

2011

A review of the relationships between mindfulness, stress, coping styles and substance use among university students

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Recommended Citation

Thomas, C. (2011). *A review of the relationships between mindfulness, stress, coping styles and substance use among university students*. Retrieved from http://ro.ecu.edu.au/theses_hons/33

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A Review of the Relationships between Mindfulness, Stress, Coping styles and Substance
Use among University Students.

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A Review Submitted in Partial Fulfilment of the Requirements for the Award of
Bachelor of Science (Psychology) Honours,
Faculty of Computing, Health and Science,
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Submitted October 2011

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Abstract

Adaptive coping and self-regulation are critical for students' academic and professional development. Mindfulness meditation and mindfulness based programs present a promising option for those wishing to reduce stress and anxiety levels, improve self-regulation and coping strategies and or reduce the need for substance use. This paper sought to review the literature concerning the relationship mindfulness has with stress, coping styles and substance use in student populations. Proposed models and mechanisms of mindfulness are initially considered and reperiencing is identified as a prime mechanism through which mindfulness operates. Studies concerning stress reduction in student populations through mindfulness based programs are considered and a theoretical account of how mindfulness is believed to reduce stress and anxiety is provided. Mindfulness and its association with different coping strategies and styles is considered and it was found higher mindfulness predicts the use of more adaptive, approach coping and less avoidant and emotional coping. Further, mindfulness was found to assist with students wishing to reduce their alcohol and or tobacco use. These findings, along with the myriad of other physical and psychological health benefits present mindfulness as an effective way for students to alleviate stress, improve coping styles and reduce substance use.

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Acknowledgements

I would firstly like to sincerely thank my supervisors Dr David Ryder and Dr Mary Flaherty for their support, guidance and willingness to assist me with this project. Your knowledge and expertise are truly great. I would also like to thank Dr Andrew Guilfoyle, Dr Jennifer Loh and Dr Guillermo Campitelli for their timely assistance in the last few weeks prior to the projects submission. I wish you all the very best of luck, health and happiness.

To Francoise Sandow, although distance separated us, the inspiration I derived from your academic success kept me persistent and determined. You are a rare and precious jewel.

I would also like to express my gratitude to all my family and friends, for supporting and encouraging me through such a critical and challenging time. Above all else, I would like to thank my parents Geoffrey Thomas and Annie Greive, for all your monumental help, council, encouragement and love. Thank you.

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A Review of the Relationships between Mindfulness, Stress, Coping styles and Substance Use among University Students.

It is consistently evidenced by research investigating student populations that college/university lifestyle is stressful. Li and Boey (2002) have conceptualised college stress as the product of academic hassles, personal problems and negative life events. Indeed, if the adaption to and maintenance of university life coincides with the transition of adolescence to adulthood then this stress may be intensified (Palmer & Rodger, 2009). Additionally, during this time, students will also negotiate changes and developmental milestones such as interpersonal relationships with family and peers, formation of political, religious, spiritual and/ or world views and identity (Kegan, 1998; Leftkowitz, 2005) on top of a demanding academic curriculum (Shapiro, Schwartz & Bonner, 1998).

Stress among university students can result in a number of negative consequences. Stress and anxiety are seen to precipitate procrastinating behaviours, whereby students deliberately delay the completion of work. Procrastination has been shown to result in decrements in quality and quantity of school work (Schraw, Wadkins & Olafson, 2007). Stress can also impact students' personal and professional lives. For example, stress has been shown to negatively effect emotional, physical and spiritual well being in student populations (Shapir et al., 1998). Stress has been identified as a main factor leading to substance use among medical students (Johnson, Michels & Thomas, 1990) and has further been linked to increases in depression and suicide (Salt, Nadelson & Notman, 1984; Richings, Khara & McDowell, 1986). The management of stress in this context is critical, as many of the outcomes from the challenges students face will have lasting and shaping influences on their lives (Palmer & Rodger, 2009).

University students, to manage the stress of university life, employ an array of coping strategies, utilising combinations of coping strategies, pending on factors such as time,

competence and perceived stress levels (Tice & Baumeister, 1997). Substance use is an example of an emotion-focused/ avoidance coping mechanism used by university students. The popularity of this coping strategy is reflected in the high rates of illicit drug use, alcohol consumption and tobacco smoking among university students (Adalf, Demers & Gliksman, 2005). This is a concern for student populations as many of the coping strategies learned throughout tertiary education will shape and impact graduates' academic and professional lives (Shapiro et al., 1998). If, for example, drinking becomes the primary coping strategy students use to alleviate stress, academic behaviours are likely to become dysfunctional and performance will suffer (Windle & Windle, 1996). However, students can and do use coping strategies that are more beneficial to overall health.

Meditation and other mindfulness training present a coping strategy that yields positive physiological and psychological benefits. Mindfulness meditation, also known as Vipassana, is an ancient Buddhist practice designed to cultivate awareness (Goldstein, 1976). The development of mindfulness, often trained through regular meditation practice, involves the conscious and purposeful attending to and acceptance of cognitions, emotional states and external experiences without elevating or judging these experiences (Kabat Zinn, 1990; Segal, Williams & Teasdale, 2002). By doing so, one creates a mental space where one is better able to skilfully respond to intrusive thoughts or difficult situations, rather than react impulsively or reflexively via habitual patterns of associated meaning, emotion or behaviour (Bishop, 2002; Shapiro, Carlson, Astin & Freedman, 2006; Vidrine, et al., 2009). Importantly, mindfulness-based programs designed to alleviate stress have demonstrated success in student populations (Astin, 1997; Chang et al., 2004; Shapiro et al., 1998). Mindfulness-based treatments have also demonstrated effectiveness in dealing with substance use disorders (SUDs) in clinical and community populations (Zgierska, Rabago, Chawla,

Kushner, Koehler & Marlatt, 2009) and this has particular relevance for students who use substances to deal with academic pressures.

The purpose of this paper is to review the literature concerning mindfulness and its relationships with stress, coping styles and substance use. This review has begun with a brief background on the topics of interest and an explanation of its relevance to university students. From here, a more detailed account of the current models and proposed mechanisms of mindfulness will be given. Then, studies supporting current theory on the relationship between stress and mindfulness will be reviewed. Next, the same will be done for mindfulness and coping styles and finally, for mindfulness and substance use.

Models and mechanisms of Mindfulness

Mindfulness meditation has been regarded as the ‘heart’ of Buddhist tradition (Kabat-Zinn, 2003). It has been practised for over 2500 years by Buddhist monastics in order to cultivate awareness and insight (Hahn, 1976). Mindfulness involves “paying attention in a particular way: on purpose, in the present and non-judgmentally” (Kabat-Zinn, 1994, p.4). To elaborate, it requires one to remain intentionally aware of the internal (thoughts, feelings and sensations) and external stimuli that dovetail to create present moment experience, without labelling, judging, evaluating or becoming too identified or pre-occupied with this experience (Kabat-Zinn, 2003). Additionally, it has been emphasised that the quality of attention one brings to the present moment must embody impartiality, compassion and acceptance of self and others, gentleness, openness, kindness and curiosity (Kabat-Zinn, 1993). These qualities are cornerstones to Buddhist philosophy and cautions have been given regarding the stripping of mindfulness of these critical qualities (Childs, 1997; Rosenbaum, 2009).

The use of meditation to cultivate mindfulness has been said to be analogous to the use of scaffolding in the construction of a building (Shapiro et al., 2006); meditation

systematically develops the capacity to be mindful through its simple, structured deployment of attention and awareness (Carmody, 2009). Continued and consistent practise of mindfulness through meditation has been said to lead to a number of insights, facilitating a shift in perspective of the self and of experience itself. Sustained, non-judgmental observation of one's thoughts, emotions and bodily sensations without automatically responding or reacting to them in habitually conditioned ways creates a mental 'breathing space' (Kabat-Zinn, 2003; Shapiro et al., 2006). In this space, judgments about thoughts, feelings and sensations, their associated meanings and learned/habitual behaviours are suspended and reconsidered. This cognitive skill has been named 'reperceiving' by Shapiro et al. (2006) and as 're-cognition' by Carmody (2009).

Re-cognition/ reperceiving has featured as a prime mechanism in proposed models of mindfulness. Carmody (2009) argues that the skill of re-cognition and the perceptual shift can facilitate highlights the aspect of attention as a parsimonious starting point from which to base the development of mindfulness models. As the basis for his proposition, Carmody cites Damascio (2003) in describing a mental cycle that occurs automatically when attention is not intentionally directed. The cycle is initiated and maintained by attention highlighting a particular component of experience, then evoking habitual and conditioned responses that are associated with that component. Carmody (2009) explains that this cycle can remain in place until it is disrupted with the intentional redirection of attention (as is done in reperceiving).

Carmody (2009) recommends the use of an attention based model for a number of reasons. He notes that an attention based model would allow for the measurement of how influential constructs like compassion are, above and beyond the effects of attention training. Indeed, the need for dismantling studies to investigate the multiple pathways mindfulness impacts well being, has been a strong echo through recent publications (Zgierska et al., 2009; Baer, 2003). He then suggests that in clinical settings, mind-body interventions with a focus

on attention without such unfamiliar concepts would be more accessible and digestible for patients. This attention focused approach has been cautioned by a number of authors (Childs, 2007; Kabat-Zinn, 2003; Rosenbaum, 2009), who suggest that ignoring or removing essential concepts such as non-judgmentalness, kindness or present moment experience, will result in a distorting or diluting of the potentially transformative effects that a mindful approach to life and moment to moment experience can provide.

In line with this position, Shapiro et al. (2006) proposed a model including three major axioms: intention, attention and attitude (IAA). They explain that the three axioms directly reflect the most commonly cited definition of mindfulness: purposeful (intention) attention (attention) in a particular way (attitude) in the present moment (Kabat-Zinn, 1994). Shapiro et al. (2006) explained that for Buddhists, *intention* represented the journey of enlightenment and compassion for all living things. They cite previous work (Shapiro, 1992) that demonstrated the intentions of meditators' shift along a continuum with continued practise; from self regulation to self exploration and finally to self-liberation. Shapiro et al.'s (2006) model also included the axiom of *attention* (the moment to moment observation of internal and external stimuli) and *attitude* (the quality one brings to attention). The essential qualities that make up one's attitude in this context are foundational to Buddhist philosophy and include kindness, patience, acceptance, compassion, non-striving and non-judgmental openness and curiosity toward experience (Childs, 1997; Kabat-Zinn, 2003; Rosenbaum, 2009).

Shapiro et al. (2006) posit that the state of mindfulness is a moment to moment cyclic process where these three axioms (intention, attention and attitude) are working and interacting in concert with each other, and to neglect any one of these aspects would result in some *thing* that is not mindfulness. They hypothesise that the three axioms account directly and indirectly for a large portion of transformations and changes consistently found (Baer,

2003; Zgierska et al., 2009) in mindfulness studies. Further, they highlight reperceiving as the prime mechanism overarching four other direct mechanisms that lead to well being.

The first mechanism stemming from the skill of reperceiving reported on by Shapiro et al. (2006) is improved self-regulation and self management. They reason that, given present moment awareness and reperceiving disrupts conditioned, automatic reactions to events or provocative stimuli, one is afforded the mental space necessary to consciously choose to respond or self-regulate in adaptive and healthy ways. The positive association between mindfulness and self-regulation has been consistently observed in studies examining mindfulness and coping styles. Walach, Nord, Zier, Dietz-Waschkowski, Kersig and Schupbach (2007), in their testing of the Coping with Stress Questionnaire (SVF-120), found a group of employees who were delivered a brief mindfulness based program exhibited a significant increase in positive coping strategies when compared to a no mindfulness control group. Brown and Ryan (2003), in their research developing the Mindfulness Awareness Attention Scale (MAAS), demonstrated in an experience sampling study that both trait and state mindfulness as measured by the MAAS, significantly predict greater self-regulated behaviour and positive affect.

The second mechanism recognised to stem from reperceiving by Shapiro et al. (2006) is values clarification. They explain that reperceiving assists individuals to see clearly what is meaningful and valuable to them and allows them to respond to situations in ways that are consistent with these values. Consistent with Self Determination Theory, being able to act in accordance with one values and beliefs (Deci & Ryan, 2000) is an important part of reperceiving (Shapiro et al., 2006). Brown and Ryan (2003) findings support this; in their study, participants scoring higher on the MAAS behaved in ways that were more autonomous and consistent with their values and interests.

Inherent in cognitive, affective and behavioural regulation is the ability to be adaptive and flexible in one's choice of responses. Cognitive, affective and behavioural flexibility, Shapiro et al.'s (2006) third proposed mechanism of change, is reasoned to be born from re-perceiving in that it allows one to suspend and reconsider previously rigid, reflexive and automatic patterns of reacting, therefore allowing one to consider and act upon more adaptive courses of action. This assertion is consistent with research on attentional processing and affect regulation (Baumeister, Heatherton & Tice, 1994; Thayer, Friedman & Borkovec, 1996) demonstrating that effortful redirection of attention, also known as flexible disengagement, is a crucial element of psychological health and is mediated through its influence on cognitive and behavioural regulation.

The last mechanism believed to stem from re-perceiving proposed by Shapiro et al. (2006) is exposure. They reason that through sustained observation the content of the mind without labelling, judging or reacting to it, one undergoes a form of desensitisation whereby one learns that previously feared components of experience are not overwhelming, do not necessitate the enacting of avoidance behaviours, and will eventually pass out of conscious awareness (Kabat-Zinn, 2003). Ultimately, such constant exposure to the contents of the mind will result in the extinction of fear based reactions such as avoidance coping (Breslin, Zack & McCain, 2002). Indeed, this aspect of mindfulness has been compared to interoceptive exposure treatments designed for a variety of disorders in clinical settings (Barlow & Craske, 2000). Through these proposed mechanisms, mindfulness practice can reduce perceived stress and improve coping strategies.

Mindfulness, stress and anxiety.

Definitions of stress have included both the labelling and judging of events as well as the assessment of one's ability to deal with the event. Winterowd et al. (2005) cite Beck

(1999) when defining stress as “feeling overwhelmed or unable to handle or deal effectively with people or events in one’s life” (p.516). Lazarus and Folkman (1984) have defined stress as the “relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being” (p.19). It is important to note the distinction made here in that the events or situations in people’s lives are not themselves inherently stressful. It is an individual’s *primary appraisal* of an event or situation (i.e., labelling/judging it as either good, bad or neutral, threatening or challenging) in conjunction with their *secondary appraisal* of perceived coping resources (i.e., availability and relevance of one’s coping strategies and or resources) that determines *how* they experience the event or situation (Lazarus & Folkman, 1984).

Mindfulness, through the skill of re-perceiving, promotes a more willing receptivity to challenging events and experiences as they occur (Kabat-Zinn, 1994). This reduces the likelihood that negative cognitive appraisals will be made and increases the chance of events and experiences being seen as benign, neutral or challenging (Breslin et al., 2002). Evidence for this line of reasoning has been found by Brown, Ryan, Creswell and Neimeic (2008), who found through functional magnetic resonance imaging (fMRI) that mindfulness predicts more benign social threat responses. Mindfulness also builds tolerance to provocative stimuli and events, creating new, more adaptive conditioned responses to negative affect (Kabat-Zinn, 2003). Davidson et al. (2003) demonstrated, also using fMRIs, that mindfulness meditation is associated with greater left sided anterior activation; an area of the brain that is linked to adaptive responding to negative events.

An inverse relationship between perceived stress and mindfulness is demonstrated consistently by many studies. Perhaps the most well known studies demonstrating reductions in stress and anxiety are those conducted by Kabat-Zinn and colleagues using the Mindfulness Based Stress Reduction (MBSR) program. The MBSR program is run with

groups of up to 30 participants who meet once a week for two and a half hours for 8 to 10 weeks. The program includes mindfulness based skills such as sitting meditation and body scan, as well as other techniques such as Hatha yoga postures and stretches (Kabat-Zinn, 1994) believed to increase certain facets of mindfulness.

A wealth of research conducted through the last 20 years suggests that Kabat-Zinn's (1990) MBSR program is effective in the treatment of a range of physical and psychological ailments in clinical and community populations. A number of early studies of MBSR, report program completers to have significantly reduced their chronic pain levels, psychological symptoms and other medical symptom severity (Kabat-Zinn et al., 1992; Kabat-Zinn, Lipworth & Burney, 1985 Kabat-Zinn, Lipworth, Burney & Sellers, 1987; Randolph, Caldera, Tacone & Greak, 1999). However, many authors (Baer, 2003; Bishop, 2002; Carmody, 2009; Zgierska et al., 2009) have noted methodological shortcomings in these studies, such as lack of control groups and randomisation, and have emphasised the need for randomised control trials comparing manualised mindfulness based interventions against control groups and other well-established interventions.

Recent research has shown MBSR to be effective in reducing negative affect and psychological symptoms as well as increase positive humanistic qualities in student populations. In their study of college students, Astin (1997) randomised 19 participants to either an MBSR condition ($n = 12$) or a wait list control ($n = 7$). Results indicated that those completing the MBSR program significantly increased their scores on empathy and spirituality indexes, as well as significantly decreasing severity of physical and psychological symptoms. Astin's (1997) study did not however include any measures of mindfulness and suffered from an insufficient sample size.

Shapiro et al. (1998) investigated the effects of an MBSR program for a moderately sized sample ($n = 73$) of medical and pre-medical students. They used a between group

design, randomising 78 participants to either an MBSR condition ($n = 36$) or a wait list control. Their post hoc analysis revealed that those completing the MBSR program, compared to the control, reported significantly less state and trait anxiety, depression and symptom severity as well as significant increases on measures for empathy and spirituality. This study addressed common methodological limitations to mindfulness research. The two studies cited here both show students to be receptive to the benefits mindfulness based programs have to offer.

Mindfulness and coping styles

Coping strategies refer to the repertoire of cognitive-affective regulatory strategies that an individual possesses. Coping strategies are seen to operate by manipulating one's physical, psychological and behavioural responses to stressful events (Weinstein, Brown & Ryan, 2009). Lazarus and Folkman (1984) define coping as the "changing thoughts and acts an individual uses to manage the external and or internal demands of a specific person-environment transaction that is appraised as stressful" (p.34).

Broadly, coping strategies have been separated into either approach or avoidance type strategies (Roth & Cohen, 1986). Stowell, Kiecolt and Glaser (2001) have described approach coping as involving attention and effort directed toward the event that has been deemed stressful. Examples of approach coping include: acting directly on or working through a stressful event and cognitive re-appraisals to build acceptance. Similarly, task-oriented coping (Lazarus & Folkman, 1984) has been described as the purposeful altering of a demanding or stressful situation through increased effort, planning and/or situation appraisal management. Approach and task-oriented coping are considered an adaptive style of coping, where as avoidant coping is not. Avoidance coping has been described as a defensive and maladaptive style of coping, involving the psychological and or behavioural

ignoring, escaping and distorting of stressful events (Roger, Jarvis & Najarian, 1993). Two examples of avoidance coping include procrastination, as discussed earlier, and thought suppression, which is the deliberate blocking or escaping of undesirable cognitive-affective events (Stowell et al., 2001). Lazarus and Folkman (1984) have described avoidance coping strategies as aimed at distracting or disengaging oneself from such a stressful situation with enjoyable activities.

Roger et al. (1993) have further distinguished coping into four distinct styles. Roger et al. (1993) and Elklit (1996) tested the empirical validity of the Coping Styles Questionnaire (CSQ) using factor analysis and found four clusters of items in their terminal solutions. These item clusters represented rational, detached, avoidant and emotional coping styles. Expanding on the classification seen above, strategies aimed at manipulating and distorting the way one feels about an event or situation are classified as emotion-focused (Roger et al., 1993). Both avoidant and emotional coping are considered maladaptive (Elklit, 1996). Rational coping concerns action-based, problem solving strategies and is considered an adaptive style. A detached coping style includes strategies and beliefs that create cognitive distance and independence between oneself and a stressor (Elklit, 1996).

It has been hypothesised that mindfulness meditation facilitates use of more adaptive coping through a number of avenues. Shapiro et al. (2006) explain that through the skill of re-perceiving, one is able to take the time to consider an experience or event objectively without activating negative affective states associated with the event. This enables one to choose to respond in a self-regulatory and solution focused manner as opposed to reacting reflexively with habitual coping mechanisms. This accordingly improves one's cognitive-behavioural flexibility and reduces one's reliance on behavioural automaticity and emotional reactivity. It has been argued also that re-perceiving allows one to consider a much larger range of coping resources or strategies as well. Baer (2003) suggests that sustained objective

observation of painful or distressing events facilitates the use of a greater variety of coping strategies through increased awareness and tolerance of these sensations. This sustained exposure to provocative events without reacting to them, counteracts pre-existing conditioned avoidance coping behaviours (Breslin et al, 2002).

A number of recent studies have investigated the relationship between mindfulness and coping styles. Marcus, Fine and Kouzekanani (2001) examined the effects of a standard MBSR program on psychological symptom severity and coping styles for 36 residents of a therapeutic community (TC). At the end of the 8 week program, the only significant group difference found was the MBSR group ($n = 18$), when compared to the standard of care (SOC) control group, reported using more self-controlling coping strategies.

Tacon, McComb, Caldera and Randolph (2003) investigated the effects of a standard MBSR program on women with heart disease, taking measures for anxiety, emotional expression and coping styles. Tacon et al. used their own Problem Focused Styles of Coping (PF-SOC; Tacon et al., 2003) to measure differences in coping styles. The PF-SOC splits coping styles into three dimensions: 1) reflective/thoughtful, 2) impulsive/reactive and 3) suppressive/controlling. At the end of the 8 week program, their MBSR group showed significant decreases in state anxiety and the tendency to suppress and control emotional expression, however, the only significant difference found on coping styles was for the impulsive/reactive scale; The MBSR group demonstrating a significant decrease compared to the control. This difference in reactive and impulsive coping, as well as increases in self controlling coping seen above, is consistent with aforementioned explanations of the relationship between mindfulness and coping provided by Baer (2003), Carmody (2009) and Shapiro et al. (2006).

A mixed qualitative and quantitative study by Walach et al. (2007) investigated the use of a standard MBSR program within a personal development workplace. They conducted

formal interviews and also took quantitative measures for locus of control, subjective workplace experience, compliance, satisfaction and coping styles (Coping with Stress; SVF-120, Janke & Erdmann, 1997). The SVF-120 includes six items for each of 10 different positive strategies, six negative and four neutral strategies. Walach et al. (2007) found that the MBSR group reported using significantly more positive coping strategies and fewer negative strategies, when compared to a wait list control. Further, the interviews with participants revealed that coping strategies such as approaching superiors for help, not immediately panicking, taking time before responding to phone calls and not carrying over problems from work into family life were characteristic of the changes found in the MBSR treatment group. Additionally, as measured directly after the MBSR program, 82% of participants reported having attained personal goals which they had set for themselves before the program began and thought that the program was effective in improving coping skills within the work place.

A number of recent studies have also examined the relationship between mindfulness and coping styles within student populations. Weinstein et al. (2009) conducted four studies investigating the role of mindfulness on cognitive appraisals of and coping with stress as well as the consequences of different styles of processing and coping. Study one, using a single laboratory based stress induction session, demonstrated that more mindful individuals (as measured by the MAAS; Brown & Ryan, 2003), reported less perceived stress and faster recovery time after a stress inducing arithmetic exercise, than those with lower mindfulness. Further, more mindful individuals also reported using less avoidant coping but not more approach coping. Weinstein et al.'s (2009) second study, using a longitudinal design, showed that in a one month period more mindful individuals reported lower overall perceived stress and perceived event-related stress, perception of fewer stressors and the use of fewer avoidant coping strategies and more approach strategies. Study three demonstrated that more mindful

individuals use more adaptive cognitive processing of stress, more approach coping and less avoidance coping strategies. Study four provided evidence that more mindful individuals are more likely to interpret future events as benign, or challenging as opposed to threatening. The results from Weinstein et al.'s (2009) studies, while not experimental in design, did consistently show higher mindfulness levels in students to predict more approach coping and less avoidant coping across longitudinal, cross sectional and diary based designs. Further, they demonstrated these effects consistently after controlling for personality variables of optimism and neuroticism, supporting their hypothesis that mindfulness has unique effects on stress and coping, not accountable for by variation in personality traits.

Another recent study investigating the relationships between stress, coping and mindfulness among university students was conducted by Palmer and Rodger (2009). They delivered a single package of measures including the MAAS (Brown & Ryan, 2003) for mindfulness, the PSS (Cohen, Kamaarack & Mermelstein, 1983) for perceived stress and the Coping Styles Questionnaire (CSQ; Roger et al., 1993) to 1,200 students. From the 135 returned and completed questionnaire packages (13.4% response rate), higher mindfulness scores were associated with lower perceived stress and the use of more adaptive (rational and detached) coping styles and less maladaptive (emotional and avoidant) coping styles.

Palmer and Rodger's (2009) results support the discussion above regarding the pathways through which mindfulness influences coping styles; re-perceiving facilitates the ability to create mental distance from a provocative event (detached coping) and therefore allows a more informed and objective decision (rational coping) to be made in response. Further, while this process is occurring, the tendency to automatically process information as negative, threatening or stressful is disrupted and the associated negative affect is likewise halted (Breslin et al, 2002; Shapiro et al., 2006). This then reduces the need to emotionally react (emotional coping) and/or avoid (avoidance coping) the experience (Weinstein, Brown

& Ryan, 2009). Palmer and Roger's study did however find a positive correlation between perceived stress and rational coping as well as a weak negative correlation between rational coping and avoidance coping. These findings do not support the CSQ's classification of coping styles, which purport that rational coping predicts less perceived stress and is strongly negatively correlated with avoidance coping (Roger et al., 1993). Irrespective, research into mindfulness and coping styles shows that greater mindfulness relates to greater use of positive, task-focused coping strategies and less use of avoidant and emotional coping strategies.

Mindfulness and substance use

A number of authors (Breslin et al., 2002; Shapiro et al., 2006) have drawn upon theoretical models of addiction, affect regulation and cognitive processing to explain how mindfulness influences observed differences in substance use and relapse. Negative affect is the most commonly cited factor in maintaining drug use and triggering relapse. The Negative Reinforcement Model of Relapse (Baker, Morse & Sherman, 1986) posits negative affect is the strongest motivating factor in continued drug use; individuals use drugs to desensitise themselves to/or avoid emotional states such as anxiety and depression. This then bleeds into Self Medication Hypothesis (Khantzian, 1985), which suggests individuals use substances as a means to escape unpleasant experiences or maintain pleasurable ones. It has been argued by a number of researchers (Baer, 2003; Breslin et al., 2002; Shapiro et al., 2006) that mindfulness reduces the need individuals experience to escape or avoid negative affect through reducing this negative affect and increasing positive affect. In fact, it has even been noted that for current or ex-substance users, mindfulness meditation may serve as a drug replacement behaviour as it induces the same emotional states (relaxation/positive affect) as some drugs do (Fernandez et al., 2010).

Tiffany's Cognitive Processing Model of Addiction (1990) is another commonly cited theory in explanations of the relationship between mindfulness and substance use. Tiffany's (1990) theory suggests that routines and behavioural scripts involving drug use become automatised over time and difficulty refraining from continued use or relapse comes from the inability to disrupt these automatic behavioural routines. Consistent with this theory is the Dual Process Model of Addiction (Wiers et al., 2007), which states addictive behaviour is maintained by automatic processes but conscious controlled cognitive processes will disrupt and reduce it. Mindfulness has been suggested, through the skill of re-perceiving, to disrupt automatically conditioned emotional and behavioural responses (routines and scripts) to provocative stimuli (drug use triggers), allowing an individual to then act in a more self-regulated way (Baer, 2003; Carmody, 2009; Shapiro et al., 2006). Although it has been noted that the relationship between mindfulness and substance use is not yet clearly understood (Fernandez, Wood, Stein & Rossi, 2010), some studies have begun to investigate substance use and correlates with the different facets of mindfulness.

MBSR has been utilised in the treatment of substance use by a number of recent studies. Virdrine et al. (2009) investigated the efficacy of an MBSR program on smoking cessation in a community sample ($n = 158$), taking measures for smoking, smoking withdrawal severity, self-efficacy, affect regulation and mindfulness. This study stands as unique, in that mindfulness was measured using both the MAAS (Brown & Ryan, 2003) and the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith & Allen, 2004). The MAAS primarily measures the 'acting with awareness' facet of mindfulness (Fernandez et al., 2010; Weinstein et al., 2009) but the KIMS taps four subscales: 'acting with awareness', 'observing', 'describing' and 'accepting without judgement'. Participants were randomised to either the MBSR condition or a standard of care control group. Virdrine et al. (2009) found that mindfulness was negatively related to level of nicotine dependence and withdrawal

severity and was positively related to self efficacy. Interestingly, the MAAS and the KIMS yielded a nearly identical pattern of scores across all measures except for the self-efficacy scale; the KIMS only positively associated with one of the three subscales for self-efficacy: Habitual/Craving Situations.

A number of studies have investigated the efficacy of mindfulness based relapse prevention (MBRP) in treating SUDs. MBRP is an eight week manualised treatment where groups of participants attend weekly two-hour sessions incorporating guided mindfulness meditation, experiential exercises and discussions about the role mindfulness can play in preventing relapse. The first randomised control trial of MBRP was conducted by Bowen et al. (2009). One hundred and sixty eight adults with mixed SUDs who had recently completed a residential or outpatient treatment program were randomised to either a standard 8 week MBRP condition or to follow their treatment as usual (TAU). Measures for substance use, craving, related consequences, mindfulness (using the FFMQ; Baer et al., 2006) and acceptance were taken pre and post treatment as well as at 2 and 4 month follow ups. Bowen et al. (2009) found, compared to the TAU group, the MBRP group significantly improved on the measures for substance use, craving, awareness and acceptance. These findings were consistent with theoretical accounts on which processes are targeted by MBRP, however, there were no significant differences found between the different facets of mindfulness (observing, describing, non-judgment and non-reactivity) measured by the FFMQ.

Garland et al. (2010) conducted a randomised control trial assessing the efficacy of mindfulness oriented recovery enhancement (MORE) in a sample of 53 alcohol dependent adults. Participants were randomised to either MORE or an evidenced based alcohol support group (ASG) and measures were taken for psychosocial symptoms of alcohol dependence, mindfulness (using the FFMQ; Baer et al., 2006), treatment experience, psychophysiological cue reactivity and alcohol attentional bias before and after the ten week program. Garland et

al. (2010) found that the MORE group significantly reduced stress and alcohol related thought suppression when compared to the ASG control group. Further, mindfulness training resulted in decreases in attentional bias toward alcohol cues and improved heart rate variability recovery from alcohol related cues preceded by a stress induction. The authors reasoned that mindfulness training in the MORE condition was influential in de-automatising alcohol related scripts which in turn reduces attentional bias towards alcohol cues.

Another study examining the relationship between mindfulness and alcohol use that also used the FFMQ to measure mindfulness was conducted by Fernandez et al. (2010). They delivered a survey package to 316 college students, measuring alcohol use and related consequences and mindfulness. Fernandez et al. (2010) found alcohol use to be significantly negatively associated with the FFMQ subscales of 'act with awareness' and 'describe' and also that alcohol related consequences, even after controlling for alcohol consumption, were significantly negatively associated with the subscales 'describe' and 'non-judging'. The finding that different facets of mindfulness differentially predict alcohol consumption and alcohol related consequences is interesting as it suggests that some facets (act with awareness) may be more associated with reducing avoidance or emotion focused coping (alcohol consumption), other facets (non-judging) may relate more to consequential thinking (alcohol related consequences) and/or increasing rational coping.

Inconsistent with the aforementioned studies demonstrating greater mindfulness is associated with less substance use, is another cross sectional study of 123 college students conducted by Leigh, Bowen and Marlatt (2005). Leigh et al. (2005) tested the reliability and validity of the newly developed Freiburg Mindfulness Inventory (FMI) as well as taking measures for alcohol use, smoking status and spirituality. Using factor analysis, Leigh et al. extracted three factors for the FMI: 1) acceptance and openness to self and experiences, 2) mind/body awareness and 3) non-attachment to thoughts. They found FMI scores to be

significantly positively associated with smoking and binge drinking. Leigh et al. (2005) explain that this unexpected finding may be due to sample characteristics, in that participants may have been very in tune with mind/body awareness and use substances to maximise pleasurable experiences. Other publications (Fernandez et al., 2010; Rogojanski et al., 2011) have cited this finding but did not find mindfulness to be positively associated with substance use, however, these studies did not use the FMI to measure mindfulness.

Bowen & Marlatt (2009) conducted a mindfulness based intervention known as 'urge surfing' for college students who smoked. Participants in the treatment condition were instructed on how to cope with smoking urges mindfully after a cigarette cue exposure. It was found that those in the mindful 'urge surfing' condition smoked fewer cigarettes compared to a 'cope as normal' control over a 7 day follow up period. Rogojanski, Vettese and Antony (2011) conducted a follow up replication and expansion on this study. They randomised 61 students to either an 'urge surfing' condition or a 'thought suppression' control condition. Rogojanski et al. found, regardless of treatment condition, all participants reported improved self-efficacy and reductions in smoking quantity. This finding was surprising in that thought suppression strategies are the opposite of the acceptance aspect of mindfulness-based techniques such as urge surfing.

Conclusion

This paper aimed to review the literature concerning mindfulness and its relationships with stress, coping and substance use. Evidence suggests that mindfulness meditation and mindfulness-based treatments are effective at reducing physical and psychological symptom severity as well as improving aspects of positive affect, empathy, spirituality and increasing the use of more adaptive coping strategies. Authors theorise that the meta-cognitive skill of re-perceiving is a central and essential component of mindfulness, responsible for affecting

many of the positive outcomes observed in mindfulness studies. Further, improved self-regulation, cognitive and behavioural flexibility, exposure, values clarification, acceptance and relaxation have also been proposed as possible avenues through which mindfulness exerts its transformational influence.

Indeed, a number of measures of mindfulness exist that tap varying numbers of facets of mindfulness. However, there is a scarcity of research that replicates work using the same mindfulness measure under the same conditions, and so the inquiry into which facets of mindfulness are related to the differences in perceived stress, coping styles and substance use currently lacks solidarity. Irrespective, the evidence available concerning mindfulness in these contexts indicates that for students, improvements in mindfulness is related to decreased stress and the use of more rational, approach and detached coping styles and the use of less avoidant and emotional coping styles. Although mixed, research also suggests mindfulness levels to be important in predicting drinking and smoking behaviours in student populations.

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An Investigation of the Relationships between Mindfulness, Stress, Coping styles and
Substance Use among University Students

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A Report Submitted in Partial Fulfilment of the Requirements for the Award of
Bachelor of Science (Psychology) Honours,
Faculty of Computing, Health and Science,
Edith Cowan University

Submitted October 2011

I declare that this written assignment is my own work and does not include:

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Abstract

Mindfulness is known to influence levels of perceived stress, the types of coping styles individuals use as well as treatment outcomes for substance use reduction programs. In student populations however, the evidence supporting the relationships between mindfulness and these other variables is mixed. Therefore, the current research sought to replicate the work of Palmer and Rodger (2009) who investigated mindfulness, stress and coping styles (rational, detached, emotional and avoidant). Additionally, the current study took measures for alcohol use and smoking status in order to clarify mixed findings about mindfulness and substance use in student populations. In the present student sample of 134, mindfulness levels were associated with less perceived stress, the use of more rational and detached coping and the use of less emotional and avoidant coping. Further, the results show that higher mindfulness predicted individuals to drink less and to be either ex-smokers or have never smoked as opposed to being a current smoker. The results are considered in light of the fact the Mindful Awareness Attention Scale is primarily a measure of the acting with awareness facet of mindfulness. The results support previous work on mindfulness, indicating that greater mindfulness (and acting with awareness) are linked with reductions in stress and anxiety levels and quantity of substance use as well as the use of better coping styles.

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Acknowledgements

I would firstly like to sincerely thank my supervisors Dr David Ryder and Dr Mary Flaherty for their support, guidance and willingness to assist me with this project. Your knowledge and expertise are truly great. I would also like to thank Dr Andrew Guilfoyle, Dr Jennifer Loh and Dr Guillermo Campitelli for their timely assistance in the last few weeks prior to the projects submission. I wish you all the very best of luck, health and happiness.

To Francoise Sandow, although distance separated us, the inspiration I derived from your academic success kept me persistent and determined. You are a rare and precious jewel.

I would also like to express my gratitude to all my family and friends, for supporting and encouraging me through such a critical and challenging time. Above all else, I would like to thank my parents Geoffrey Thomas and Annie Greive, for all your monumental help, council, encouragement and love. Thank you.

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An Investigation of the Relationships between Mindfulness, Stress, Coping styles and Substance Use among University Students.

The transition for undergraduate students to university lifestyle is commonly understood to be stressful. College stress has been described as the product of academic challenges, personal issues and negative life events (Li & Boey, 2002). As many undergraduate students are also facing the developmental milestones that come with moving from adolescence to adulthood, the stress experienced through university work may be magnified (Palmer & Rodger, 2009). Stress in student populations has been shown to be associated with substance use (Johnson, Michels & Thomas, 1990), interpersonal difficulties and decrements in academic performance (Schraw, Wadkins & Olafson, 2007). Developing adaptive coping strategies to manage this stress is imperative for students, as the way one copes with stressors associated with tertiary education and training will shape one's coping style, which will then determine how one continues to manage stress in their professional life (Shapiro, Schwartz & Bonner, 1998).

Stress has been defined by Lazarus and Folkman (1984) as a "relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p.19). They go on to define coping as the "changing thoughts and acts an individual uses to manage the external and or internal demands of a specific person-environment transaction that is appraised as stressful" (p.34). Task-focused and approach coping is aimed at deliberately altering a demanding or challenging situation through increased effort, planning and/or situation appraisal management. Emotion-focused/ avoidance coping strategies, on the other hand, are aimed at distracting or disengaging oneself from such a situation, usually with enjoyable activities (Grzywacz & Almeida, 2008; Lazarus & Folkman, 1984). Roger, Jarvis and Najarian (1993) have further distinguished coping styles as being either detached, rational, avoidant or

emotion-focused. University students employ an array of coping strategies, utilising combinations of task focused and emotional/avoidant strategies, pending on factors such as time, competence and perceived stress levels (Tice & Baumeister, 1997).

Substance use, generally considered an emotion-focused or avoidance coping strategy, is used by some university students to manage stress. The popularity of this coping strategy is reflected in the high rates of illicit drug use, alcohol consumption and tobacco smoking among college and university students (Adalf, Demers & Glikzman, 2005). Grzywacz and Almeida (2008) describe the stress-alcohol link in terms of Self Medication Hypothesis; people who experience stress self-medicate by drinking to alleviate stress. Further, this stress- alcohol link is a two-way relationship; stress predicts alcohol consumption but regular alcohol consumption results in higher levels of perceived day to day stress (Swendsen et al., 2000). As such, if drinking alcohol becomes the primary coping strategy students use in response to stress, academic performance is likely to suffer (Windle & Windle, 1996).

Mindfulness meditation presents as an adaptive alternative for students managing academic stress. Mindfulness meditation has been practised for over 2500 years by Buddhist monastics in order to develop awareness and insight (Hahn, 1976). Mindfulness involves the purposeful attending to, and acceptance of, cognitions, emotions and physical sensations without elevating or judging these experiences (Kabat Zinn, 1990; Segal, Williams & Teasdale, 2002). In doing so, one creates a mental 'breathing space', where one is able to suspend automatic and impulsive behaviours, consider more fully all the information available regarding a stressful or challenging situation, and then choose a more skilful and adaptive means of responding to this situation (Baer, 2003; Bishop, 2002). This process is referred to as 'reperceiving' (Shapiro, Carlson, Astin & Freedman, 2006) or 're-cognition' (Carmody, 2009).

Reperceiving is consistently regarded as a prime mechanism through which mindfulness operates, and is considered to overarch other mechanisms through which mindfulness exerts its positive influence (Baer, 2003; Bishop, 2002; Carmody, 2009; Shapiro et al., 2006). Shapiro et al. (2006) detail four such mechanisms; self-regulation/management, cognitive/affective and behavioural flexibility, values clarification and exposure. They explain that through the skill of reperceiving, an individual is able to disrupt automatic, conditioned reactions to stress or other negative events and is therefore afforded the time and space necessary to act or respond in a more self-regulatory fashion. Inherent in this ability to self regulate in an adaptive fashion is cognitive, affective and behavioural flexibility. Further, an individual who approaches situations or challenges in a mindful manner is also more likely to act in accordance with their beliefs and values (Brown & Ryan, 2003). Lastly, Shapiro et al. (2006) explain that through constant, conscious awareness of the contents of present moment experience, without judging, labelling or reacting impulsively to it, an individual undergoes a form of desensitisation to previously stress provoking situations. As such, the individual learns that these situations are in fact manageable and do not necessitate the engaging of avoidant or emotion focused coping (Carmody, 2009).

Mindfulness based programs, such as the Mindfulness Based Stress Reduction (MBSR) program, have been shown to reduce stress and anxiety in student populations. MBSR is a manualised treatment program where groups of up to 30 participants meet once a week for two and half hours for 8-10 weeks. Participants are guided through sitting mindfulness meditation as well as techniques such as body scan and Hatha yoga postures (Kabat-Zinn, 1993). Astin (1997) randomised 19 college students to either an MBSR condition (n = 12) or a wait list control (n = 7). Astin (1997) found that students completing the MBSR program, compared to the wait list control, significantly decreased the severity of physical and psychological symptoms as well as increasing their scores on empathy and

spirituality measures. Shapiro et al. (1998) randomised a larger number of students ($n = 78$) to either an MBSR condition ($n = 36$) or a wait list control. Post hoc analysis indicated that students completing the MBSR program, compared to the wait list control, significantly decreased state and trait anxiety, depression and physical and psychological symptom severity as well as increasing their scores on empathy and spirituality measures (Shapiro et al., 1998). In a more recent study of college students, Oman, Shapiro, Thoresen, Plante and Flinders (2008) found that students who were assigned to an MBSR condition, and those in another meditation based treatment condition, reported significant decreases in stress and rumination as well as significant increases for scores on forgiveness when compared against a control group. Taken together, research in student populations has shown that MBSR programs are able to reduce stress levels, rumination and symptom severity in addition to improving the capacity for empathy, spirituality and forgiveness.

MBSR and other mindfulness based programs have also demonstrated initial efficacy in the treatment of substance use/ disorders. A detailed review of the mindfulness based treatments and their outcomes in clinical and community populations are provided by Zgierska et al. (2009). Zgierska et al. (2009) conclude their review by stating that mindfulness meditation based programs consistently demonstrate positive outcomes for subjects with chronic substance use disorders and that this finding held true across a variety of study designs investigating community and clinical populations. Given the aforementioned connection between students and substance use as a coping strategy, this finding holds particular importance. However, research into the relationship between mindfulness and substance use in student populations is mixed.

Leigh, Bowen and Marlatt (2005) used a cross sectional design to test the reliability and validity of their newly developed Freiburg Mindfulness Inventory (FMI) in a sample of 123 college students. They took measures for alcohol use using the Daily Drinking Inventory

(DDQ; Dimeff, Baer, Kivlahan & Marlatt, 1999) and the Alcohol Use Disorders Identification Test (AUDIT; NIAAA, 2000) and additionally asked participants if they were smokers or non-smokers. Further, spirituality was measured using two different instruments. Using factor analysis, Leigh et al. (2005) extracted three factors for the FMI: 1) acceptance and openness to self and experiences, 2) mind/body awareness and 3) non-attachment to thoughts. T-tests comparing smokers to non-smokers revealed that non-smokers scored higher than smokers on one of the spirituality measures but the smokers scored higher on the FMI. A t-test comparing binge drinkers to non-drinkers similarly found that non-drinkers scored higher than binge drinkers on the STI but binge drinkers scored higher on the FMI. Further, a t-test on the subscales of the FMI revealed that smokers and binge drinkers both scored significantly higher on the mind-body awareness subscale than the acceptance and non-attachment subscales. Leigh et al. (2005) explain that this unexpected finding in terms of Self Medication Hypothesis (Khantzian, 1985); participants may have been very in tune with mind/body awareness and use substances to maximise pleasurable experiences.

Bowen and Marlatt (2009) have since investigated the use of a mindfulness based 'urge surfing' program in a sample of college students who smoked. Participants in the urge surfing group were instructed on how to use mindfulness techniques when faced with nicotine cravings, which were induced via cue exposure. Over a seven day follow up period, students in the urge surfing condition smoked significantly fewer cigarettes than those in the control group, however, no differences were found for negative affect. A follow up replication and expansion on this study was conducted by Rogojanski, Vettese and Antony (2011). They randomised 61 students to either an urge surfing condition or a thought suppression control condition. Rogojanski et al. (2011) found, regardless of treatment condition, all participants reported improved self efficacy and also reductions in smoking quantity. This finding was surprising in that thought suppression strategies are the opposite of

the acceptance aspect of mindfulness based techniques such as urge surfing. Fernandez, Wood, Stein & Rossi (2010) have commented on the studies mentioned above, suggesting that the relationship between substance use and mindfulness requires analysis of the different facets or aspects of mindfulness.

Fernandez et al. (2010) conducted a cross sectional study in a large student sample of 316, using the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006). The FFMQ is a measure of mindfulness, tapping multiple facets including: observing experience, describing experience, acting with awareness, non-judging and non-reacting (the latter two facets relating to acceptance of internal states). They found the factors 'acting with awareness' and 'describe' to negatively associate with alcohol use. Interestingly, they also found alcohol related consequences to be positively related to the factor 'describe' and negatively related to 'non-judging'. Fernandez et al. (2010) could not account for the bi-directional association the factor 'describe' had with alcohol use and related consequences. However, they note that their findings are inconsistent with that of Leigh et al.'s (2005); the factor 'observe' (corresponding to the FMI's mind/body awareness) did not significantly associate with alcohol use or related consequences.

The finding from Fernandez et al.'s (2010) study receiving the most theoretical support was that 'acting with awareness' was negatively associated with alcohol use. In explanation, they refer to the Dual processing model of addiction (Wiers et al., 2007) which posits that addictive behaviours are maintained by automatic and unconscious cognitive processes but conscious attention and control over these processes will disrupt them. Fernandez et al. (2010) then suggest that increasing awareness will therefore result in reduced alcohol use, as indicated by their results. Acting with awareness has also been linked to well being through research on impression management and self presentation (Turnley & Bolino, 2001) as well as studies on self determination theory (Brown & Ryan, 2003).

One instrument that has been shown to measure the acting with awareness facet of mindfulness is the Mindfulness Awareness Attention Scale (MAAS; Brown & Ryan, 2003). The MAAS was developed by Brown and Ryan using factor analysis and comparative studies in student populations. Brown and Ryan found the MAAS to be a reliable and valid instrument, capable of distinguishing between groups with different levels of mindfulness (e.g., meditators and non-meditators). They found mindfulness as measured by the MAAS to be a distinct form of awareness, with higher MAAS scores associated with higher levels of self knowledge, self regulation, emotional regulation and autonomous behaviour as well as declines in mood disturbance and stress. Further they found the MAAS was effective at measuring both state and dispositional (trait) mindfulness levels. As Brown, Ryan and other authors (Carmody, 2009) have argued, a model of or an instrument that measures mindfulness purely in terms of attention presents a parsimonious starting point from which to begin collaborative works investigating which mechanisms of mindfulness are responsible for the positive and transformational changes in physical and psychological well being.

Further research has investigated the MAAS in the context of coping styles for university students. Weinstein, Brown and Ryan (2009) used a combination of longitudinal, daily diary and laboratory based designs to investigate the associations the MAAS has with stress appraisals, coping styles and well being in four studies of college students (n 's = 65 - 141). They found individuals scoring high on mindfulness, as measured by the MAAS, viewed demanding and challenging situations as less stressful or threatening and also used more approach focused coping and less avoidant coping when compared to those with lower mindfulness levels. Importantly, these effects were found even after controlling for the personality variables optimism and neuroticism which are both known to relate strongly to well being and emotional stability respectively. However, in light of the fact that across the four studies MAAS scores did not consistently relate to both less avoidant and more approach

coping, Weinstein et al. (2009) note that coping strategies and even styles may change across context.

Another recent study investigating the relationships between stress, coping styles and mindfulness among college students was conducted by Palmer and Rodger (2009). They also measured mindfulness using the MAAS (Brown & Ryan, 2003). Perceived stress was measured using the Perceived Stress Scale (PSS; Cohen, Kamaarack & Mermelstein, 1983) and the Coping Styles Questionnaire (CSQ; Roger et al., 1993) measured four distinct coping styles: rational, detached, emotional and avoidant. They found higher mindfulness scores were associated with lower perceived stress and the use of more adaptive (rational and detached) coping styles and less maladaptive (emotional and avoidant) coping styles. However, they do note a number of unexpected findings. Palmer and Rodger (2009) expected to find a significant positive correlation between mindfulness and detached coping but did not. This finding clashes with the fact they also found a significant univariate effect for mindfulness level with detached coping; significant post hoc differences being found between the low mindfulness group and both the moderate and high mindfulness groups. Further, rational coping was positively correlated with perceived stress and only weakly negatively correlated with avoidance coping. This contradicts previous research indicating adaptive coping styles such as task-focused and approach coping, the conceptual opposite to avoidant coping, result in lower levels of perceived stress (Weinstein et al., 2009). In light of their mixed results for rational and detached coping, Palmer and Rodger (2009) suggest more investigation is needed to clarify the CSQ's classification of coping styles.

The current study aims to provide clarification on the relationships between mindfulness and Roger et al.'s (1993) coping style classification system, as well as between mindfulness and substance use in a student population. This study will replicate the Palmer and Rodger's (2009) study design and will expand on their work to include measures for

alcohol and tobacco use, as these were the substances measured in Leigh et al.'s (2005) study. It is hypothesised that university students who score higher on the mindfulness measure will: 1) report less perceived stress, 2) use more rational and detached coping styles and use less emotional and avoidant coping styles, 3) be more likely to drink in a low risk manner and 4) be more likely to have never smoked or be ex-smokers than those scoring lower on the mindfulness measure.

Method

Design

The study used a quasi experimental, between subjects design given there was no manipulation of any independent variables. The initial analysis for hypothesis one, two and three involved calculating Spearman's Rho correlation coefficients for mindfulness, perceived stress, alcohol use and coping styles. Then, a multivariate analysis of variance using mindfulness level as the independent variable and perceived stress, alcohol use and coping styles as the dependent variables was conducted. To answer hypothesis four, binary logistic regression was used to determine whether mindfulness could predict membership to either the current, ex or never smoked groups.

Ethics Approval

Before commencement of the research, approval for the proposed study was gained from the Faculty of Computing Health and Science Ethics Committee of Edith Cowan University.

Participants

A total of 143 undergraduate university students enrolled at Edith Cowan University, Joondalup, participated in the study (150 survey packages were delivered with a 95.3% response rate). A minimum of 108 undergraduate students ($104 + 4 =$ minimum cases for

testing individual predictor variables) were needed for adequate power (Field, 2009). Of the final sample, 68.7% were female, 72.4% were aged between 17 and 22 and 72.4% had never smoked tobacco (Table 1). Further, 29 (21.6%) participants were reported meditators and 20 (14.9%) participants were reported non-drinkers (AUDIT = 0).

Table 1.

Demographic Statistics of Final Sample (N = 134)

Age	<i>n</i>	%	Smoker	<i>n</i>	%	Gender	<i>n</i>	%
17-22	97	72.4	Current	12	8.9	Male	42	31.3
23-28	17	12.7	Never	97	72.4	Female	92	68.7
29-34	7	5.2	Ex	25	18.7			
35+	13	9.7						

Materials

An information letter was provided to each participant which detailed the background and purpose of the study and explained that participation was completely voluntary and that no identifying information would be needed (Appendix A). The survey package included instructions to complete the following questionnaires:

1. A half page demographics survey (Appendix B) devised by the author that asked for the participants age, gender, course of study, smoking status (current/ex/non-smoker) and asked how many times they meditated per week in the last few months and if they did, what the average time spent meditating would be.
2. The perceived stress survey (PSS; Cohen et al., 1983) (Appendix C). The PSS has 14 items (for example, “In the last month, how often have you dealt successfully with irritating life hassles?”) and subjects answer according to a Likert-type scale (0 = never to 4 = very often). Low scores indicate a low level of perceived control and a high level of perceived stress, while a high score indicates low level of

stress and high perceived control. For the PSS, alpha reliability has been recorded at .84 and .85 (Cohen et al., 1983).

3. The Coping Styles Questionnaire (CSQ; Roger et al., 1993) (Appendix D). The 60 item CSQ measures coping styles according to four factors. For example, detached Coping (DETCOP) has a 15 item scale that looks at detached coping styles (e.g., “I feel completely calm in the face of any adversity”) with alpha levels of internal consistency recorded at .77 (Elklit, 1996) and .90 (Roger et al., 1993). Rational Coping (RATCOP) is a 16 item scale that investigates a problem solving coping style (e.g., “be realistic in my approach to the situation”), alpha levels recorded at .81 (Elklit, 1996) and .85 (Roger et al., 1993). Emotional coping (EMCOP) is a 16 item scale that looks at emotion-focused coping styles (e.g., “I look for sympathy and understanding from people”) with alpha levels of .79 (Elklit, 1996) and .73 (Roger et al., 1993). Avoidance Coping (AVCOP) deals with coping styles that are avoidant in nature (e.g., “try to think about or do something else”) with alpha levels of .66 (Elklit, 1996) and .69 (Roger et al., 1993).
4. The Mindful Awareness Attention Scale (MAAS; Brown & Ryan, 2003) (Appendix E). The MAAS gauges a subject’s awareness of internal and external experiences in the present moment and has been shown primarily to tap into the ‘acting with awareness’ facet of mindfulness (Brown & Ryan, 2003). It uses a 15 item (e.g., “it seems I am running on automatic without much awareness of what I’m doing”), 6 point Likert scale (1 = almost always to 6 = almost never). For the MAAS, Cronbach’s alpha has been found to range from .80 to .87 (Brown & Ryan, 2003).

5. The Alcohol Use Disorders Identification Test (AUDIT; NIAAA, 2000) (Appendix F). The AUDIT is a 10 item, 5 point Likert-scale measure of the volume and frequency of alcohol consumption as well as alcohol-related harm. Items include questions such as “How often do you have 5 or more drinks on one occasion?” High scores indicate the person is likely to experience a number of negative alcohol related consequences.

Procedure

First, permission was obtained from the ECU counsellor to refer any participants for counselling who became distressed by participation (Appendix A). The survey package was delivered to students during a first year psychology lecture with permission from the students’ lecturer. The author briefly described the purpose of the study, informed them of the approximate time it would take to complete, explained that their consent would be implied by their participation and assured them that participation was voluntary and no identifying information would be required. Students who decided to participate were given the information letter and survey package. All surveys were returned and placed in a small box at the front of the room.

Data Analysis

Data was entered into SPSS (Version 17.0) and then the appropriate questions (for the PSS) were reverse coded. Scores for the CSQ were then transformed into four new variables labelled: RATCOP, DETCOP, AVCOP and EMCOP representing rational, detached, avoidant and emotional coping respectively. Scores for the MAAS were then recoded into a new variable labelled: MAAS.level, representing three levels of mindfulness (low = 0.00 - 3.34, moderate = 3.39 - 4.00 and high = 4.01 - 6.00). These cut off points corresponded to the 33rd and 66th percentiles and this was done so as to replicate Palmer and Rodger’s (2009)

procedure. The demographic variable, smoking status, was also recoded into several binary variables labelled: Smoke.everVnever, Smoke.currentVex and Smoke.currentVnever.

AUDIT scores were also recoded into a new binary variable labelled: AUDIT.risk, representing those who drink at a low risk level (AUDIT \leq 7) and those drinking at a high-risk level (AUDIT \geq 8).

Nineteen missing values were excluded from the analysis pairwise (Field, 2009). Seven participants had not completed the MAAS questionnaire in the survey package and were subsequently removed from the data set. Mahalanobis distance was calculated and a further two participants were identified as outliers (Mahalanobis distance $>$ 20.0; Field, 2009) and were removed from the data set. Frequency and explore statistics were run on the remaining data set ($n = 134$). Data sets for the PSS, AUDIT and EMCOP were found to be non-normal (Shapiro-Wilk, $p < .05$). The AUDIT and EMCOP scores also displayed a positive skew (.835 and .534 respectively). A log-linear transformation was carried out on the entire data set in order to correct normality and skew (Field, 2009). The transformation did not significantly alter normality for the PSS, AUDIT or EMCOP. Sixteen outliers were then identified using box and whisker plots and were subsequently replaced with the series M plus two SD (Field, 2009). As a result, PSS scores became normally distributed but the AUDIT and EMCOP scores did not. No further transformations were attempted. Descriptive statistics and Spearman's Rho correlation coefficients were conducted on the final data set ($n = 134$) and are reported on in Table 2 and 3 respectively. The main analysis will be reported on in order of hypothesis one through four.

Table 2.

Descriptive Statistics for Major Variables

	M	SD	N	Missing
PSS	26.58	6.94	131	3
MAAS	3.72	.729	134	0
AUDIT	7.91	6.41	128	6

RATCOP	41.25	8.05	133	1
DETCOP	33.86	6.36	128	6
EMCOP	32.11	7.40	132	2
AVCOP	29.89	4.70	133	1

Table 3

Correlation Matrix for Hypotheses Variables Using Spearman's Rho

	PSS	MAAS	AUDIT	RATCOP	DETCOP	EMCOP	AVCOP
PSS	1.00	-.458**	.146	-.516**	-.469**	.673**	.560**
MAAS		1.00	-.273**	.297**	.252**	-.375**	-.293**
AUDIT			1.00	-.082	.066	.146	.162*
RATCOP				1.00	.697**	-.458**	-.309**
DETCOP					1.00	-.430**	-.059
EMCOP						1.00	.518**
AVCOP							1.00

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

Results

Hypothesis 1.

Hypothesis 1 stating that those scoring higher on the mindfulness measure are likely to report less perceived stress was supported. The MAAS was significantly negatively correlated with PSS ($r = -.458$, $p < .01$, Table 3). A MANOVA was conducted using MAAS level as the independent variable and PSS, AUDIT, RATCOP, DETCOP, EMCOP and AVCOP as the dependent variables. Box's M test was non-significant, as was Levene's test for all dependent variables except EMCOP, indicating the scores for EMCOP did not satisfy the assumption of homogeneity of variance. As such, Hotelling's Trace was used, as it is a robust measure for the violation of assumptions (Field, 2009). A significant effect of mindfulness level on the group of dependent variables was found, $F(12, 220) = 2.903$, $p < .01$, $\eta^2 = .12$. Univariate tests were conducted to determine which of the dependent variables were influenced by mindfulness level and a significant effect was found for all variables, except for DETCOP ($p = .05$, Table 4); PSS, $F(2, 116) = 12.405$, $p < .01$, $\eta^2 = .18$. Tukey's

HSD post hoc tests were carried out; differences in mindfulness level were found for every dependent variable except DETCOP. For PSS scores; significant differences were observed between the high ($M = 22.58$, $SD = 5.03$) and both the low ($M = 29.46$, $SD = 7.18$) and moderate ($M = 28.14$, $SD = 7.13$) mindfulness levels (Table 5).

Table 4

Univariate and Post Hoc Test Results for MANOVA with MAAS.level as I.V.

	Univariate			Post Hoc	
	F (2,116)	Sig.	Partial η^2	MAAS.level	Sig
PSS	12.405	.000**	.176	1 v 2	.647
				2 v 3	.000**
				3 v 1	.000**
AUDIT	3.432	.036*	.056	1 v 2	.346
				2 v 3	.395
				3 v 1	.027*
RATCOP	4.488	.013*	.072	1 v 2	.606
				2 v 3	.102
				3 v 1	.012*
DETCOP	3.064	.050*	.050	1 v 2	.987
				2 v 3	.092
				3 v 1	.083
EMCOP	13.000	.000**	.183	1 v 2	.726
				2 v 3	.000**
				3 v 1	.000**
AVCOP	4.765	.010**	.076	1 v 2	.877
				2 v 3	.040*
				3 v 1	.015*

Note: MAAS.level 1 = low, 2 = moderate and 3 = high mindfulness.

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

Linear regression analysis was used to find which variables would predict PSS scores. Using the backward stepwise approach (reducing the likelihood of leaving significant predictors out of a model, Field, 2009) with PSS as the dependent variable and coping styles, MAAS and AUDIT as predictors. Regression model one was created and included MAAS, DETCOP, EMCOP and AVCOP (Table 5). This model accounted for 65.3% of the variance in PSS scores, revealing that MAAS ($\beta = -1.234$) and DETCOP ($\beta = -.316$) are significant negative predictors of PSS and that EMCOP ($\beta = .354$) and AVCOP ($\beta = .358$) are positive

predictors, $F(4, 117) = 54.932$, $p = 0.037$. The finding that MAAS scores negatively predict PSS scores supports hypothesis 1.

Table 5.

Linear Regression Summary for Hypotheses 1

Model	D.V.	R ²	F change	Sig	Predictors	Beta	Sig.
1	PSS	.633	.808	.037	Constant	19.786	.001
					MAAS	-1.234	.035
					DETCOP	-.316	.000
					EMCOP	.354	.000
					AVCOP	.358	.000

Hypothesis 2

The second hypothesis predicted that those with higher mindfulness scores would also use more rational and detached coping styles and use less emotional and avoidant coping styles. This hypothesis was supported. The correlations in Table 3 show the MAAS measure to be significantly positively correlated with RATCOP ($r = .297$) and DETCOP ($r = .252$) as well as being significantly negatively correlated with EMCOP ($r = -.375$) and AVCOP ($r = -.293$) (all sig. at $p < .01$). The MANOVA using MAAS.level as the independent variable demonstrated significant univariate effects for all the coping styles (Table 4). However, Tukey's HSD post hoc tests showed mixed results; significant differences were found in the moderate to high and low to high MAAS comparisons for emotional and avoidant coping. Rational coping had a significant effect for low to high MAAS levels only and detached coping had no significant comparisons.

To examine further the relationship between mindfulness and coping styles, a linear regression analysis was conducted for each style, entering other coping styles, Gender, PSS, AUDIT and MAAS as predictors using the backwards conditional method. The regression

equations (two to five, Table 6) did not demonstrate any further connection between MAAS and coping styles.

Table 6.

Model Summary for Linear Regression Equations - Hypotheses 2

Model	D.V.	R ²	F	Sig.	Predictors	Beta	Sig.
2	RATCOP	.624	98.907	.000	Constant	22.380	.000
					DETCOP	.903	.000
					AVCOP	-.389	.000
3	DETCOP	.618	46.659	.000	Constant	11.619	.020
					PSS	-.238	.030
					AUDIT	.126	.022
					RATCOP	.509	.000
					EMCOP	-.145	.038
					AVCOP	.375	.000
4	EMCOP	.578	40.027	.000	Constant	13.154	.050
					Gender	1.751	.008
					PSS	.502	.000
					DETCOP	-.200	.022
					AVCOP	.318	.002
5	AVCOP	.475	26.499	.000	Constant	7.365	.085
					PSS	.363	.000
					RATCOP	-.253	.001
					DETCOP	.478	.000
					EMCOP	.223	.000

Hypothesis 3

Hypothesis three predicted that those scoring high on mindfulness would be more likely to drink in a low risk manner. This hypothesis was partially supported. The AUDIT and MAAS were significantly negatively correlated ($r = -.273, p < .01$, Table 3). The MANOVA conducted using MAAS.level as the independent variable also showed a significant univariate effect for AUDIT (Table 4), $F(2,116) = 3.432, p < .05, \eta^2 = .06$.

Tukey's HSD post hoc tests revealed a significant difference for AUDIT scores between the

low ($M = 9.71$, $SD = 7.18$) and high mindfulness ($M = 6.02$, $SD = 5.98$) groups only (Table 5).

To investigate whether mindfulness scores could predict alcohol use, a linear regression, using the backwards stepwise method, was carried out with AUDIT as the dependent variable and PSS, MAAS, all coping styles and Smoke.everVnever as the predictors. The resulting equation six (Table 7) showed that MAAS ($\beta = -2.579$) and RATCOP ($\beta = -.212$) were negative predictors and DETCOP ($\beta = .300$) and Smoke.everVnever ($\beta = 3.259$) were positive predictors of AUDIT scores ($R^2 = .16$).

Table 7.

Model Summary for Linear Regression Equations - Hypotheses 3

Model	D.V.	R ²	F	Sig.	Predictors	Beta	Sig
6	AUDIT	.163	5.713	.000	Constant	15.422	.000
					MAAS	-2.579	.001
					RATCOP	-.212	.043
					DETCOP	.300	.020
					Smoke.ever		
					Vnever	3.259	.024

To determine whether MAAS scores could differentiate between those who drink in either a low or high-risk manner, the AUDIT.risk variable was used as the outcome variable and the same predictors were entered again into a binary logistic regression analysis, using the backward stepwise method (Field, 2009). No model significantly predicted group membership (i.e., all predictors were removed from the equation to leave a constant).

Hypothesis 4

The fourth hypothesis predicted that those scoring higher on the mindfulness measure would be more likely to be ex smokers or have never smoked than to be a current smoker.

This hypothesis was also partially supported. Three binary logistic regression analyses were carried out with the dependent variables Smoke.everVnever, Smoke.exVcurrent, and Smoke.currentVnever. As there were only 12 current smokers in the student sample, only one variable (MAAS) was able to be entered for model 11 and 12 (one predictor variable per 10 subjects; Field, 2009). The models are summarised below (Table 8).

Table 8

Binary Logistic Summary of R for hypothesis 4

Model	DV	Predictors	B	LL	OR	UL	Sig.
7	Smoke.ever Vnever	Constant	4.510				
		AUDIT	-.109	.839	.897	.959	.020
		RATCOP	-.064	.887	.938	.993	.004
8	Smoke.ex Vcurrent	Constant	2.307				
		MAAS	-.836	.174	.422	1.021	.056
9	Smoke.current Vnever	Constant	-1.001				
		MAAS	1.261	1.318	3.530	9.452	.012

Note: for Smoke.everVnever (0 = current + ex, 1 = never), Smoke.exVcurrent (0 = ex, 1 = current), Smoke.currentVnever (0 = current, 1 = never).

Model seven revealed that as alcohol use and rational coping increase, a person is more likely to belong to the ‘ever’ group; that they smoke or are ex smokers. Model eight showed that increases in mindfulness will increase the likelihood of being an ex smoker as opposed to being a current smoker, however, this model was only near significance ($p = .056$). Model nine indicated that as mindfulness increased, a person is more likely to belong to the ‘never’ smoked group as opposed to the ‘current’ smoker group. These results indicate that the more mindful an individual is, the more likely they are to be an ex-smoker compared to a smoker or to have never smoked.

Discussion

The results from hypothesis one indicated that those with a higher level of mindfulness are more likely to report less perceived stress. These findings are consistent with research demonstrating an inverse relationship between mindfulness and perceived stress in student populations (Astin, 1997; Shapiro et al., 1998; Chang et al., 2004; Oman et al., 2008; Brown & Ryan, 2003). The linear regression using PSS as an outcome variable further supported hypothesis one. Mindfulness and detached coping scores were seen to predict lower perceived stress. The fact that increases in avoidant coping and emotional coping both predicted more perceived stress is consistent with accounts of how these coping styles operate in relation to stress. When situations are appraised as stressful, an unmindful person is likely to unconsciously enact avoidance behaviours (procrastination, for example) or emotion focused behaviours (such as, drinking alcohol to alleviate stress or anxiety) (Breslin et al., 2002; Shapiro et al., 2006). These strategies are effective at relieving stress in the short term but inevitably the event or situation that has been appraised as stressful has not changed or been dealt with, and as such, the associated stress returns, often with greater intensity (Tice & Baumeister, 1997).

The results for hypothesis one do not confirm Palmer and Rodger's findings that rational coping was positively associated with perceived stress. In fact, a significant negative correlation ($r = -.516$, $p < .01$) was found between perceived stress and rational coping, lending support to the Roger et al.'s (1993) classification of rational coping as an adaptive coping style, believed to reduce stress. Rational coping was not a significant predictor for perceived stress in the linear regression however. Moreover, perceived stress was not a significant predictor of rational coping either (Table 6). It is important to note, as a number of researchers have said (Sears & Kraus, 2009; Weinstein et al., 2009), an individual's coping style/s are likely to change and fluctuate depending on situational factors.

The results from testing the second hypothesis indicated that higher mindfulness levels were associated with the use of more rational and detached coping strategies and the use of less emotional and avoidant strategies. This replicates the relationship between mindfulness and coping styles demonstrated by Palmer and Rodger's (2009) study. The present results also support other studies, indicating that higher mindfulness scores on the MAAS are associated with the use of more approach coping strategies and less avoidant strategies (Weinstein et al., 2009) and also that higher mindfulness, as measured by the MAAS, is related to higher levels of self-regulation, emotional regulation and reduced stress (Brown & Ryan, 2003).

Additionally, as hypothesised, detached coping positively correlated with mindfulness. This conflicts with Palmer and Rodger's (2009) finding that the two variables were uncorrelated. However, the relationship between mindfulness and detached coping is complex. Shapiro et al. (2006) make a distinction between the skill of re-perceiving and one's attempt to detach from internal experience to the point of apathy or indifference. They argue that re-perceiving, while still creating the mental breathing space, non-attachment and cognitive distance from one's experience, still allows for a more richly enhanced experience of moment to moment awareness. Detached coping is characterised by disconnection and a form of disassociation from events and situations as well as emotional control strategies that do not involve denial or attempts to relieve stress (Elklit, 1996; Roger et al., 1993) and this is not how re-perceiving is theorised to operate (Carmody, 2009; Shapiro et al., 2006). In fact, it has been shown in evaluations of the CSQ that detached coping is weakly positively associated with avoidance coping (Elklit, 1996). In the present results, this phenomenon was also observed; detached coping, as an adaptive style of coping, was expected to significantly negatively correlate with avoidant coping but no correlation was found. Further, linear regression demonstrated that detached and avoidant coping were significant positive

predictors of each other. Given the conceptual (Carmody, 2009; Kabat-Zinn, 2003; Shapiro et al., 2006) and empirical research (Marcus, Fine & Kouzekanani, 2001; Tacon, McComb, Caldera & Randolph, 2003; Weinstein et al., 2009) indicating avoidance coping is opposite to the way re-perceiving functions to create and maintain mindfulness, the way the results describe the relationship between detached coping, mindfulness and avoidant coping is interesting. It would seem that detached coping, while being partially avoidant yet not emotion focused in nature, is still capable of facilitating higher mindfulness. Future research may uncover a more penetrating understanding of the relationship detached coping has with mindfulness by using the FFMQ (Baer et al., 2006) to measure mindfulness. The FFMQ taps five facets of mindfulness whereas the MAAS only directly measures the acting with awareness facet. It is possible that detached coping is predicted differentially by the multiple facets of mindfulness.

The linear regression conducted for each coping style did not demonstrate any further connection to mindfulness. It was seen that each coping style was significantly predicted by PSS (except for rational coping) and other coping styles. This phenomenon was reported on by Palmer and Rodger (2009) also; they found Roger et al.'s (1993) four coping styles to share a high amount of variance, suggesting a lack of clear distinction between the coping styles. Indeed, this high shared variance is seen again in the R^2 summary of the linear regression conducted in the present study (Table 6). It is possible that due to the coping styles high shared variance, the predictive power of mindfulness on coping styles may have gone undetected.

The results for hypothesis three demonstrated mindfulness, as measured by the MAAS, to be inversely related to alcohol use. This is consistent with Fernandez et al.'s (2011) finding that the acting with awareness facet of mindfulness significantly associated with alcohol consumption. The specific hypothesis that those with higher mindfulness would

drink in a low risk manner was only partially supported though. The binary logistic regression analysis of the variable AUDIT.risk (differentiating those who drink at low versus high risk levels) did not yield any model that could predict group membership. That is, in this sample, perceived stress, mindfulness, coping styles, smoking status and other demographic variables could not differentiate low risk from high-risk drinkers.

The linear regression conducted for AUDIT scores yielded some interesting results. Alcohol use was positively predicted by smoking status and detached coping but was negatively predicted by rational coping and mindfulness. This suggests that those who use more detached coping strategies and those who have ever smoked are likely to drink more. The fact that detached coping positively predicted alcohol use is a mixed result. It could reflect a proportion of individuals who use alcohol to detach from their daily stress. In this context therefore, detached coping could be considered to closely resemble avoidant or emotion focused coping. As discussed above, detached coping is conceptualised to share similar qualities to avoidance coping but not with emotion focused coping. The only significant correlation alcohol use had in this study was with avoidance coping, supporting the notion that people who drink alcohol may do so to avoid unpleasant experiences or tasks. This is supported by numerous studies investigating alcohol use, mindfulness and the motives behind excessive consumption (Garland et al., 2010; Bowen et al., 2007). However, current theory also posits that people drink to alleviate stress and undesirable emotional states (Dawson, Grant & Ruan, 2005), yet emotional coping was not a significant predictor of alcohol use. Interestingly, neither avoidant nor emotional coping predicted alcohol use in the linear equation but detached and rational coping (negatively) did. Further research is needed to closely examine the interconnectedness between alcohol use and detached, avoidant and emotional coping.

The results of the fourth hypothesis showed that those with higher mindfulness levels were more likely to be an ex-smokers or to have never smoked. This finding is consistent with previous work investigating the use of mindfulness techniques to reduce smoking quantity (Bowen & Marlatt, 2009; Rogojanski et al., 2011). The near significant ($p = .056$) result for the ex versus current smoker binary logistic model could mean a number of things. Given increased mindfulness through mindfulness training programs has been demonstrated to result in more people attempting and succeeding in smoking cessation (Davis et al., 2007), it could be expected that those people who are ex-smokers have had to develop new adaptive coping strategies associated with mindfulness in order to manage the discomfort and stress that comes with quitting smoking. Therefore, it is possible that ex smokers have had to access and build a more mindful and adaptive repertoire of coping strategies than those people who have never smoked. This assertion was not supported by the near significance for the ex versus current smoker regression model compared to the significant never versus current model. Alternately, it could be argued that those people who have never smoked already possessed superior dispositional mindfulness to those who ever started smoking and, as such, used more adaptive coping and never resorted to smoking to manage stress. However, results from the binary logistic model using `smoke.ever` versus `never` as the outcome variable, indicated that mindfulness could not predict whether a person had once smoked or had never smoked. This lends support to the notion that dispositional mindfulness did not affect whether an individual had ever started smoking, which is not what the current results imply. Importantly, a serious limitation must be noted here. Only one predictor was able to be entered into the binary logistic analysis (Field, 2009), as there were only 12 current smokers in the sample. Therefore, the predictive power of mindfulness relative to the other major variables cannot be commented on. Irrespective, mindfulness was demonstrated to differentiate between ex smokers and current smokers as well as between smokers and those who have never smoked.

Conclusion

The results of the current study were largely consistent with previous work. Higher mindfulness levels were seen to be related to less perceived stress and maladaptive coping and also related to greater use of adaptive coping. Additionally, higher mindfulness was seen to predict an individual to drink less alcohol and to be an ex-smoker or have never smoked. Further, inconsistencies found in previous work investigating mindfulness, stress, coping and substance use in student populations were not replicated, lending support to theories of coping style classification and information processing accounts of the relationship between mindfulness and substance use.

Given the MAAS primarily measures the acting with awareness facet of mindfulness, the interpretation of results can be understood as such. This facet has been proposed as a key feature of some mindfulness models and it has been argued that attention and awareness present as the best starting point for dismantling studies. Here, mindfulness, as measured foremost by awareness of one's actions, demonstrated associations and significant differences with stress, coping styles, alcohol and tobacco use in all the hypothesised directions. However, mixed findings were obtained for detached coping. It is suggested that some relationships mindfulness has with variables such as this would require the use of an instrument that measures more than one facet of mindfulness. Irrespective, the current study provides further support for the use of mindfulness in student populations to reduce stress and substance use and to improve coping styles and self-regulation.

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Appendix A: Information Letter

The Investigation of Mindfulness, Stress, Coping Styles and Substance Use Among
University Students.

Dear Student,

My name is Chris Thomas and I am currently studying Honours in Psychology at Edith Cowan University. I am conducting a study required for completion of my degree. My research is based around the benefits of mindfulness and meditation. Specifically, I am looking at how these two factors relate to perceived stress, coping styles, alcohol and tobacco use. I am seeking participants who are currently university students.

The study involves a short questionnaire that will take about ten to fifteen minutes to complete. The first part will involve some initial demographic questions. Next there are four short sections that will include questions and statements relating to perceived stress, coping styles, mindfulness and alcohol use. This study has gained ethics approval from ECU human ethics sub-committee for the Faculty of Computing and Health Science.

Participation in this study is completely voluntary. If you do begin this questionnaire you have the right to cease participation at any time. Consent to participate in this study will be implied if you do the questionnaire. Your responses will be completely anonymous. There is no place in which your name and any identifying details are required. You will only be asked for general information such as your age and gender.

There are benefits of participating in this study. For example, you will get the opportunity to learn about how the data for studies such as these are collected. You may also learn about or extend your knowledge on the concepts of mindfulness, stress, coping and substance use.

If you do have any other questions please feel free to contact me on 0401221266 or email me a cdthomas@ecu.edu.au. Alternatively, you may contact the Principle Supervisor, Dr David Ryder on 63045452 or david.ryder@ecu.edu.au or the Associate Supervisor, Dr Mary Flaherty on 63045692 or m.flaherty@ecu.edu.au. If you wish to speak to any one not directly related to the study you may also contact Dr Andrew Guilfoyle on 63045192 or a.guilfoyle@ecu.edu.au. Any participants who become distressed during this study can access counselling services by contacting the student counselling service on 93706706. You may also contact the Alcohol and other drug information service on (.....).

Thank you for your time.

Chris Thomas

Appendix B: Demographics Questionnaire

This survey will ask you a number of questions and provide you with a number of statements. These questions and statements will relate to perceived stress, coping styles, mindfulness and substance use. Please follow the instructions for each section and answer as truthfully as possible.

General Information

1. Age (*in years*):_____
2. Gender (*tick*):
 _____ male
 _____ female
3. What course are you currently studying? _____
4. Do you identify as being a current smoker, an ex-smoker or have never smoked tobacco products? (*please circle*) Current Ex-smoker Never smoked
5. On average, in the last few months, how many times a week do you formally meditate?_____
6. On average, how long do these meditation sessions last for? (if any) (*in minutes*)

Appendix C: Perceived Stress Scale

For each question choose from the following alternatives:

0 = never 1 = almost never 2 = sometimes 3 = fairly often 4 = very often

1. In the last month, how often have you been upset because of something that happened unexpectedly?

0 1 2 3 4

2. In the last month, how often have you felt that you were unable to control the important things in your life?

0 1 2 3 4

3. In the last month, how often have you felt nervous and "stressed"?

0 1 2 3 4

4. In the last month, how often have you dealt successfully with irritating life hassles?

0 1 2 3 4

5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?

0 1 2 3 4

6. In the last month, how often have you felt confident about your ability to handle your personal problems?

0 1 2 3 4

7. In the last month, how often have you felt that things were going your way?

0 1 2 3 4

8. In the last month, how often have you found that you could not cope with all the things that you had to do?

0 1 2 3 4

9. In the last month, how often have you been able to control irritations in your life?

0 1 2 3 4

10. In the last month, how often have you felt that you were on top of things?

0 1 2 3 4

11. In the last month, how often have you been angered because of things that happened that were outside of your control?

0 1 2 3 4

12. In the last month, how often have you found yourself thinking about things that you have to accomplish?

0 1 2 3 4

13. In the last month, how often have you been able to control the way you spend your time?

0 1 2 3 4

14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

0 1 2 3 4

Appendix D: Coping Styles Questionnaire

How would YOU describe the way YOU *typically* react to stress?

Circle Always (A), Often (O), Sometimes (S), or Never (N) for **each** item below:

- | | |
|--|---------|
| 1. Feel overpowered and at the mercy of the situation. | A 0 S N |
| 2. Work out a plan for dealing with what has happened. | A 0 S N |
| 3. See the situation for what it actually is and nothing more. | A 0 S N |
| 4. See the problem as something separate from myself so I can deal with it. | A 0 S N |
| 5. Become miserable or depressed. | A 0 S N |
| 6. Feel that no-one understands. | A 0 S N |
| 7. Stop doing hobbies or interests. | A 0 S N |
| 8. Do not see the problem or situation as a threat. | A 0 S N |
| 9. Try to find the positive side to the situation. | A 0 S N |
| 10. Become lonely or isolated. | A 0 S N |
| 11. Daydream about times in the past when things were better. | A 0 S N |
| 12. Take action to change things. | A 0 S N |
| 13. Have presence of mind when dealing with the problem or circumstances. | A 0 S N |
| 14. Avoid family or friends in general. | A 0 S N |
| 15. Feel helpless-there's nothing you can do about it. | A 0 S N |
| 16. Try to find out more information to help make a decision about things. | A 0 S N |
| 17. Keep things to myself and not let others know how bad things are for me. | A 0 S N |
| 18. Think about how someone I respect would handle the situation and try to do the same. | A 0 S N |
| 19. Feel independent of the circumstances. | A 0 S N |
| 20. Sit tight and hope it all goes away. | A 0 S N |
| 21. Take my frustrations out on the people closest to me. | A 0 S N |

22. 'Distance' myself so I don't have to make any decision about the situation. A 0 S N
23. Resolve the issue by not becoming identified with it. A 0 S N
24. Assess myself or the problem without getting emotional. A 0 S N
25. Cry, or feel like crying. A 0 S N
26. Try to see things from the other person's point of view. A 0 S N
27. Respond neutrally to the problem. A 0 S N
28. Pretend there's nothing the matter, even if people ask what's bothering me. A 0 S N
29. Get things into proportion-nothing is really that important. A 0 S N
30. Keep reminding myself about the good things about myself. A 0 S N
31. Feel that time will sort things out. A 0 S N
32. Feel completely clear-headed about the whole thing. A 0 S N
33. Try to keep a sense of humour-laugh at myself or the situation. A 0 S N
34. Keep thinking it over in the hope that it will go away. A 0 S N
35. Believe that I can cope with most things with the minimum of fuss A 0 S N
36. Try not to let my heart rule my head. A 0 S N
37. Eat more (or less) than usual. A 0 S N
38. Daydream about things getting better in future. A 0 S N
39. Try to find a logical way of explaining the problem. A 0 S N
40. Decide it's useless to get upset and just get on with things. A 0 S N
41. Feel worthless and unimportant. A 0 S N
42. Trust in fate-that things have a way of working out for the best. A 0 S N
43. Use my past experience to try deal with the situation. A 0 S N
44. Try to forget the whole thing. A 0 S N
45. Just take nothing personally. A 0 S N
46. Become irritable or angry. A 0 S N

- | | |
|--|---------|
| 47. Just give the situation my full attention. | A 0 S N |
| 48. Just take one step at a time. | A 0 S N |
| 49. Criticise or blame myself. | A 0 S N |
| 50. Simply and quickly disregard all irrelevant information. | A 0 S N |
| 51. Pray that things will just change. | A 0 S N |
| 52. Think or talk about the problem as if it did not belong to me. | A 0 S N |
| 53. Talk about it as little as possible. | A 0 S N |
| 54. Prepare myself for the worst possible outcome. | A 0 S N |
| 55. Feel completely calm in the face of any adversity. | A 0 S N |
| 56. Look for sympathy and understanding from people. | A 0 S N |
| 57. See the thing as a challenge that must be met. | A 0 S N |
| 58. Be realistic in my approach to the situation. | A 0 S N |
| 59. Try to think about or do something else. | A 0 S N |
| 60. Do something that will make me feel better. | A 0 S N |

Appendix E: Mindfulness Awareness Attention Scale

Using the 1–6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what *really reflects* your experience rather than what you think your experience should be.

1 = *almost always*, 2 = *very frequently*, 3 = *somewhat frequently*,
4 = *somewhat infrequently*, 5 = *very infrequently*, 6 = *almost never*.

1. I could be experiencing some emotion and not be conscious of it until sometime later.

1 2 3 4 5 6

2. I break or spill things because of carelessness, not paying attention, or thinking of something else.

1 2 3 4 5 6

3. I find it difficult to stay focused on what's happening in the present.

1 2 3 4 5 6

4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.

1 2 3 4 5 6

5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.

1 2 3 4 5 6

6. I forget a person's name almost as soon as I've been told it for the first time.

1 2 3 4 5 6

7. It seems I am "running on automatic" without much awareness of what I'm doing.

1 2 3 4 5 6

8. I rush through activities without being really attentive to them.

1 2 3 4 5 6

9. I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there.

1 2 3 4 5 6

10. I do jobs or tasks automatically, without being aware of what I'm doing.

1 2 3 4 5 6

11. I find myself listening to someone with one ear, doing something else at the same time.

1 2 3 4 5 6

12. I drive places on "automatic pilot" and then wonder why I went there.

1 2 3 4 5 6

13. I find myself preoccupied with the future or the past.

1 2 3 4 5 6

14. I find myself doing things without paying attention.

1 2 3 4 5 6

15. I snack without being aware that I'm eating.

1 2 3 4 5 6

Appendix F: Alcohol Use Disorders Identification Test

Your answers will remain confidential so please be honest. For each question below, choose one number only from either 0 to 4 according to the following (*please tick*):

1.How often do you have a drink containing alcohol?	Never	Monthly or less	2 to 4 times a month	2 to 3 times a week	4 or more times a week
2.How many drinks containing alcohol do you have on a typical day when you are drinking?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more
3.How often do you have 5 or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
4.How often during the last year have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
5.How often during the last year have you failed to do what was normally expected of you because of drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
6.How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
7.How often during the last year have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
8.How often during the last year have you been unable to remember What happened the night before	Never	Less than monthly	Monthly	Weekly	Daily or almost daily

because of your drinking?					
9. Have you or someone else been injured because of your drinking?	No		Yes, but not in the last year		Yes, during the last year
10. Has a relative, friend, doctor or other health care worker been concerned about your drinking or suggested you cut down?	No		Yes, but not in the last year		Yes, during the last year