects effects, as within-subjects within-day effects, and as within-subjects across-day effects. In that study, cognitive defusion had consistently larger effects on avoidance than on approach coping (for between-subjects effects, $\beta = -.19$ on avoidance, and $\beta = .09$ on approach; for within-subjects within-day effects, $\beta = -.22$ on avoidance and $\beta = .05$ on approach). This basic trend is consistent with Studies 1 and 2, which found more consistent effects of mindfulness manipulations on avoidance than approach coping. These findings are also consistent with previous evidence that cognitive defusion manipulations result in reduced emotional discomfort with an aversive stimulus (Mandavia et al., 2015; Masuda, Feinstein, et al., 2010; Masuda et al., 2004; Masuda, Twohig, et al., 2010). Emotional discomfort is associated with the avoidance of unpleasant thoughts and feelings and a reduced willingness to be in contact with such experience (Hayes et al., 1999; Hayes et al., 2006), which in-turn is linked to avoidance behaviour, such as self-distraction and behavioural disengagement (Karekla & Panayiotou, 2011).

However, the findings relating to cognitive defusion from Study 3 are not consistent with those of Study 4. In the former, there was no evidence that a cognitive defusion induction resulted in greater approach or less avoidance than a self-affirmation or relaxation control. Moreover, main effects on both approach and avoidance were significantly less for the cognitive defusion manipulation than for the acceptance manipulation. As discussed in Chapter 6, the likely reason for this is that the cognitive defusion induction in Study 3 was relatively difficult for participants to engage with. As evidence for this, participants in the defusion induction group reported significantly more distraction during the induction than

those in the other three conditions, suggesting that they were not applying themselves to the task as much as those in the other conditions. Although several studies have used similar defusion exercises (e.g., Bach & Hayes, 2002; Bond & Bunce, 2000; Metzler, et al., 2000), it is possible that the instructions to ‘unhook’ from thoughts may have been too complex or difficult to engage with for relatively young participants situated in a classroom environment. For some participants, the cognitive defusion induction may have in-fact drawn participants further into their thoughts, rather than distancing from them, thereby undermining the impact of the induction on coping behaviours in Study 3.

This suggests that future manipulations of cognitive defusion would benefit from ensuring the induction has acceptable ecological validity and is appropriately explained and introduced to participants. Alternatively, other cognitive defusion manipulations could be used that have consistently shown to influence hypothesized outcomes. One example of this is the ‘word repetition’ exercise that involves the repetition of (unwanted) words until they lose their literal meaning (Hayes et al., 1999). This has been used in several studies of cognitive defusion, emotional discomfort and the believability of aversive thoughts (e.g., Mandavia et al., 2015; Masuda, Feinstein, et al., 2010; Masuda et al., 2004; Masuda, Twohig, et al., 2010).

Mindfulness components as predictors of enhanced coping independent of effects of stress-related appraisals

A final aim of this thesis was to test whether mindfulness components predict enhanced approach and less avoidance coping, controlling for the effects of stress-related appraisals on coping responses. This was the focus of Study 4. Lazarus and Folkman’s (1987) transactional theory of coping describes primary and secondary appraisals as predicting individuals’ coping responses. Primary appraisals are appraisals of the nature of

the stressor – as threatening, challenging, or as representing an opportunity (Lazarus & Folkman, 1987). In this thesis, primary appraisal was measured as the extent to which a stressor was appraised as a threat, following similar approaches used in previous studies (Hodgins et al., 2010; Tomaka et al., 1993). On the other hand, secondary appraisals are appraisals regarding the individuals' ability to influence or manage the stressor (Lazarus & Folkman, 1987). In this thesis, secondary appraisals were operationalized as the individuals' level of perceived self-efficacy regarding a stressful experience, following Chwalisz et al., (1992).

A key claim of the transactional theory is that stress-related cognitions (i.e., primary and secondary appraisals) predict subsequent responses to stress (Folkman et al., 1986). While there is strong theoretical and empirical support for this (Folkman et al., 1986; Folkman & Moskowitz, 2004; Lazarus, 1993), it may be that in addition to the *form* of individuals' stress-related appraisals (i.e., primary and secondary appraisals), the *relationship* an individual has to such appraisals is also a valuable predictor of coping responses (Keng et al., 2011; Khoury et al., 2015). Mindfulness involves changing one's relationship to thoughts and feelings (Hayes et al., 1999), so exploring effects of mindfulness components on coping responses is a way of examining this possibility. Study 4 tested whether inter- and intra-individual differences in mindfulness components (acceptance and cognitive defusion) predicted more approach and less avoidance coping, beyond the effects of primary and secondary appraisals.

At both the between- and within-subjects levels of analysis, (primary) threat appraisals predicted more avoidance while (secondary) self-efficacy appraisals predicted less avoidance, consistent with previous research on stress appraisals and coping (Folkman et al., 1986; Franks & Roesch, 2006; Lazarus & Folkman, 1987). However beyond these

effects, cognitive defusion and acceptance each predicted less avoidance coping, both between- and within-subjects, independent of the effects of stress-related appraisals. These findings are the first evidence that the author is aware of showing that an individuals' relationship to his or her stress-related cognitions (i.e., acceptance and cognitive defusion) predict less avoidant coping responses.

Notably, similar effects were not found as consistently for approach coping. Only cognitive defusion predicted enhanced approach coping (between- and within-subjects) independent of threat and self-efficacy appraisals. Similar effects were not found for acceptance, which, as discussed, may be due to the measure of acceptance used in Study 4. Also of note, the effect-sizes (at the between- and within-levels of analysis) for threat and self-efficacy appraisal were consistently larger than the mindfulness variables on approach coping, while the opposite was the case on avoidance coping.

This pattern of results suggests that mindfulness variables may be more important than stress-related appraisals in predicting less avoidance coping. This may be because avoiding engaging with a stressor (the measure of avoidance coping in Study 4) is a relatively immediate and non-cognitive response to a stressful situation (Blumberg, 2000; Cramer, 2000), while approach coping is a more elaborate, cognitively-complex response (i.e., taking steps to resolve a stressful situation). In the context of a stressful situation, defusing from and accepting stress-related cognitions may be enough to inhibit avoidant stress responses (Karekla & Panayiotou, 2011), while cognitive appraisals are less likely to have an impact on such responses. This explanation is consistent with findings from studies comparing the effects of acceptance and control manipulations on stress-responses, where acceptance manipulations consistently predicted less avoidance of aversive stimuli

(breathing in CO₂-enriched air and receiving an electric shock) than efforts to control stress-related cognitions and behaviour (Eifert & Heffner, 2003; Gutiérrez et al., 2004).

On the other hand, to facilitate more approach forms of coping such as taking steps to directly resolve a stressful situation (the measure of approach coping in Study 4), a person's cognitions in relation to the stressful event and their perceived capacity to influence the situation appear to be more important than for avoidance coping. In particular, the effect-sizes for self-efficacy appraisals were consistently the largest predictor of enhanced approach coping in Study 4. This suggests that only when an individual perceives him or herself as having the skills and personal resources to positively influence a stressful situation do such efforts occur, and is consistent with the research on self-efficacy and coping with stress (Benight & Bandura, 2004; Jex, et al., 2001). Cognitive defusion still predicted greater approach coping in Study 4, but with smaller effect-sizes than self-efficacy appraisals.

In sum, Study 4 provided evidence that mindfulness components may be particularly important in inhibiting avoidance coping, consistent with findings from Studies 1 to 3. However, Study 4 extended the findings of Studies 1 to 3 by showing that the effects of mindfulness components in reducing avoidant coping responses occur above and beyond the influence of stress-related appraisals (i.e., threat and self-efficacy appraisals). This pattern of results suggests that avoidance coping is a relatively cognitively basic response to stress, more easily influenced by mindfulness; while approach coping, on the other hand, is a more cognitively complex behaviour, meaning that mindfulness has less of an influence on it.

Contribution of the thesis to theories of mindfulness

Theories of mindfulness highlight its role in enhancing behavioural regulation in the presence of aversive experience (Brown et al., 2007; Hayes et al., 2006; Shapiro et al., 2006). Mindfulness is claimed to increase individuals' willingness to be exposed to aversive experiences and reduce reactivity to them, thereby expanding the range of possible responses and the flexibility of these responses (Hayes et al., 2006; Shapiro et al., 2006). In the context of coping with stress, it was expected that, by enhancing psychological acceptance and perspective-taking, greater mindfulness would result in less reactive and avoidant forms of coping and at the same time result in more efforts to resolve the stressful issue or make plans for how to do so (i.e., approach coping).

The findings of this thesis are generally consistent with this theoretical prediction, but add an important nuance to it. Namely, that the effects of mindfulness on stress-responses are not uniform across both approach and avoidant coping responses. Instead, the findings of this thesis suggest that as stress increases, mindfulness has an increasingly large effect in reducing avoidance coping, but no parallel effect in increasing approach coping. As discussed, avoidance coping is a relatively proximal outcome of mindfulness. That is, the very behaviour of mindfulness – and especially acceptance, which had the largest effects on coping in this thesis – involves the non-avoidance of present-moment experience. By being non-avoidant with one's internal experience (i.e., thoughts, feelings and sensations), avoidant coping behaviours such as self-distraction and behavioural disengagement are significantly less likely to occur (Karekla & Panayiotou, 2011), as these are public behaviours aimed at avoiding unwanted internal experience.

On the other hand, approach coping is a more distal outcome of enhanced mindfulness. It involves cognitions and actions aimed at directly resolving, or planning to

resolve, a stressful experience, as well as positive reappraisals that re-frame stressful events in a more positive light. These behaviours are not directly manipulated by mindfulness, which involves simply noticing and accepting moment-by-moment experience. In this thesis, I found less consistent evidence for perceived stress moderating the effects of mindfulness on enhanced approach coping. These findings suggest that in order for mindfulness to enhance approach coping behaviours, there needs to be a clear pathway to controlling the stressor or resolving it, as a means of down-regulating negative affect. The moderated effects of stressor control with mindfulness in Study 4 are consistent with this explanation; as are the findings of greater approach coping in Study 3, where there was a clear path to remediation following failure.

This general pattern of findings can be characterized as a ‘narrowing and intensifying’ effect of mindfulness: As negative affect increases for individuals, the benefits of mindfulness appear to narrow to have less of an influence on relatively distal outcomes (e.g., approach coping), but simultaneously intensify to have increasingly large effects on relatively proximal outcomes (e.g., avoidance coping). I expect that this is because as stress increases for a person, stress-related thoughts and feelings command an increasing amount of the person’s attention. In this context, any increases in mindfulness are directed toward being aware and accepting of such thoughts and feelings, which, in turn, is associated with less avoidant coping behaviour. Conversely, as stress increases, the individual has less and less attentional and affective capacity to engage in more distal approach coping behaviours.

This explanation of mindfulness processes is consistent with other stress-related theories, such as the conservation of resources model (Hobfoll, 1989), which suggests that individual responses to stress are aimed at conserving limited resources (e.g., energy, self-

efficacy, security and social relationships). The present research suggests that being present with and not avoiding stressful experiences, as primed by mindfulness, may be an efficient way of the individual conserving energy, otherwise spent in rumination and worry. Moreover, as stress increases, this becomes an increasingly effective strategy compared with attempting more distal approach coping strategies, which have a less direct influence on the energy-depleting effects of stress-related anxiety and rumination.

Taken together, the present studies suggest that mindfulness has differentiated effects on individuals' responses to stress as a function of how stressful such situations are appraised to be. Rather than opening up response options in similar ways, as proposed in previous theoretical accounts of how mindfulness works (e.g., Shapiro et al., 2006), our findings suggest that mindfulness has a differential effect on stress-related behaviour, which can be termed the 'narrowing and intensifying' effect of mindfulness.

Contribution of the thesis to theories of coping with stress

This thesis makes a valuable addition to Lazarus and Folkman's (1987) transactional theory of coping. According to their theory, coping responses are preceded (and can be predicted) by stress-related appraisals of two kinds: primary appraisals of threat, challenge or opportunity; and secondary appraisals of the individual's capacity to influence the stressor. A key assumption of this theory is that the form of these appraisals (e.g., opportunity versus threat), or their acuity (e.g., high versus low threat), predict coping responses (Lazarus & Folkman, 1987). Rather than describing the form or frequency of specific stress-related cognitions, mindfulness describes the *relationship* an individual has with his or her cognitions and emotions (Hayes et al., 2006; Shapiro et al., 2006).

The finding in the present thesis that mindfulness – and particularly acceptance – predicted less avoidance and in some cases enhanced approach coping suggests that the

relationship an individual has to his or her stress-related thoughts and feelings is in-fact a valuable predictor of coping responses. In Study 4, I found evidence for this, independent of stress-related appraisals. Together, these findings suggest that measuring the *relationship* an individual has with their stress-related thoughts and feelings (e.g., mindful or accepting versus unmindful or non-accepting) is useful in examining the antecedents of individuals' coping responses. In-turn, this has implications for the transactional theory of coping, suggesting that in studying coping responses, including a measure of the kind of relationship a person has with their stress-related cognitions is a useful adjunct to measuring primary and secondary appraisals.

Practical implications of this thesis

There are three main practical implications from this thesis. First, the findings from Studies 2 and 3 suggest that acceptance, and self-acceptance in particular, has an important role to play in enhancing how individuals cope with stress. Both of these studies found significant increases in approach coping and reductions in avoidance coping following acceptance interventions. This suggests that for organisations or groups seeking to enhance individual resilience and coping with stress, an intervention that targets acceptance, self-acceptance and self-compassion may be particularly useful. Importantly, cultivating acceptance does not imply that the stressful issues people face should then simply be tolerated, without any efforts to change them. Instead, acceptance as a mindfulness component describes the relationship a person has to their own thoughts and feelings: it is possible to be accepting but still seek to influence or reduce the impact of a stressor, as Studies 2 and 3 demonstrated. As an example of this, in Study 2, individuals in the MBSR-adapted condition reported significantly greater planning and active efforts to address the stressor they identified than those in the waitlist condition, suggesting that it is possible to be accepting, but also to take direct action to reduce the impact of a stressful experience.

Second, this thesis found that mindfulness, and acceptance in particular, inhibits avoidance coping more consistently than it enhances approach coping. This suggests that mindfulness and acceptance interventions would be most usefully targeted at reducing avoidant behaviours. In the workplace, examples of avoidant behaviours include conflict avoidance (i.e., covering over or avoiding having difficult but important conversations with colleagues when there are conflicting opinions or agendas), blame-shifting or denying links to potentially stressful or challenging issues, turning a blind eye to risky or problematic issues, or taking periods of leave to avoid stressful periods at work. All of these behaviours involve efforts to take an individual *away* from engaging with a stressful issue or experience. In work or other group settings where there are significant or ongoing stressful issues that need to be addressed for a group or team to function effectively, mindfulness skills – and particular mindful acceptance - may be of significant value.

A third and final practical contribution of this thesis relates to the effects of mindfulness on coping in high-stress settings. This thesis found that mindfulness (Studies 1 and 2) and mindful-acceptance (Study 3) interventions resulted in less avoidance coping as a function of levels of perceived stress between individuals. However, similar effects were not consistently found for approach coping. This suggests that mindfulness interventions are likely to be particularly effective in terms of reducing avoidance coping behaviours among individuals experiencing relatively high levels of stress. In-turn, this has implications for high-stress environments such as stressful workplaces, including, for example, the defense-forces and other front-line law-enforcement and emergency services agencies, which tend to be the most stress-inducing places of work. For people working in these sorts of environments, mindfulness training should be particularly effective; and more specifically, should reduce avoidance behaviours, such as taking periods of extended leave of absence, not raising issues or concerns at work due to avoidance of potential conflict or

sanction, and using distraction or substances such as drugs and alcohol to avoid dealing directly with stressors.

Limitations and future directions

This thesis has a number of limitations. First, all four studies in this thesis included students in their samples, limiting the applicability of its findings to a wider adult population. Studies 1 and 3 were both with undergraduate samples, while Studies 2 and 4 included a mix of undergraduate, post-graduate students and university staff. Future studies of mindfulness and coping would benefit from drawing on non-student samples, for example working samples, to broaden the scope of this research. Examining these research questions among a high-stress working sample may be a particularly worthwhile replication and extension of the present thesis (following Josefsson et al., 2012 and Walach et al., 2007), given the growing costs of stress-related illness in modern workplaces and the associated increasing interest in mindfulness in the workplace.

Second, there were potential short-comings with manipulations and measures of cognitive defusion and acceptance, respectively, in Studies 3 and 4 of this thesis. These issues mean that the findings in relation to mindfulness components in this thesis were perhaps less consistent than they otherwise would have been. In Study 3, the manipulation of cognitive defusion does not appear to have been efficacious. Subjects who received that intervention reported themselves as being significantly more distracted during it than those in the other three conditions of that study. Future studies of cognitive defusion and coping with stress should explore using other cognitive defusion manipulations that have more consistently been shown to influence outcomes related to coping. One candidate is the word-repetition manipulation used in several cognitive defusion studies (e.g., Mandavia et al., 2015; Masuda, Feinstein, et al., 2010; Masuda et al., 2004; Masuda, Twohig, et al.,

2010). A laboratory replication of Study 3, using a different manipulation of cognitive defusion, would be a logical next step in this line of research.

In addition, the measure of acceptance used in Study 4 appears to have been problematic. Although self-report, multi-item scales generally display stronger psychometric properties than single-item scales (Fuchs, & Diamantopoulos, 2009), there is arguably value in studying coping responses as close to the stressor as is possible (Todd et al., 2004), meaning that daily or momentary reports of behaviour, with shorter scales, are often a necessity in this context. Future studies of acceptance as an intra- and inter-individual difference predictor of coping with stress would benefit from using a well-validated measure of acceptance. Although the other single-item measures used in Study 4 appeared to have displayed acceptable psychometric properties, future studies of mindfulness and coping with daily stress would be well-served by using already-validated measures of all items, so as to minimize the likelihood of psychometric problems being identified for measures after they have been administered.

A third shortcoming of this thesis was the absence of process or mediating variables in any of the four studies. Mindfulness-based theoretical frameworks identify a number of mechanisms by which mindfulness is expected to have beneficial effects on outcomes of interest (e.g., Brown et al., 2007; Shapiro et al., 2006). For example, a well-cited mediator is ‘reperceiving’, or a shift in perspective from one’s thoughts and emotions as being the subject of one’s experience to these being an object of experience (Shapiro, et al., 2006; Teasdale et al., 2002). Although testing mediators of change for mindfulness on coping responses was not a goal of this thesis, doing so in future research would provide clearer insights into *how* mindfulness enhances coping responses.

Finally, given the evidence that daily stressors have a larger impact on well-being than more acute stressors (Almeida, 2005; DeLongis & Holtzman, 2005), future research into mindfulness and coping would benefit from focusing on these kinds of stressors, as was done in Study 4 of this thesis.

Conclusion

This thesis set out to explore three main research questions: first, whether mindfulness manipulations enhance approach and inhibit avoidance coping; second, whether perceived stress moderates these effects; and third, whether mindfulness components, namely acceptance and cognitive defusion, predict more approach and less avoidance coping. Although these issues were examined using a range of different methods, and the empirical studies in this thesis focused on coping with stress in a number of different contexts, several general conclusions nonetheless emerge from this work.

First, regarding main effects of mindfulness manipulations on enhancing approach and inhibiting avoidance coping, mindfulness appears to predict less avoidance coping more consistently than it does enhanced approach coping. This is in-line with previous research on mindfulness and coping that found similar results (Halland et al., 2015; Tacón et al., 2003; Weinstein et al., 2009), but makes a useful contribution to theories of mindfulness. In the context of stressful experiences, greater mindfulness is associated with less avoidance of the thoughts and feelings associated with such experiences, including less avoidance coping behaviours such as self-distraction, behavioural disengagement and denial. On the other hand, approach coping is a more distal and cognitively complex response to a stressful event that appears to be less directly linked to mindfulness behaviours.

Regarding the second research question in the thesis, I found consistent evidence across three studies that mindfulness manipulations have increasingly large effects on coping responses as a function of individual perceived stress. This is the first evidence the author is aware of in support of this moderation effect, although it has been proposed elsewhere (Josefsson et al., 2012). I found that this moderation effect occurred most consistently for avoidance coping, and less so for approach coping. As discussed, this may be because as stress levels increase between individuals, the effects of enhanced mindfulness narrow in scope but strengthen in intensity. That is, their effects narrow to more proximal outcomes, and in terms of approach and avoidance coping, this means limiting effects to avoidance coping. However, I also found that these effects intensify: across Studies 1 to 3, the effects of mindfulness in reducing avoidance coping increased as a function of increases in perceived stress. This is a novel finding, suggesting that mindfulness may have its largest benefits for how people cope with stress in highly stressful contexts.

Third, the findings of this thesis suggest that acceptance may be a particularly valuable component of mindfulness, in terms of improving coping responses – and again, most consistently in reducing avoidance coping. Studies 3 and 4 found, respectively, that manipulations of and individual differences in acceptance predicted less avoidance coping, measured in two very different contexts: laboratory-induced social comparison stress in Study 3 and naturally-occurring daily stress in Study 4. In addition, the MBSR-adapted intervention in Study 2 contained considerable emphasis on acceptance and willingness to engage with aversive experiences, as well as self-compassion. Together, these findings suggest that acceptance, and especially self-acceptance and self-compassion, may have a particularly useful role to play in enhancing coping responses. In Study 4 I found evidence that cognitive defusion may also have a valuable role to play in predicting improved coping

responses – particularly less avoidant responses – though further research is needed to test this possibility.

Lastly, this thesis provides important theoretical insights to the study of mindfulness and stress responses. A first insight is that an individual's *relationship* to his or her stress-related appraisals (measured in this thesis via mindfulness, acceptance and cognitive defusion) is an important predictor of subsequent stress-responses, above and beyond the effects of primary and secondary appraisals. This adds to Lazarus and Folkman's (1987) transactional theory of coping, highlighting an additional source of variance in individual coping responses beyond those included in the theory. Second, the findings of this thesis add a potentially valuable nuance to basic theories of mindfulness, suggesting that mindfulness may have effects on stress-responses that are a function of the levels of stress the person encounters. As levels of negative affect increase between individuals, mindfulness serves to narrow but intensify stress-responses, increasingly inhibiting avoidant behaviours but at the expense of enhancing approach responses. This suggests a kind of ipsative process whereby the effects of mindfulness become increasingly targeted at more proximal behaviours (i.e., reduced avoidance), but at the expense of more distal ones (i.e., enhanced approach).

Taken together, this thesis explored several under-researched areas of the mindfulness and coping literature. Although this research raises a number of still unresolved issues that need further examination, it makes a valuable contribution to our understanding of the efficacy of mindfulness as a means of enhancing individual behavioural responses to stressful events as they occur. In the context of rapidly growing interest in mindfulness as a stress-management tool, this thesis found that mindfulness is useful for enhancing *responses* to stress, beyond how such events make a person feel. In

particular, this suggests that interventions targeting acceptance, and self-acceptance in particular, are an effective means of enhancing responses to stress, especially for individuals navigating the demands of highly stressful roles.

REFERENCES

- Affleck, G., Tennen, H., Urrows, S., Higgins, P. (1994). Person and Contextual Features of Daily Stress Reactivity: Individual Differences in Relations of Undesirable Daily Events With Mood Disturbance and Chronic Pain Intensity. *Journal of Personality & Social Psychology*, *66*(2), 329–340.
- Agee, J. D., Danoff-Burg, S., & Grant, C. A. (2009). Comparing Brief Stress Management Courses in a Community Sample: Mindfulness Skills and Progressive Muscle Relaxation. *Explore: The Journal of Science and Healing*, *5*(2), 104–109. doi:10.1016/j.explore.2008.12.004
- Aldwin, C. M. (1991). Does age affect the stress and coping process? Implications of age differences in perceived control. *Journal of Gerontology*, *46*(4), P174–P180.
- Almeida, D. M. (2005). Resilience and vulnerability to daily stressors assessed via diary methods. *Current Directions in Psychological Science*, *14*(2), 64–68.
- Antoniou, P., & Bebetos, E. (2003). Psychological skills of Greek badminton athletes. *Perceptual and Motor Skills*, *97*(3), 1289–1296. doi:10.2466/pms.2003.97.3f.1289
- Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: emotion regulation following a focused breathing induction. *Behaviour Research and Therapy*, *44*(12), 1849–58. doi:10.1016/j.brat.2005.12.007
- Ayduk, O., Mischel, W., & Downey, G. (2002). Attentional Mechanisms Linking Rejection to Hostile Reactivity: The Role of “Hot” Versus “Cool” Focus. *Psychological Science (Wiley-Blackwell)*, *13*(5), 443–448. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=7225327&site=ehost-live>

- Bach, P., & Hayes, S. C. (2002). The use of acceptance and commitment therapy to prevent the rehospitalization of psychotic patients: a randomized controlled trial. *Journal of Consulting and Clinical Psychology, 70*(5), 1129–1139. doi:10.1037/0022-006X.70.5.1129
- Baer, R. A., 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. A. (2003). Mindfulness Training as a Clinical Intervention, *Clinical Psychology: Science and Practice, 10*(2), 125–143. doi:10.1093/clipsy/bpg015
- Baraldi, A. N., & Enders, C. K. (2010). An introduction to modern missing data analyses. *Journal of School Psychology, 48*(1), 5–37. doi:10.1016/j.jsp.2009.10.001
- Baumeister, R. F., Vohs, K. D., & Funder, D. C. (2007). Psychology as the Science of Self-Reports and Finger Movements. *Psychological Science, 2*(4), 396–403.
- Benight, C. C., & Bandura, A. (2004). Social cognitive theory of posttraumatic recovery: The role of perceived self-efficacy. *Behaviour Research and Therapy, 42*(10), 1129–1148. doi:10.1016/j.brat.2003.08.008
- Bergen-Cico, D., Possemato, K., & Cheon, S. (2013). Examining the efficacy of a brief mindfulness-based stress reduction (Brief MBSR) program on psychological health. *Journal of American College Health, 61*(6), 348–60. doi:10.1080/07448481.2013.813853
- Bergomi, C., Ströhle, G., Michalak, J., Funke, F., & Berking, M. (2013). Facing the dreaded: does mindfulness facilitate coping with distressing experiences? A moderator analysis. *Cognitive Behaviour Therapy, 42*(1), 21–30.

doi:10.1080/16506073.2012.713391

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

Blackledge, J. T. (2007). Disrupting Verbal Processes: Cognitive Defusion in Acceptance and Commitment Therapy and Other Mindfulness-Based Psychotherapies. *The Psychological Record, 57*, 555–576.

Blumberg, S. J. (2000). Guarding against Threatening HIV Prevention Messages: An Information-Processing Model. *Health Education & Behavior, 27*(6), 780–795. doi:10.1177/109019810002700611

Bolger, N., & Laurenceau, J. P. (2013). *Intensive longitudinal methods: An introduction to diary and experience sampling research*. New York: The Guilford Press.

Bollen, K. A. (1989). *Structural equations with latent variables*. New York: Wiley.

Bond, F. W., & Bunce, D. (2000). Mediators of change in emotion-focused and problem-focused worksite stress management interventions. *Journal of Occupational Health Psychology, 5*(1), 156–163. doi:10.1037/1076-8998.5.1.156

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., ... Zettle, R. D. (2011). Preliminary psychometric properties of the Acceptance and Action Questionnaire-II: A revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy, 42*(4), 676–88. doi:10.1016/j.beth.2011.03.007

Bond, F. W., Hayes, S. C., & Barnes-Holmes, D. (2006). Psychological Flexibility, ACT,

- and Organizational Behavior. *Journal of Organizational Behavior Management*, 26(1/2), 25–54. doi:10.1300/J075v26n01
- Bowen, S., & Marlatt, A. (2009). Surfing the urge: brief mindfulness-based intervention for college student smokers. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*, 23(4), 666–71. doi:10.1037/a0017127
- Brinkborg, H., Michanek, J., Hesser, H., & Berglund, G. (2011). Acceptance and commitment therapy for the treatment of stress among social workers: A randomized controlled trial. *Behaviour Research and Therapy*, 49(6-7), 389–398. doi:10.1016/j.brat.2011.03.009
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and 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: An International Journal of the Advancement of Psychological Theory*, 18(4), 211–237.
- Brown, S., & Locker, E. (2009). Defensive responses to an emotive anti-alcohol message. *Psychology & Health*, 24(5), 517–528. doi:10.1080/08870440801911130
- Campbell-Sills, L., Barlow, D. H., Brown, T. A., & Hofmann, S. G. (2006). Effects of suppression and acceptance on emotional responses of individuals with anxiety and mood disorders. *Behaviour Research and Therapy*, 44, 1251–1263. doi:10.1016/j.brat.2005.10.001
- Cardaciotto, L., Herbert, J. D., Forman, E. M., Moitra, E., & Farrow, V. (2008). The

- assessment of present-moment awareness and acceptance: the Philadelphia Mindfulness Scale. *Assessment*, 15(2), 204–23. doi:10.1177/1073191107311467
- Carver, C. S. (1997). You want to measure coping but your protocol's too long: consider the brief COPE. *International Journal of Behavioral Medicine*, 4(1), 92–100. doi:10.1207/s15327558ijbm0401_6
- Carver, C. S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, 61, 679–704. doi:10.1146/annurev.psych.093008.100352
- Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: a theoretically based approach. *Journal of Personality and Social Psychology*, 56(2), 267–83. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/2926629>
- Caspi, A., Bolger, N., & Eckenrode, J. (1987). Linking person and context in the daily stress process. *Journal of Personality and Social Psychology*, 52(1), 184–195. doi:10.1037/0022-3514.52.1.184
- Chamberlin, K. & Zika, S. (1990). The minor events approach to stress: Support for the use of daily hassles. *British Journal of Psychology*, 81(4), 469–481.
- Chambers, R., Lo, B. C. Y., & Allen, N. B. (2007). The impact of intensive mindfulness training on attentional control, cognitive style, and affect. *Cognitive Therapy and Research*, 32(3), 303–322. doi:10.1007/s10608-007-9119-0
- Chatzisarantis, N. L. D., & Hagger, M. S. (2007). Mindfulness and the intention-behavior relationship within the theory of planned behavior. *Personality & Social Psychology Bulletin*, 33(5), 663–76. doi:10.1177/0146167206297401
- Chawla, N., Collin, S., Bowen, S., Hsu, S., Grow, J., Douglass, A., & Marlatt, G. A. (2010). The mindfulness-based relapse prevention adherence and competence scale:

development, interrater reliability, and validity. *Psychotherapy Research: Journal of the Society for Psychotherapy Research*, 20(4), 388–397.

doi:10.1080/10503300903544257

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, 14(3), 464–504. doi:10.1080/10705510701301834

Chen, G., Gully, S. M., & Eden, D. (2001). Validation of a new general self-efficacy scale. *Organizational Research Methods*, 4(1), 62–83.

doi:10.1177/109442810141004

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating Goodness-of-Fit Indexes for Testing Measurement Invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, 9(2), 233–255. doi:10.1207/S15328007SEM0902

Chiesa, A. (2012). The Difficulty of Defining Mindfulness: Current Thought and Critical Issues. *Mindfulness*, 4(3), 255–268. doi:10.1007/s12671-012-0123-4

Chiesa, A., & Serretti, A. (2011). Mindfulness based cognitive therapy for psychiatric disorders: a systematic review and meta-analysis. *Psychiatry Research*, 187(3), 441–53. doi:10.1016/j.psychres.2010.08.011

Chwalisz, Kathleen, Altmaier, Elizabeth, M. and Russell, D. (1992). Causal attributions, self-efficacy cognitions, and coping with stress. *Journal of Social and Clinical Psychology*, 11(4), 377–400.

Cohen, S., Karmarck, T., & Mermelstein, R. J. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 385–396.

Cook, S. W., & Heppner, P. P. (1997). A Psychometric Study of Three Coping Measures.

Educational and Psychological Measurement, 57(6), 906–923.

doi:10.1177/0013164497057006002

Cramer, P. (1998). Coping and Defense Mechanisms: What's the Difference? *Journal of Personality*, 66(December), 919–946.

Cramer, P. (2000). Defense mechanisms in psychology today: Further processes for adaptation. *American Psychologist*, 55(6), 637–646. doi:10.1037//0003-066X.55.6.637

Creswell, J. D., Lam, S., Stanton, A. L., Taylor, S. E., Bower, J. E., & Sherman, D. K. (2007). Does self-affirmation, cognitive processing, or discovery of meaning explain cancer-related health benefits of expressive writing? *Personality and Social Psychology Bulletin*, 33, 238–250. doi:10.1177/0146167206294412

Crocker, J., Niiya, Y., & Mischkowski, D. (2008). Why does writing about important values reduce defensiveness? Self-affirmation and the role of positive other-directed feelings. *Psychological Science*, 19(7), 740–747.

De Young, K. P., Lavender, J. M., Washington, L. A., Looby, A., & Anderson, D. A. (2010). A controlled comparison of the Word Repeating Technique with a word association task. *Journal of Behavior Therapy and Experimental Psychiatry*, 41(4), 426–432. doi:10.1016/j.jbtep.2010.04.006

Deisinger, J. A., Cassisi, J. E., & Whitaker, S. L. (1996). Relationships between coping style and PAI profiles in a community sample. *Journal of Clinical Psychology*, 52(3), 303–10. doi:10.1002/(SICI)1097-4679(199605)52:3<303::AID-JCLP7>3.0.CO;2-S

DeLongis, A., & Holtzman, S. (2005). Coping in context: the role of stress, social

support, and personality in coping. *Journal of Personality*, 73(6), 1633–56.

doi:10.1111/j.1467-6494.2005.00361.x

Doron, J., Trouillet, R., Gana, K., Boiché, J., Neveu, D., & Ninot, G. (2014). Examination of the Hierarchical Structure of the Brief COPE in a French Sample: Empirical and Theoretical Convergences. *Journal of Personality Assessment*, (May), 37–41.

doi:10.1080/00223891.2014.886255

Duangdao, K. M., & Roesch, S. C. (2008). Coping with diabetes in adulthood: a meta-analysis. *Journal of Behavioral Medicine*, 31(4), 291–300. doi:10.1007/s10865-008-9155-6

Dweck, C. S., & Elliott-Moskwa, E. S. (2010). Self-theories: The roots of defensiveness. In J. E. Maddux & J. P. Tangney (Eds.), *Social psychological foundations of clinical psychology* (pp. 136–153). New York, NY: Guilford Press.

Ehlers, A., & Breuer, P. (1996). How good are patients with panic disorder at perceiving their heartbeats? *Biological Psychology*, 42(1-2), 165–182. doi:10.1016/0301-0511(95)05153-8

Eifert, G. H., & Heffner, M. (2003). The effects of acceptance versus control contexts on avoidance of panic-related symptoms. *Journal of Behavior Therapy and Experimental Psychiatry*, 34(3-4), 293–312. doi:10.1016/j.jbtep.2003.11.001

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

Flaxman, P. E., Bond F. W., & Leventhal, F. (2013). *The mindful and effective employee: An Acceptance & Commitment Therapy manual for improving well-being and performance*. Oakland, CA: New Harbinger.

Folkman, S., Lazarus, R. S., Dunkel-Schetter, C., DeLongis, A., & Gruen, R. J. (1986).

Dynamics of a stressful encounter: cognitive appraisal, coping, and encounter outcomes. *Journal of Personality and Social Psychology*, 50(5), 992–1003.

Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/3712234>

Folkman, S., Lazarus, R. S., Gruen, R. J., & Delongis, A. (1986). Appraisal, Coping, Health Status, and Psychological Symptoms, *Journal of Personality and Social Psychology* 50(3), 571–579.

Folkman, S., & Moskowitz, J. T. (2004). Coping: pitfalls and promise. *Annual Review of Psychology*, 55, 745–74. doi:10.1146/annurev.psych.55.090902.141456

Fontaine, K. R., Manstead, A. S. R., & Wagner, H. (1993). Optimism , perceived control over stress , and coping. *European Journal of Personality*, 7, 267–281.

Franks, H. M., & Roesch, S. C. (2006). Appraisals and coping in people living with cancer: A meta-analysis. *Psycho-Oncology*, 15(12), 1027–1037.
doi:10.1002/pon.1043

Fuchs, C., & Diamantopoulos, A. (2009). Using single-item measures for construct measurement in management research: conceptual issues and application guidelines. *Die Betriebswirtschaft*, 69(2), 195–210.

Gardner, D. G., Cummins, L. L., Dunham, R. B., & Pierce, J. L. (1998). Single-item versus multiple-item measurement scales: an empirical comparison. *Educational and Psychological Measurement*, 58(6), 898–915. doi:10.1177/1056492611432802

Gaspard, H., Dicke, A., Flunger, B., Brisson, B. M., Häfner, I., Nagengast, B., Trautwein, U. (2015). Developmental Psychology Fostering Adolescents' Value Beliefs for Mathematics With a Relevance Intervention in the Classroom. *Developmental Psychology*. Advance online publication. <http://dx.doi.org/10.1037/dev0000028>.

- Gianakos, I. (2002). Predictors of Coping With Work Stress: The Influences of Sex, Gender Role, Social Desirability, and Locus of Control, *Sex Roles*, 46(March), 149-157.
- Gifford, E. V., Kohlenberg, B. S., Hayes, S. C., Antonuccio, D. O., Piasecki, M. M., Rasmussen-Hall, M. L., & Palm, K. M. (2004). Acceptance-based treatment for smoking cessation. *Behavior Therapy*, 35(4), 689–705. doi:10.1016/S0005-7894(04)80015-7
- Gifford, E. V., Kohlenberg, B. S., Hayes, S. C., Pierson, H. M., Piasecki, M. P., Antonuccio, D. O., & Palm, K. M. (2011). Does Acceptance and Relationship Focused Behavior Therapy Contribute to Bupropion Outcomes? A Randomized Controlled Trial of Functional Analytic Psychotherapy and Acceptance and Commitment Therapy for Smoking Cessation. *Behavior Therapy*, 42(4), 700–715. doi:10.1016/j.beth.2011.03.002
- Gillanders, D. T., Bolderston, H., Bond, F. W., Dempster, M., Flaxman, P. E., Campbell, L., ... Remington, B. (2014). The development and initial validation of the cognitive fusion questionnaire. *Behavior Therapy*, 45(1), 83–101. doi:10.1016/j.beth.2013.09.001
- Glomb, T. M., Duffy, M. K., Bono, J. E., & Yang, T. (2012). Mindfulness at Work. *Research in Personnel and Human Resources Management*, 30, 115-157.
- Good, A., & Abraham, C. (2007). Measuring defensive responses to threatening messages: a meta-analysis of measures. *Health Psychology Review*, 1(2), 208–229. doi:10.1080/17437190802280889
- Goyen, M. J., & Anshel, M. H. (1998). Sources of acute competitive stress and use of coping strategies as a function of age and gender. *Journal of Applied Developmental*

Psychology, 19(3), 469–486. doi:10.1016/S0193-3973(99)80051-3

Graham, J. W. (2009). Missing data analysis: making it work in the real world. *Annual Review of Psychology*, 60, 549–576.

doi:10.1146/annurev.psych.58.110405.085530

Graham, J., Olchowski, A., & Gilreath, T. (2007). How many imputations are really needed? Some practical clarifications of multiple imputation theory. *Prevention Science*, 8, 206–213. doi:10.1007/s11121-007-0070-9

Gutiérrez, O., Luciano, C., Rodríguez, M., & Fink, B. C. (2004). Comparison between an acceptance-based and a cognitive-control-based protocol for coping with pain.

Behavior Therapy, 35(4), 767–783. doi:10.1016/S0005-7894(04)80019-4

Halland, E., de Vibe, M., Solhaug, I., Friborg, O., Rosenvinge, J. H., Tyssen, R., Sorlie, T., & Bjorndal, A. (2015). Mindfulness Training Improves Problem-Focused Coping in Psychology and Medical Students: Results From a Randomized Controlled Trial. *College Student Journal*, 49(3), 387–399.

Haney, C. J., & Long, B. C. (1995). Coping Effectiveness: A Path Analysis of Self-Efficacy, Control, Coping, and Performance in Sport Competitions. *Journal of Applied Social Psychology*, 25(19), 1726–1746. doi:10.1111/j.1559-

1816.1995.tb01815.x

Harnett, D., & Carr, A. (2013). Leaves on a stream: The effectiveness of a mindfulness-based exercise on the frequency, and difficulty in “letting go” of anxious self-statements. *Journal of Articles in Support of the Null Hypothesis*, 10(1), 41–52.

Retrieved from <http://www.jasnh.com/pdf/Vol10-No1-article4.pdf>

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and

commitment therapy: model, processes and outcomes. *Behaviour Research and Therapy*, 44(1), 1–25. doi:10.1016/j.brat.2005.06.006

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and Commitment Therapy: An experiential approach to behaviour change*. New York, NY: Guilford Press.

Hayes, S. C., Wilson, K. G., Gifford, E. V., Bissett, R., Piasecki, M., Batten, S. V., Gregg, J. (2004). A preliminary trial of twelve-step facilitation and acceptance and commitment therapy with polysubstance-abusing methadone-maintained opiate addicts. *Behavior Therapy*, 35(4), 667–688. doi:10.1016/S0005-7894(04)80014-5

Hayes, S. C & Fletcher, L. (2005). Relational Frame Theory, Acceptance and Commitment Therapy and a Functional Analytic Definition of Mindfulness. *Journal of Rational Emotive and Cognitive Behavioural Therapy*, 23(4), 1–28.

Heppner, W. L., Kernis, M. H., Lakey, C. E., Campbell, W. K., Goldman, B. M., Davis, P. J., & Cascio, E. V. (2008). Mindfulness as a means of reducing aggressive behavior: dispositional and situational evidence. *Aggressive Behavior*, 34(5), 486–96. doi:10.1002/ab.20258

Hobfoll, S. E. (1989). Conservation of resources. A new attempt at conceptualizing stress. *The American Psychologist*, 44(3), 513–524. doi:10.1037/0003-066X.44.3.513

Hodgins, H. S., Weibust, K. S., Weinstein, N., Shiffman, S., Miller, A., Coombs, G., & Adair, K. C. (2010). The cost of self-protection: threat response and performance as a function of autonomous and controlled motivations. *Personality & Social Psychology Bulletin*, 36(8), 1101–14. doi:10.1177/0146167210375618

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-

- based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology*, 78(2), 169–83. doi:10.1037/a0018555
- Hong, Y., Chui, C., Dweck, C. S., Lin, D. M.-S. and Wan, W. (1999). Implicit Theories, Attributions, and Coping: A Meaning System Approach. *Journal of Personality and Social Psychology*, 77(3), 588–599.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55.
doi:10.1080/10705519909540118
- Hülshager, U. R., Alberts, H. J. E. M., Feinholdt, A., & Lang, J. W. B. (2012). Benefits of Mindfulness at Work: The Role of Mindfulness in Emotion Regulation, Emotional Exhaustion, and Job Satisfaction. *Journal of Applied Psychology*, 98(2), 310–325.
doi:10.1037/a0031313
- Jain, S., Shapiro, S. L., Swanick, S., Roesch, S. C., Mills, P. J., Bell, I., & Schwartz, G. E. R. (2007). A randomized controlled trial of mindfulness meditation versus relaxation training: effects on distress, positive states of mind, rumination, and distraction. *Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine*, 33(1), 11–21. doi:10.1207/s15324796abm3301_2
- Jex, S. M., Bliese, P. D., Buzzell, S. and Primeau, J. (2001). The Impact of Self-Efficacy on Stressor-Strain Relations: Coping Style as an Explanatory Mechanism. *Journal of Applied Psychology*, 86(3), 401–409.
- Jorm, A. F, Morgan, A. J., & Hetrick, S. E. (2008). Relaxation for depression (Review). *The Cochrane Library*, (4). doi:10.1002/14651858.CD007142.pub2

- Josefsson, T., Lindwall, M., & Broberg, A. G. (2012). The Effects of a Short-term Mindfulness Based Intervention on Self-reported Mindfulness, Decentering, Executive Attention, Psychological Health, and Coping Style: Examining Unique Mindfulness Effects and Mediators. *Mindfulness*. doi:10.1007/s12671-012-0142-1
- Kabat-Zinn, J., Massion, A. O., Kristeller, J., Peterson, L. G., Fletcher, K. E., Pbert, L., Santorelli, S. F. (1992). Effectiveness of a Meditation-Based Stress Reduction Program in the Treatment of Anxiety Disorders. *American Journal of Psychiatry*, *149*(7), 936–943. Retrieved from <Go to ISI>://WOS:A1992JB01500014
- Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York, NY: Dell.
- Kapsou, M., Panayiotou, G., Kokkinos, C. M., & Demetriou, A. G. (2010). Dimensionality of coping: an empirical contribution to the construct validation of the brief-COPE with a Greek-speaking sample. *Journal of Health Psychology*, *15*(2), 215–29. doi:10.1177/1359105309346516
- Karekla, M., & Panayiotou, G. (2011). Coping and experiential avoidance: unique or overlapping constructs? *Journal of Behavior Therapy and Experimental Psychiatry*, *42*(2), 163–70. doi:10.1016/j.jbtep.2010.10.002
- Kato, T. (2013). Frequently Used Coping Scales: A Meta-Analysis. *Stress and Health : Journal of the International Society for the Investigation of Stress*. doi:10.1002/smi.2557
- Keng, S.-L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: a review of empirical studies. *Clinical Psychology Review*, *31*(6), 1041–56. doi:10.1016/j.cpr.2011.04.006

- Kessels, L. T. E., Ruiter, R. A. C., Brug, J., & Jansma, B. M. (2011). The effects of tailored and threatening nutrition information on message attention. Evidence from an event-related potential study. *Appetite*, *56*(1), 32–8.
doi:10.1016/j.appet.2010.11.139
- Kessels, L. T. E., Ruiter, R. A. C., & Jansma, B. M. (2010). Increased attention but more efficient disengagement: neuroscientific evidence for defensive processing of threatening health information. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *29*(4), 346–354.
doi:10.1037/a0019372
- Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L. T., Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, *32*(6), 959–976. doi:10.1017/S0033291702006074
- Kessler, R. C., Barker, P. R., Colpe, L. J., Epstein, J. F., Gfroerer, J. C., Hiripi, E., Alan, A. M. (2003). Screening for serious mental illness in the general population. *Archives of General Psychiatry*, *60*(2), 184–189.
- 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), 763–71. doi:10.1016/j.cpr.2013.05.005
- Khoury, B., Sharma, M., Rush, S. E., & Fournier, C. (2015). Mindfulness-based stress reduction for healthy individuals: A meta-analysis. *Journal of Psychosomatic Research*, *78*(6), 519–528. doi:10.1016/j.jpsychores.2015.03.009
- Kleiber, C. & Zeileis, A. (Eds.). (2008). *Applied Econometrics with R*. Retrieved from <http://link.springer.com/book/10.1007/978-0-387-77318->

6/page/1\npapers3://publication/uuid/D8338B50-36A6-434B-B720-6AAB90F1E36A

- Klein, W. M. P., Blier, H. K., & Janze, A. M. (2001). Maintaining Positive Self-Evaluations: Reducing Attention to Diagnostic but Unfavorable Social Comparison Information When General Self-Regard is Salient. *Motivation and Emotion, 25*(1), 23–40.
- Koestner, R., & Zuckerman, M. (1994). Causality orientations, failure, and achievement. *Journal of Personality, 64*, 321–346. doi:10.1111/j.1467-6494.1994.tb00300.x
- Kramer, U. (2010). Coping and defence mechanisms: what's the difference?--second act. *Psychology and Psychotherapy, 83*(Pt 2), 207–21. doi:10.1348/147608309X475989
- Lakey, C. E., Campbell, W. K., Brown, K. W., & Goodie, A. S. (2007). Dispositional Mindfulness as a Predictor of the Severity of Gambling Outcomes. *Personality and Individual Differences, 43*(7), 1698–1710. doi:10.1016/j.paid.2007.05.007
- Lau, M. A., Bishop, S. R., Buis, T., Anderson, N. D., Carlson, L., & Carmody, J. (2006). The Toronto Mindfulness Scale: Development and Validation. *Journal of Clinical Psychology, 62*(12), 1445–1467. doi:10.1002/jclp
- Lazarus, R. S. (1993). Coping theory and research: past, present, and future. *Psychosomatic Medicine, 55*(3), 234–47. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/8346332>
- Lazarus, R. S., & Folkman, S. (1987). Transactional theory and research on emotions and coping. *European Journal of Personality, 1*(3), 141–169. doi:10.1002/per.2410010304
- Levin, M. E., Hildebrandt, M. J., Lillis, J., & Hayes, S. C. (2012). The Impact of

- Treatment Components Suggested by the Psychological Flexibility Model: A Meta-Analysis of Laboratory-Based Component Studies. *Behavior Therapy*, 43, 741–756. doi:10.1016/j.beth.2012.05.003
- Levitt, J. T., Brown, T. A., Orsillo, S. M., & Barlow, D. H. (2004). The effects of acceptance versus suppression of emotion on subjective and psychophysiological response to carbon dioxide challenge in patients with panic disorder. *Behavior Therapy*, 35(4), 747–766. doi:10.1016/S0005-7894(04)80018-2
- Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York, NY: Guilford Press.
- Little, T. D. (2013). *Longitudinal structural equation modeling*. New York: Guilford Press.
- Lu, L. (1991). Daily hassles and mental health: A longitudinal study. *British Journal of Psychology*, 82, 441–447.
- Lyne, K., & Roger, D. (2000). A psychometric re-assessment of the COPE questionnaire. *Personality and Individual Differences*, 29(2), 321–335. doi:10.1016/S0191-8869(99)00196-8
- Mandavia, A., Masuda, A., Moore, M., Mendoza, H., Donati, M. R., & Cohen, L. L. (2015). The application of a cognitive defusion technique to negative body image thoughts: A preliminary analogue investigation. *Journal of Contextual Behavioral Science*, 4(2), 86–95. doi:10.1016/j.jcbs.2015.02.003
- Manocha, R., Black, D., Sarris, J., & Stough, C. (2011). A randomized, controlled trial of meditation for work stress, anxiety and depressed mood in full-time workers. *Evidence-Based Complementary and Alternative Medicine*, 2011.

doi:10.1155/2011/960583

Manzoni, G. M., Pagnini, F., Castelnuovo, G., & Molinari, E. (2008). Relaxation training for anxiety: a ten-years systematic review with meta-analysis. *BMC Psychiatry*, *8*, 41. doi:10.1186/1471-244X-8-41

Masuda, A., Feinstein, A. B., Wendell, J. W., & Sheehan, S. T. (2010). Cognitive defusion versus thought distraction: a clinical rationale, training, and experiential exercise in altering psychological impacts of negative self-referential thoughts. *Behavior Modification*, *34*, 520–538. doi:10.1177/0145445510379632

Masuda, A., Hayes, S. C., Sackett, C. F., & Twohig, M. P. (2004). Cognitive defusion and self-relevant negative thoughts: Examining the impact of a ninety year old technique. *Behaviour Research and Therapy*, *42*, 477–485. doi:10.1016/j.brat.2003.10.008

Masuda, A., Twohig, M. P., Stormo, A. R., Feinstein, A. B., Chou, Y. Y., & Wendell, J. W. (2010). The effects of cognitive defusion and thought distraction on emotional discomfort and believability of negative self-referential thoughts. *Journal of Behavior Therapy and Experimental Psychiatry*, *41*(1), 11–17.
doi:10.1016/j.jbtep.2009.08.006

McCallie, M. S., Blum, C. M. & Hood, C. J. (2008). Progressive Muscle Relaxation. *Journal of Human Behavior in the Social Environment*, *13*(3), 51–66.
doi:10.1300/J137v13n03

McCracken, L. M., & Yang, S. (2008). A contextual cognitive-behavioral analysis of rehabilitation workers' health and well-being: Influences of acceptance, mindfulness, and values-based action. *Rehabilitation Psychology*, *53*(4), 479–485.

McQueen, A., & Klein, W. M. P. (2006). Experimental manipulations of self-affirmation:

- A systematic review. *Self and Identity*, 5(4), 289–354.
doi:10.1080/15298860600805325
- Medco. (2011). *America's state of mind*. Retrieved from
<http://www.jstor.org/stable/10.2307/1148663>
- Medibank. (2008). *The Cost of Workplace Stress in Australia Medibank Private and Workplace Health. Econtech*. Retrieved from <http://www.medibank.com.au/>
- Metzler, C. W., Biglan, A., Noell, J., Ary, D. V., & Ochs, L. (2000). A randomized controlled trial of a behavioral intervention to reduce high-risk sexual behavior among adolescents in STD clinics. *Behavior Therapy*, 31, 27–54. Retrieved from <http://linkinghub.elsevier.com/retrieve/pii/S0005789400800039>
- Millsap, R. E. (2011). *Statistical approaches to measurement invariance*. New York, NY: Routledge.
- Millsap, R. E., & Meredith, W. (2007). Factorial invariance: Historical perspectives and new problems. In R. Cudeck & R. MacCallum (Eds.) *Factor analysis at 100* (pp. 131-152) Mahwah, NJ: Lawrence Erlbaum.
- Mohiyeddini, C., Bauer, S., & Semple, S. (2015). Neuroticism and stress: the role of displacement behavior. *Anxiety, Stress, and Coping*, 28(4), 391–407.
doi:10.1080/10615806.2014.1000878
- Mueller, C. M., & Dweck, C. S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology*, 75(1), 33–52. doi:10.1037//0022-3514.75.1.33
- National Institute for Occupational Safety and Health (2004). *Worker health chartbook* (Publication no. 2003-46). Cincinnati, OH: Author.

- Neff, K. D., Hsieh, Y.-P., & Dejjitrat, K. (2005). Self-compassion, Achievement Goals, and Coping with Academic Failure. *Self and Identity*, 4(3), 263–287.
- Neff, K. D., Kirkpatrick, K. L., & Rude, S. S. (2007). Self-compassion and adaptive psychological functioning. *Journal of Research in Personality*, 41(1), 139–154.
doi:10.1016/j.jrp.2006.03.004
- Nicholls, A. R., & Polman, R. C. J. (2007). Coping in sport: A systematic review. *Journal of Sports Sciences*, 25(1), 11–31. doi:10.1080/02640410600630654
- Nussbaum, A. D., & Dweck, C. S. (2008). Defensiveness versus remediation: self-theories and modes of self-esteem maintenance. *Personality & Social Psychology Bulletin*, 34(5), 599–612. doi:10.1177/0146167207312960
- OECD. (2014). Making Mental Health Count. *Making Mental Health Count*, (July), 1–8.
doi:10.1787/9789264208445-en
- OECD. (2015). *Fit Mind, Fit Job: From Evidence to Practice in Mental Health and Work*. Mental Health and Work, OECD Publishing, Paris. doi:http://www.oecd-ilibrary.org/employment/fit-mind-fit-job_9789264228283-en
- Öst, L. G. (2008). Efficacy of the third wave of behavioral therapies: A systematic review and meta-analysis. *Behaviour Research and Therapy*, 46(3), 296–321.
doi:10.1016/j.brat.2007.12.005
- Öst, L.-G. (2014). The efficacy of Acceptance and Commitment Therapy: An updated systematic review and meta-analysis. *Behaviour Research and Therapy*, 61, 105–121. doi:10.1016/j.brat.2014.07.018
- Ostafin, B. D., & Kassman, K. T. (2012). Stepping out of history: mindfulness improves insight problem solving. *Consciousness and Cognition*, 21(2), 1031–6.

doi:10.1016/j.concog.2012.02.014

Páez-Blarrina, M., Luciano, C., Gutiérrez-Martínez, O., Valdivia, S., Ortega, J., & Rodríguez-Valverde, M. (2008). The role of values with personal examples in altering the functions of pain: Comparison between acceptance-based and cognitive-control-based protocols. *Behaviour Research and Therapy*, *46*(1), 84–97.

doi:10.1016/j.brat.2007.10.008

Palmer, Angèle & Rodger, S. (2009). Mindfulness, Stress, and Coping Among University Students. *Canadian Journal of Counselling*, *43*(3), 198–212.

Parent-Thirion, A., Macais, E. F., Hurley, J. & Vermeulen, G. (2007). *Fourth European working conditions survey*. Dublin: European Foundation for the Improvement of Living and Working Conditions.

Park, C. L., Armeli, S., & Tennen, H. (2004). Appraisal-coping goodness of fit: a daily internet study. *Personality and Social Psychology Bulletin*, *30*, 558–569.

doi:10.1177/0146167203262855

Park, C. L., Fenster, J. R., Suresh, D. P., & Bliss, D. E. (2006). Social support, appraisals, and coping as predictors of depression in congestive heart failure patients. *Psychology & Health*, *21*(6), 773–789. doi:10.1080/14768320600682368

Penley, J. A., Tomaka, J., & Wiebe, J. S. (2002). The association of coping to physical and psychological health outcomes: a meta-analytic review. *Journal of Behavioral Medicine*, *25*(6), 551–603. Retrieved from

<http://www.ncbi.nlm.nih.gov/pubmed/12462958>

Pensgaard, A.M., Ursin, H., & Roberts, G.C. (1999). Motivational factors and coping strategies of Norwegian Paralympic and Olympic winter sport athletes. *Adapted*

Physical Activity Quarterly, 16, 238-250.

Poulin, P. A., Mackenzie, C. S., Soloway, G., & Karayolas, E. (2008). Mindfulness training as an evidence-based approach to reducing stress and promoting well-being among human services professionals. *International Journal of Health Promotion & Education*, 46(March), 72–80. doi:10.1080/14635240.2008.10708132

Preacher, K. J., Zhang, Z., & Zyphur, M. J. (2015). Multilevel Structural Equation Models for Assessing Moderation Within and Across Levels of Analysis. *Psychological Methods*. Retrieved from [http://www.quantpsy.org/pubs/preacher_zhang_zyphur_\(in.press\).pdf](http://www.quantpsy.org/pubs/preacher_zhang_zyphur_(in.press).pdf)

Ptacek, J. T., Smith, R. E., & Zanas, J. (1992). Gender, Appraisal, and Coping: A Longitudinal Analysis. *Journal of Personality*, 60(4), 747–770.

Ptacek, J. T., Smith, R. E., Espe, K. & Raffety, B. (1994). Limited Correspondence Between Daily Coping Reports and Retrospective Coping Recall. *Psychological Assessment*, 6(1), 41–49.

R Core Team (2015). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Australia. URL <https://www.R-project.org/>.

Raes, F., Pommier, E., Neff, K. D., & Van Gucht, D. (2011). Construction and factorial validation of a short form of the Self-Compassion Scale. *Clinical Psychology & Psychotherapy*, 18(3), 250–5. doi:10.1002/cpp.702

Rayburn, N. R., Wenzel, S. L., Elliott, M. N., Hambarsoomians, K., Marshall, G. N., & Tucker, J. S. (2005). Trauma, depression, coping, and mental health service seeking among impoverished women. *Journal of Consulting and Clinical Psychology*, 73(4),

667–677. doi:10.1037/0022-006X.73.4.667

Reb, J., & Narayanan, J. (2014). The Influence of Mindful Attention on Value Claiming in Distributive Negotiations: Evidence from Four Laboratory Experiments.

Mindfulness, 5(6), 756–766. doi:10.1007/s12671-013-0232-8

Reb, J., Narayanan, J., & Chaturvedi, S. (2012). Leading Mindfully: Two Studies on the Influence of Supervisor Trait Mindfulness on Employee Well-Being and

Performance. *Mindfulness*, 1(1). doi:10.1007/s12671-012-0144-z

Reb, J. & Narayan, J. (2013). The Influence of Mindful Attention on Value Claiming in Distributive Negotiations: Evidence from Four Laboratory Experiments.

Mindfulness, (Research Collection Lee Kong Chian School Of Business).

Rippetoe, P. A., & Rogers, R. W. (1987). Effects of components of protection-motivation theory on adaptive and maladaptive coping with a health threat. *Journal of*

Personality and Social Psychology, 52(3), 596–604. Retrieved from

<http://www.ncbi.nlm.nih.gov/pubmed/3572727>

Roelofs, J., Peters, M. L., Patijn, J., Schouten, E. G.W., & Vlaeyen, J. W. S. (2004).

Electronic diary assessment of pain-related fear, attention to pain,

and pain intensity in chronic low back pain patients, *Pain*, 112(3), 335-342.

Roesch, S. C., Adams, L., Hines, A., Palmores, A., Vyas, P., Tran, C., & Vaughn, A. A.

(2005). Coping with prostate cancer: a meta-analytic review. *Journal of Behavioral*

Medicine, 28(3), 281–93. doi:10.1007/s10865-005-4664-z

Roth, S., & Cohen, L. J. (1986). Approach, avoidance, and coping with stress. *The*

American Psychologist, 41(7), 813–9. Retrieved from

<http://www.ncbi.nlm.nih.gov/pubmed/3740641>

- Schafer, J. L., & Kang, J. (2008). Average causal effects from nonrandomized studies: A practical guide and simulated example. *Psychological Methods, 13*(4), 279–313.
doi:10.1037/a0014268
- Schumacker, R. E., & Lomax, R. G. (2010). *A Beginner's Guide to Structural Equation Modeling*. doi:10.1002/9781118133880.hop202023
- Schwartz, J. E, Neale, J., Marco, C, Shiffman, S. S., & Stone, A.A. (1999). Does Trait Coping Exist? A Momentary Assessment Approach to the Evaluation of Traits. *Journal of Personality and Social Psychology, 77*(2), 360–369.
- Sears, S., & Kraus, S. (2009). I Think Therefore I Om: Cognitive Distortions and Coping Style as Mediators for the Effects of Mindfulness Meditation on Anxiety, Positive and Negative Affect, and Hope. *Journal of Clinical Psychology, 65*(6), 561–573.
doi:10.1002/jclp
- Sedlmeier, P., Eberth, J., Schwarz, M., Zimmermann, D., Haarig, F., Jaeger, S., & Kunze, S. (2012). The psychological effects of meditation: a meta-analysis. *Psychological Bulletin, 138*(6), 1139–71. doi:10.1037/a0028168
- Segal, Z. V., Teasdale, J. D., Williams, J. M., & Gemar, M. C. (2002). The mindfulness-based cognitive therapy adherence scale: Inter-rater reliability, adherence to protocol and treatment distinctiveness. *Clinical Psychology and Psychotherapy, 9*, 131–138.
doi:10.1002/cpp.320
- Serido, J., Almeida, D. M., & Wethington, E. (2004). Chronic stressors and daily hassles: unique and interactive relationships with psychological distress. *Journal of Health and Social Behavior, 45*(1), 17–33. doi:10.1177/002214650404500102

- Seymour L. & Grove, B. (2005). *Workplace interventions for people with common mental health problems: Evidence, review and recommendations*. London: British Occupational Health Research Foundation.
- Shapiro, S. L., Carlson, L. E., Astin, J. A., Freedman, B. (2006). Mechanisms of Mindfulness. *Journal of Clinical Psychology*, 62(3), 373–386. doi:10.1002/jclp
- Sharma, M., & Rush, S. E. (2014). Mindfulness-Based Stress Reduction as a Stress Management Intervention for Healthy Individuals: A Systematic Review. *Journal of Evidence-Based Complementary & Alternative Medicine*, 19(4), 271–286. doi:10.1177/2156587214543143
- Sherman, D. A. K., Nelson, L. D., & Steele, C. M. (2000). Do Messages about Health Risks Threaten the Self? Increasing the Acceptance of Threatening Health Messages Via Self-Affirmation. *Personality and Social Psychology Bulletin*, 26(9), 1046–1058. doi:10.1177/01461672002611003
- Sherman, D. K. & Cohen, G. L. (2006). The Psychology of Self-Defense: Self-Affirmation Theory. *Advances in Experimental Social Psychology*, 38(May), 183–242.
- Shikai, N., Nagata, T., & Kitamura, T. (2014). Do people cope with situations as they say? Relationship between perceived coping style and actual coping response. *Psychiatry and Clinical Neurosciences*, 68(2), 154–9. doi:10.1111/pcn.12094
- Siegling, A. B., & Petrides, K. V. (2014). Measures of trait mindfulness: Convergent validity, shared dimensionality, and linkages to the five-factor model. *Frontiers in Psychology*, 5(October), 1164. doi:10.3389/fpsyg.2014.01164
- Singer, J. D. (1998). Using SAS PROC MIXED to Fit Multilevel Models, Hierarchical

- Models, and Individual Growth Models. *Journal of Educational and Behavioral Statistics*, 23(4), 323–355. doi:10.3102/10769986023004323
- Singer, J. D. & Willett, J. B. (2003). *Applied Longitudinal Data Analysis: Modeling Change and Event Occurrence*. Oxford: Oxford University Press.
- Skinner, E. A., Edge, K., Altman, J., & Sherwood, H. (2003). Searching for the structure of coping: A review and critique of category systems for classifying ways of coping. *Psychological Bulletin*, 129(2), 216–269. doi:10.1037/0033-2909.129.2.216
- Stahl, B. & Goldstein, E. (2013). *A mindfulness-based stress reduction workbook*. Oakland, CA: New Harbinger.
- Stone, A. A., Schwartz, J. E., Neale, J. M., Shiffman, S., Marco, C. A., Hickcox, M., & Cruise, L. J. (1998). A comparison of coping assessed by ecological momentary assessment and retrospective recall. *Journal of Personality and Social Psychology*, 74(6), 1670–80. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/9654765>
- Stowell, J. R., Kiecolt-Glaser, J. K., & Glaser, R. (2001). Perceived stress and cellular immunity: when coping counts. *Journal of Behavioral Medicine*, 24(4), 323–39. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/11523331>
- Suls, J., & Fletcher, B. (1985). The relative efficacy of avoidant and nonavoidant coping strategies: a meta-analysis. *Health Psychology*, 4(3), 249–88. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/4029107>
- Tabachnick, B. G. & Fidell, L. S. (2013). *Using multivariate statistics*. Sixth Edition. Upper Saddle River, New Jersey: Pearson Education.
- Tacón, A. M., McComb, J., Caldera, Y., & Randolph, P. (2003). Mindfulness meditation, anxiety reduction, and heart disease: a pilot study. *Family & Community Health*,

26(1), 25–33. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/12802125>

Takahashi, M., Muto, T., Tada, M., & Sugiyama, M. (2002). Acceptance rationale and increasing pain tolerance: Acceptance-based and FEAR-based practice. *Japanese Journal of Behavior Therapy*, 28, 35–46.

Tan, L. B. G., Lo, B. C. Y., & Macrae, C. N. (2014). Brief Mindfulness Meditation Improves Mental State Attribution and Empathizing. *PloS One*, 9(10), e110510. doi:10.1371/journal.pone.0110510

Tanay, G., & Bernstein, A. (2013). State Mindfulness Scale (SMS): Development and initial validation. *Psychological Assessment*, 25(4), 1286–99. doi:10.1037/a0034044

Tapper, K., Shaw, C., Ilsley, J., Hill, A. J., Bond, F. W., & Moore, L. (2009). Exploratory randomised controlled trial of a mindfulness-based weight loss intervention for women. *Appetite*, 52(2), 396–404. doi:10.1016/j.appet.2008.11.012

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 and Clinical Psychology*, 70(2), 275–287. doi:10.1037/0022-006X.70.2.275

Terry, D. J. (1991). Coping resources and situational appraisals as predictors of coping behavior. *Personality and Individual Differences*, 12(10), 1031–1047. doi:10.1016/0191-8869(91)90033-8

Terry, D. J. (1994). Determinants of Coping: The Role of Stable and Situational Factors. *Journal of Personality and Social Psychology*, 66(5), 895–910.

Todd, M., Tennen, H., Carney, M. A., Armeli, S., & Affleck, G. (2004). Do we know how we cope? Relating daily coping reports to global and time-limited retrospective

assessments. *Journal of Personality and Social Psychology*, 86(2), 310–9.

doi:10.1037/0022-3514.86.2.310

Tomaka, J., Blascovich, J., Kesley, R. M., Leitten, C. L. (1993). Subjective, Physiological and Behavioral Effects of Threat and Challenge Appraisal. *Journal of Personality and Social Psychology*, 65(2), 248–260.

Twohig, M., Hayes, S., & Masuda, A. (2006). Increasing Willingness to Experience Obsessions: Acceptance and Commitment Therapy as a Treatment for Obsessive-Compulsive Disorder. *Behavior Therapy*, 37(1), 3–13.

doi:10.1016/j.beth.2005.02.001

Twohig, M. P., Shoenberger, D., & Hayes, S. C. (2007). A Preliminary Investigation of Acceptance and Commitment Therapy for Marijuana Dependence in Adults. *Journal of Applied Behavior Analysis*, 40(4), 619–632. doi:10.1901/jaba.2007.619

van 't Riet, J., & Ruiter, R. A. C. (2013). Defensive reactions to health-promoting information: an overview and implications for future research. *Health Psychology Review*, 7(sup1), S104–S136. doi:10.1080/17437199.2011.606782

Virgili, M. (2013). Mindfulness-Based Interventions Reduce Psychological Distress in Working Adults: a Meta-Analysis of Intervention Studies. *Mindfulness*.

doi:10.1007/s12671-013-0264-0

Walach, H., Nord, E., Zier, C., Dietz-Waschkowski, B., Kersig, S., & Schüpbach, H. (2007). Mindfulness-based stress reduction as a method for personnel development: A pilot evaluation. *International Journal of Stress Management*, 14(2), 188–198.

doi:10.1037/1072-5245.14.2.188

Watson, C., Burley, M. C., & Purdon, C. (2010). Verbal repetition in the reappraisal of

contamination-related thoughts. *Behavioural and Cognitive Psychotherapy*, 38, 337–353. doi:10.1017/S1352465810000196

Weinstein, N., Brown, K. W., & Ryan, R. M. (2009). A multi-method examination of the effects of mindfulness on stress attribution, coping, and emotional well-being. *Journal of Research in Personality*, 43(3), 374–385. doi:10.1016/j.jrp.2008.12.008

Williams, V., Ciarrochi, J., & Deane, F. P. (2010). On being mindful, emotionally aware, and more resilient: Longitudinal pilot study of police recruits. *Australian Psychologist*, 45(4), 274–282. doi:10.1080/00050060903573197

Woods, D. W., Wetterneck, C. T., & Flessner, C. A. (2006). A controlled evaluation of acceptance and commitment therapy plus habit reversal for trichotillomania. *Behaviour Research and Therapy*, 44(5), 639–656. doi:10.1016/j.brat.2005.05.006

Yadavaia, J. E., Hayes, S. C. & Vilardaga, R. (2014). Using acceptance and commitment therapy to increase self-compassion: A randomized controlled trial. *Journal of Contextual Behavioral Science*, 3(4), 248–257.

Zenner, C., Herrnleben-Kurz, S., & Walach, H. (2014). Mindfulness-based interventions in schools: a systematic review and meta-analysis. *Frontiers in Psychology*, 5(June), 1–20. doi:10.3389/fpsyg.2014.00603

APPENDICES

Appendix A – MBSR-adapted protocol summary from Study 2 (Chapter 5)

Workshop Component	Objectives	Key content / exercises
Workshop 1		
The stress response	<p>To understand how the stress response works and its impacts</p> <p>To identify individual-specific issues causing stress</p>	<p>Overview of the stress response</p> <p>Stress audit</p>
Introduction to mindfulness	<p>To define mindfulness</p> <p>To experience mindfulness in-practice</p> <p>To nominate one routine activity to perform mindfully</p>	<p>Definition of mindfulness</p> <p>Raising eating exercise</p>
Attitude and intention in mindfulness practice	<p>To understand the basic attitudes of mindfulness</p> <p>To understand, experientially, the role of mind-wandering in mindfulness practice and how to direct attention mindfully</p>	<p>Explanation of attitudes of mindfulness</p> <p>Overview of mind wandering and directing attention</p> <p>Mindful breathing meditation</p>
Pleasant and unpleasant experiences	<p>To notice responses to pleasant and unpleasant sensations</p> <p>To understand how these responses apply to pleasant and unpleasant aspects of one's life in general</p>	<p>Exercise noting pleasant / unpleasant sensations in the body</p>
Home practice	<p>Formal mindfulness practice: One guided meditation per day (5-20 min meditations provided on a website)</p> <p>Informal mindfulness practice: Nominating one routine activity to perform mindfully each day</p> <p>Identifying one ongoing unpleasant experience / issue one wishes to infuse with mindfulness</p>	
Workshop 2		
Review of home practice	<p>To identify enablers and barriers to mindfulness practice</p> <p>To identify an additional routine activity to perform mindfully</p>	<p>Peer-to-peer discussion and whole-of-group review</p> <p>Identifying an additional routine activity to perform mindfully</p>

Attention and mind wandering	To understand the function of mind wandering To develop skills in mindful awareness of the mind and its thoughts To gently direct attention to a chosen object	The STOP exercise Overview and discussion of how we typically respond to unwanted thoughts The body scan
Stress as bodily sensations and thoughts	To experience stress as bodily sensations plus thoughts	Stress recall exercise Exercises drawing bodily sensations and writing down thoughts associated with a stressful experience
Moving mindfulness	To enhance body-awareness through mindful movement To identify routine movements (eg, walking, running etc) to bring mindfulness to	Guided tai-chi exercises
Perspective taking	To gain first-hand experience of the observing perspective on ongoing experience	Choiceless awareness meditation
Home practice	Formal mindfulness practice: One guided meditation per day (5-20 min meditations provided on a website) Informal mindfulness practice: Nominating one routine activity to perform mindfully each day Identifying one ongoing unpleasant experience / issue to bring bodily and thought-awareness to Using the STOP exercise between activities to gain calm and focus	
Workshop 3		
Review of home practice	To further clarify enablers and barriers to ongoing mindfulness practice To share experiences with peers	Peer-to-peer discussion and whole-of-group review
Stress audit	To identify life-stressors that have changed following mindfulness skills training	Stress audit exercise and peer discussion
Mindfulness and self-compassion	To explore the effect of cultivating self-compassion in relation to challenging experiences	Self-compassion meditation
Goal setting	Identifying clear, time-bound goals for ongoing formal and informal mindfulness practice	Self-reflection and writing; peer discussion

Appendix B – ACT protocol summary from Study 2 (Chapter 5)

Workshop Component	Objectives	Key content / exercises
Workshop 1		
Two skills diagram	To understand relationship between mindfulness and values-based action	Introduction of two skills and how they are related
Introduction to mindfulness	To define mindfulness To experience mindfulness in-practice as compared with autopilot To nominate one routine activity to perform mindfully	Definition of mindfulness Raising eating exercise Discussion
Introduction to formal mindfulness practice	To experience a formal mindfulness practice To understand that mindfulness practice can be formal or informal To understand that the five senses and cognitions can all be used as foci of attention in mindfulness practice To understand, experientially, the role of mind-wandering in mindfulness practice and how to direct attention mindfully	Formal body and breath awareness exercise Discussion on types of mindfulness practice and different foci for practice Overview of mind wandering and directing attention
Introduction to values	To understand definition of values and why they are important To understand how values are different to goals, needs and feelings To gain insight into key personal values	Definition of values Compass metaphor Future birthday exercise Values card sort Exercise Discussion
Introduction to values based actions	To understand ways that values can be lived in daily life To identify past and future values based actions	Definition of values based action Writing exercise values consistent and inconsistent actions and identifying new actions for this week Discussion
Home practice	Practice 1: Identifying three values based actions to be performed over next two weeks and noting experience	

	<p>Practice 2: Formal mindfulness practice: At least three times over next two weeks (5-20 min meditations provided on a website)</p> <p>Practice 3: Informal mindfulness practice: Nominating one routine activity to perform mindfully each day. Record experiences in diary.</p>	
Workshop 2		
Mindfulness practice	To bring attention to experience	Mindfulness exercise (breath and body)
Review of home practice	<p>To identify enablers and barriers to mindfulness practice</p> <p>To identify an additional routine activity to perform mindfully</p>	<p>Peer-to-peer discussion and whole-of-group review</p> <p>Identifying an additional routine activity to perform mindfully</p>
Mindfulness of thoughts	<p>To understand that we can be mindful of thoughts and this can help us notice and let go of unhelpful thoughts</p> <p>To experience noticing and letting go of thoughts in a formal exercise</p> <p>To communicate why the mind continually judges and problem solves from an evolutionary perspective</p>	<p>The Leaves on a Stream exercise</p> <p>Overview and discussion of the judgement mind</p> <p>Passengers on the bus metaphor</p>
Defusion	<p>To understand concept of fusion and defusion with thoughts</p> <p>To identify personal habitually unhelpful thoughts</p> <p>To practice defusing from thoughts using exercises</p>	<p>Writing exercise of hot thoughts</p> <p>Defusion exercise “I notice I’m having the thought”</p> <p>Discussion of experience</p>
Experiential avoidance	<p>To understand typical responses to strong emotions (avoid or control)</p> <p>To understand concept of experiential avoidance and acceptance</p> <p>To experience opening up to emotions</p>	<p>Overview of typical responses to strong emotions</p> <p>Experiential exercise – physicalizing strong emotions</p>
Choice Point introduction	To understand the choice point tool as a way to use mindfulness, defusion, acceptance, values and values based action in real time in daily life	<p>Introduction of Choice Point Tool</p> <p>Writing exercise identifying an ongoing stressful situation and application of Choice Point to this situation</p>

Home practice	<p>Practice 1: Apply skills to stressful situation identified in Choice Point exercise</p> <p>Practice 2: Formal mindfulness practice: At least 10 minutes 2 x a week</p> <p>Practice 3: Informal mindfulness practice: Nominating one routine activity to perform mindfully each day. Record experiences in diary.</p>	
Workshop 3		
Mindfulness practice	To bring attention to experience	Exercise incorporates: Breath, body and notice three things can hear and see)
Review of home practice	<p>To further clarify enablers and barriers to ongoing mindfulness practice</p> <p>Use of Choice Point skills in daily life</p> <p>To share experiences with peers</p>	Peer-to-peer discussion and whole-of-group review
Review of content	To review types of mindfulness practice, choice point , defusion and acceptance	<p>Summary of skills</p> <p>Group discussion</p>
Observer self/Self as context	<p>To gain understanding of role of observer self with chess board metaphor</p> <p>To gain first-hand experience of the observer self</p>	<p>Chess board metaphor</p> <p>Self as context experiential exercise and discussion</p>
Review of values	<p>To review values and values based action content</p> <p>To link values and goals</p>	<p>Summary of values</p> <p>Exercise: ‘Looking back from future” at achievements and values</p> <p>Goals and values writing exercise</p>
Reflection and future commitment	<p>To allow individuals to reflect on what they haven’t learned</p> <p>To set goals for commitment to practices</p>	Self-reflection and writing; peer discussion

Appendix C - Validating single-item measures in Study 4 (Chapter 7)

In order to validate the single-item measures used in this study, as well as estimate their reliability and test-retest reliability, the single-item measures were regressed against the following multi-item measures of the same constructs:

Cognitive defusion was measured with the 13-item Cognitive Fusion Questionnaire, rated on a 1 (*never true*) to 7 (*always true*) Likert scale (Gillanders et al., 2014). This scale was reversed coded to represent a measure of cognitive *defusion* (Gillanders et al., 2014). Sample items include “I struggle with my thoughts” and “I tend to get very entangled in my thoughts”. Cronbach’s alpha for this scale was $\alpha = .93$.

Acceptance was measured using the 7-item Acceptance & Action Questionnaire (AAQ) II (Frank W Bond et al., 2011), which has a 1 (*never true*) to 7 (*always true*) Likert scale. Sample items include “I am afraid of my feelings” and “worries get in the way of my success”. This scale displayed good internal consistency with $\alpha = .90$.

Approach coping was measured using the active coping subscale of the COPE Inventory (Carver et al., 1989). Each subscale was composed of four items, rated on a 1-5 Likert scale (“*I did not do this at all*” to “*I did this a lot*”). Sample items included “I took direct action to get around the problem” and “I did what had to be done, one step at a time.” Cronbach’s alpha for this scale was .75.

Avoidance coping was composed of the behavioral disengagement, self-distraction and denial subscales of the COPE Inventory (Carver et al., 1989), following similar approaches by Cook & Heppner (1997), Deisinger et al. (1996), Lyne & Roger (2000) and Stowell et al. (2001). Each subscale contained four items rated on a 1-5 Likert scale (“*I did not do this at all*” to “*I did this a lot*”). Sample behavioral disengagement items were “I gave up the attempt to get what I want” and “I reduced the amount of effort I put into

solving the problem”; sample self-distraction items were “I turned to work or other activities to take my mind of things” and “I went to the movies or watched TV to think about it less”; and sample denial items were “I acted as though it hadn’t happened” and “I pretended that it hadn’t really happened.” Cronbach’s alpha for this scale with the present sample was .81.

New general self-efficacy scale (G. Chen et al., 2001). This scale is made up of eight items scored on a 5-point Likert scale from *strongly disagree* (1) to *strongly agree* (5). Sample items include “I will be able to achieve most of the goals that I have set for myself” and “Even when things are tough, I can perform quite well”. This scale displayed good internal consistency among the present sample ($\alpha = .91$).

I regressed each single-item scale onto its multi-item version of the same construct, using multi-level models (following Brown & Ryan, 2003). ‘Time’ was included as a random factor in each model to account for the effects of within-subjects variation in each single-item measure upon each multi-item scale. As shown in Table 1, all single-item measures except for ‘acceptance’ predicted their multi-item counterpart, with highly significant small-to-medium-sized effects.

A significant caveat with this approach, however, was that several of the multi-item scales measured global traits (i.e., present-moment awareness, cognitive defusion and acceptance). Global trait measures of constructs have been shown to have only modest correlations with context-specific versions of the same construct (e.g., Shikai, Nagata, & Kitamura, 2014). Moreover, the multi-item measures of coping were administered in relation to monthly stressors, while the single-item measures were administered in relation to daily stressors. This again brings problems of bias associated with the same construct measured over different time-frames (Stone et al., 1998).

Second, as an indication of scale reliability, I compared the portion of within-subjects versus between-subjects variation in each single-item measure. Between-subjects variation, indicated by the intraclass correlation coefficient, ρ , provides an indication of the extent to which each measure captures individual differences in the construct it is measuring (Singer, 1998). This analysis (see Table 1) indicated that between 18% and 27% of variation in the single-item measures was due to individual differences. Given that each of these measures is highly situationally-contingent, these levels of between-subjects variation are as-expected, suggesting that these measures capture a small but substantial amount of variation due to individual differences.

Finally, I calculated test-retest reliabilities for each of the single-item measures by first calculating mean scores for each of the four data-collection waves, for each study variable. I then calculated bivariate correlations between these four different mean scores, for each variable. Lastly, I calculated a mean bivariate correlation for each variable, to generate test-retest reliability estimates, shown in Table 1. I anticipated relatively low test-retest reliabilities for study variables due to their highly situational (and therefore variable) nature, especially the variable related to affect (stress-related threat appraisal). The estimates in Table 1 confirm this, with test-retest reliabilities of around .50 for all scales, except for threat appraisal which was closer to .40.

Table 1

Standardized fixed effects of single-item measure on multi-item scales, intraclass correlations coefficients and mean test-retest reliabilities for each single-item measure

	Validating single-item with multi-item measures					ICC(1)	Mean test-retest reliabilities
	β	SE	df	t-value	p-value		
Acceptance	0.11	0.04	3.90	2.65	0.058	0.263	0.55
Cognitive defusion	0.21	0.04	3.77	4.93	0.009	0.214	0.53
Approach coping	0.11	0.04	649.00	2.91	0.004	0.187	0.47
Avoidance coping	0.16	0.04	651.00	3.93	< 0.001	0.214	0.56
Self-efficacy appraisal	0.21	0.04	649.00	5.61	< 0.001	0.194	0.49
Threat appraisal						0.181	0.41
Event controllability	-	-	-	-	-	0.231	

Note: The single-item measure of acceptance was regressed on the Acceptance & Action Questionnaire II; the single-item measure of cognitive defusion was regressed on the Cognitive Fusion Questionnaire, and the estimate reversed; the single-item measures of approach and avoidance coping were regressed respectively on the 'Active coping' and 'Mental disengagement' subscales of the COPE Inventory; while the single-item measure of self-efficacy was regressed on the New General Self-Efficacy Scale. 'ICC' = Intra-class correlation coefficient.

Together, these analyses suggest that the single-item measures were reasonably reliable and valid measures of their respective constructs, notwithstanding the fact that a) they were measuring constructs that are highly situation-contingent (and therefore variable within-individuals) and b) they were validated against either global or monthly measures of the respective constructs in all cases.