

Federation University

School of Science, Psychology, and Sport

Examining factors that influence the relationship between personality and stress

Leanne Duggan

Postgraduate Diploma – Psychology

Bachelor of Psychological Science

A dissertation submitted to the School of Science, Psychology, and Sport in total  
fulfilment of the requirements of the degree of Doctor of Philosophy

May 2021

## Table of Contents

Table of Contents .....	ii
Abstract .....	vi
Acknowledgements.....	ix
Statement of Authorship .....	xi
Table of Figures .....	xii
Table of Tables .....	xiii
Table of Appendices .....	xiv
List of Abbreviations .....	xv
Chapter 1 .....	1
Introduction.....	1
Aims of the dissertation .....	4
General aims.....	4
Specific aims .....	4
Dissertation chapters organisation .....	5
Chapter 2.....	6
Review of literature.....	6
Stress .....	7
Stress events or stressors .....	9
Cognitive appraisal.....	11
Physiological stress response .....	13
Coping .....	17
Individual differences in the experience of stress.....	18
Personality .....	18
Affect .....	31
Stress and mindfulness .....	34
Personality and mindfulness.....	35
Stress, personality, and mindfulness .....	37
Summary of literature review and justification for research program .....	38
Chapter 3 .....	40
An investigation of associations between personality, affect and perceived stress .....	40
Highlights.....	41
Abstract.....	42
Introduction.....	43
Personality and perceived stress.....	44

Affect and perceived stress .....	47
Personality and affect.....	47
Aims and purpose of the study .....	50
Method .....	51
Participants .....	51
Measures.....	52
Perceived stress scale.....	52
The Big Five inventory .....	52
The positive and negative affect schedule .....	53
Procedure.....	53
Results.....	54
Bivariate associations between personality, affect, and perceived stress .....	55
Multivariate investigation of perceived stress.....	57
Moderation analysis .....	57
Mediation analysis.....	58
Discussion .....	60
Limitations and future directions .....	62
References.....	64
Chapter 4 Study 2: Examining the effects of trait mindfulness on the relationship between personality and perceived stress.....	72
Abstract .....	73
Introduction.....	74
Trait mindfulness and stress.....	75
Trait mindfulness and personality .....	76
Trait mindfulness, stress, and personality .....	78
Method .....	80
Participants .....	80
Measures.....	80
Carolina empirically derived mindfulness inventory .....	80
Results.....	82
Correlations between personality, mindfulness, and perceived stress .....	83
Multivariate investigation of perceived stress.....	85
Moderation .....	85
Mediation .....	88
Discussion .....	90

Limitations and future directions .....	95
Conclusion.....	96
References.....	97
Chapter 5 .....	101
Study 3: Examining the effectiveness of a brief mindfulness intervention on perceived and physiological stress-related outcomes: A Pilot Study.....	101
Abstract .....	102
Introduction.....	103
Physiological stress responses.....	103
Psychological stress response.....	104
Personality .....	105
Mindfulness interventions and physiological stress responses .....	107
Method .....	108
Participants .....	108
Measures.....	109
Screening questionnaire.....	109
Pre-intervention questionnaire.....	109
Post-intervention questionnaire .....	110
Equipment .....	111
Assessing physiological stress responses .....	111
Stress induction task. ....	112
Procedure.....	113
Inclusion and exclusion criteria.....	113
Pre-intervention. ....	115
Control and experimental groups .....	116
Post-intervention.....	116
Results.....	117
Descriptive statistics.....	117
Self-reported measures .....	117
Experimental group .....	119
Control group.....	120
Physiological stress measures .....	121
Heart rate .....	121
Discussion .....	123
Measures of stress .....	123

Stress test.....	124
Limitations and future directions .....	125
Conclusions .....	126
References.....	127
Chapter 6.....	134
General discussion .....	134
General findings.....	136
Personality and stress .....	136
Personality, mindfulness, and stress.....	137
Implications for stress reduction techniques .....	138
Issues with the current research .....	139
Future research .....	141
Final conclusions.....	142
References (Overall Dissertation).....	143
Appendix A Study 1 and Study 2 questionnaire package.....	166
Appendix B Ethics approval for Study 1 and Study 2 .....	180
Appendix C Pre-intervention questionnaire – Study 3 .....	182
Appendix D NEO PI-R questions – Study 3.....	188
Appendix E Post-intervention questionnaire – Study 3 .....	196
Appendix F Script for explaining the TSST – Study 3.....	200
Appendix G Script for confederates – Study 3 .....	201
Appendix H Arithmetic task – Study 3.....	203
Appendix I Plain language statement – Study 3 .....	204
Appendix J Ethics approval – Study 3 .....	206
Appendix K Final ethics report – Study 1 and Study 2 .....	208
Appendix L Final ethics report - Study 3.....	212

## **Abstract**

Individual differences in the stress response have been linked with numerous factors, including personality traits and mindfulness. Selye (1950) was among the first to detail the physiological stress response that takes place during a stressful event, or after exposure to a stressor. These responses include heart rate changes and the secretion of cortisol into the blood stream, which are key physiological indicators that a stress response is taking place. Lazarus and Folkman (1984) examined appraisal of stressful events, determining that this is crucial to the stress experience. An extension of Lazarus and Folkman's cognitive appraisal theory was offered by Vollrath (2001), suggesting an individual's personality accentuates our stress response, therefore, offering an explanation for the individual differences evident in stress responses. The relationship between personality and stress is not straight forward, and other factors, such as affect and mindfulness, may influence this relationship.

Thus, this dissertation is divided into three studies. Study 1 examined the moderating and mediating factors of affect on the relationship between personality traits and perceived stress. A total of 290 adults (71% female;  $M_{\text{age}} = 35.0$  years,  $SD = 12.92$ ) completed an online questionnaire package, comprising of the Perceived Stress Scale, Big Five Inventory, Positive and Negative Affect Schedule, and a number of demographic questions. A hierarchical regression showed that 56% of the variance in perceived stress was explained by personality and affect, and when all personality traits were viewed concurrently and with affect, neuroticism was the only one to significantly explain variance in perceived stress. No moderation effects were found in Study 1 however, positive affect partially mediated the relationship between neuroticism and perceived stress.

Study 2 aimed to further the findings of Study 1 by investigating whether trait mindfulness impacted the relationship between personality and stress. A total of 266 adults (70% female;  $M_{\text{age}} = 34.0$  years,  $SD = 12.68$ ) completed an online questionnaire package,

consisting of the Perceived Stress Scale, Big Five Inventory, and Carolina Empirically Derived Mindfulness Scale. A hierarchical regression showed that 58% of the variance in perceived stress was explained by personality and trait mindfulness. When all personality traits and trait mindfulness were viewed together, neuroticism and agreeableness were the only personality traits to significantly explain variance in perceived stress. The sub-scale trait mindfulness attention significantly moderated the relationship between agreeableness and perceived stress, while a partial mediation was found between neuroticism and the sub-scale trait mindfulness acceptance.

Study 3 investigated the effectiveness of a brief state-based mindfulness intervention on physiological (cortisol and heart rate) and psychological stress responses, in a participant matched design. A total of 20 participants (60% female;  $M_{age} = 34.60$  years,  $SD = 14.68$ ) were recruited from Studies 1 and/or 2 and matched based on gender, dominant personality trait (found in Study 1 and 2), and perceived stress. One participant in each matched pair was then randomly allocated to the mindfulness experimental, or control, group. The mindfulness experimental group completed a 10-minute breathing exercise, prior to completing the Trier Social Stress Test, a verbal presentation and arithmetic task, designed to induce stress. The control group did not complete any activity prior to the stress test. Comparison of the groups indicated that no significant differences in perceived stress were evident pre-post-intervention. Changes in heart rate were noted for all participants during the intervention, though no difference was evident between groups. The results of Study 3 indicate a mindfulness breathing exercise makes little difference to physiological stress responses during a stress task.

The combined findings of this dissertation indicate that personality traits can influence the likelihood of an individual experiencing stress. Mindfulness and affect also

impact on the relationship between personality and stress and offer some insight into the individual experience of stress responses.



## **Acknowledgements**

Leanne Duggan was supported by an Australian Government Research Training Program RTP Fee-Offset Scholarship through Federation University Australia. The support and training that Federation University has offered me during my education is something that I cannot fully express in words. The university has shaped not only my life but my career and goals.

Many people have helped me throughout my journey in completing this dissertation. Firstly, I would like to share my extreme gratitude to my supervisor Associate Professor Christopher Mesagno. Without your constant support and encouragement, I would not have been able to complete my dissertation. Your guidance throughout my journey has been vital to the finalised document. I am forever grateful for your support and understanding throughout our time working together. I would also like to thank Dr Elizabeth Temple; you started the PhD process with me and helped to develop and consolidate my ideas and hopes for this dissertation and the research I wanted to complete. Thanks to your support and guidance I was able to experience overseas conferences and grow my confidence in many areas I never expected when I started my PhD. Also, a huge shout out to Associate Professor Kate Moore, you did not hesitate to join my supervisory panel towards the end, but you offered invaluable support and guidance despite jumping in the deep end.

I would also like to thank Dr Jack Harvey, your support with statistics and you never hesitated to answer my many questions, even if you had already answered them before. Thank you for helping my understanding of complicated equations and understanding and interpretation of my results. Without your support, I would not have been able to produce the depth of understanding of my work.

To my amazing friends and my team at work, Rebecca, Matthew, and Alberto. You covered my role when I was on study leave, encouraged me, and listened to my endless discussion about results, data analysis and formatting frustrations.

Finally, I would like to thank my incredible family, especially my husband, Mathew. Without your ongoing support, not only during my PhD but throughout the entirety of my University Studies, I would not have had the courage and time to complete this work. I would also like to thank my son, Charlie. You continue to be my shining star, helping me to find my way and making me smile. You remind me daily of the importance of following the things you are passionate about.

## **Statement of Authorship**

Except where explicit reference is made in the text of this thesis, this thesis contains no material published elsewhere or extracted in part from a thesis by which I have qualified for or been awarded another degree or diploma. No other person's work has been relied upon or used without due acknowledgment in the main text and references of this these.

Signed:

Date: 10/05/2021

Leanne Duggan

PhD Candidate

## Table of Figures

Figure 2.1 The stress process .....	10
Figure 3.1 Mediation analysis between neuroticism, positive and negative affect, and perceived stress. ....	59
Figure 4.1 Interactions and slopes graphs for agreeableness and trait mindfulness attention	87
Figure 4.2 Mediation model – mindfulness as a mediator between neuroticism and perceived stress .....	89
Figure 4.3 Mediation model – mindfulness as a mediator between agreeableness and perceived stress .....	90
Figure 5.1 Timeline of the experiment .....	114

## Table of Tables

Table 2.1 The Big Five personality types and past research in associations with stress and mindfulness.....	27
Table 3.1 Bivariate associations between personality, affect and perceived stress .....	56
Table 3.2 Unstandardised ( $B$ ) and standardised ( $\beta$ ) regression coefficients and semipartial correlations ( $sr^2$ ) for predictors of perceived stress .....	58
Table 4.1 Bivariate correlations between trait mindfulness, stress and the Big Five personality traits .....	84
Table 4.2 Unstandardised ( $B$ ) and standardised ( $\beta$ ) regression coefficients and semipartial correlations ( $sr^2$ ) for predictors of perceived stress .....	86
Table 5.1 The score ranges for matched participants .....	115
Table 5.2 Mean ( $M$ ) and standard deviation ( $SD$ ) for the control and experimental groups for key variables .....	118
Table 5.3 Mann-Whitney U results for control and mindfulness groups .....	120
Table 5.4 Mean differences in heart rate readings (total group) .....	112

## **Table of Appendices**

Appendix A Study 1 and Study 2 questionnaire package.....	166
Appendix B Ethics approval for Study 1 and Study 2.....	180
Appendix C Pre-intervention questionnaire – Study 3 .....	182
Appendix D NEO PI-R questions – Study 3.....	188
Appendix E Post-intervention questionnaire – Study 3.....	196
Appendix F Script for explaining the TSST – Study 3.....	200
Appendix G Script for confederates – Study 3 .....	201
Appendix H Arithmetic task – Study 3.....	203
Appendix I Plain language statement – Study 3 .....	204
Appendix J Ethics approval – Study 3.....	206
Appendix K Final ethics report – Study 1 and Study 2 .....	208
Appendix L Final ethics report - Study 3.....	212

## **List of Abbreviations**

ACTH – Adrenocorticotrophic hormone

BFNES – Brief Fear of Negative Evaluation Scale

CEDMI – Carolina Empirically Derived Mindfulness Inventory

CRH – Corticotropin-releasing hormone

GAS – General Adaptation Syndrome

HPA Axis – Hypothalamic-pituitary-adrenal

PANAS – Positive and Negative Affect Schedule

PSS – Perceived Stress Scale

TSST – Trier Social Stress Test

## **Chapter 1**

### **Introduction**

Impacting on nearly all aspects of life, the experience of stress differs immensely from person to person. In the 100 years since the introduction of Cannon's (1915) 'fight-or-flight' response, stress-related research has increased exponentially. From Selye's (1950) biological underpinnings to Lazarus and Folkman (1984) psychological differences, definitions of stress are often debated. Selye (1977) proposed that stress is the wear and tear on the body in response to exposure to a stimulus, while Lazarus and Folkman (1984) suggested that stress occurs when an individual appraises an event as taxing or exceeding their resources. While the definition of stress may differ, the experience of stress is common for most individuals (Morton, Helminen, & Felver, 2020), yet the frequency and intensity of the stress experience often differs among individuals. Understanding individual differences in the experience of stress has been of interest since World War II and the Korean War because it was found that stress influenced performance (Lazarus & Folkman, 1984). Since then, researchers have focused on what causes individual differences in the stress experience (e.g., Engler, 2014; Penley & Tomaka, 2002).

Stress often carries a negative connotation; yet some stress exposure can be beneficial, which is often referred to as challenge stress or eustress, rather than hindrance stress or distress (Cooper & Quick, 2017). LePine, LePine, and Jackson (2004) noted that stress appraisal is crucial in determining if stress is perceived as debilitating or facilitative to personal growth. Szabo, Tache, and Somogyi (2012) summarized stress by explaining, "Stress is not what happens to you, but how you react to it" (p. 477), which provides a good indication that an individual may control stress through their evaluation of it.



Individual differences in the stress appraisal experience can be linked to increased perception of stress for some individuals (Lazarus & Folkman, 1984). Vollrath (2001) explained that personality is crucial to stress appraisal and in shaping stressful situations. Research into individual personality traits and their impact on the stress process have led to equivocal results (e.g., Ebstrup, Eplov, Pisinger, & Jørgensen, 2011; Schneider, Rench, Lyons, & Riffle, 2011). Previous research has generally examined the Big Five personality traits, with a particular focus on the relationship between neuroticism and stress due to the strong correlations between them (Giluk, 2009), with the general consensus being that individuals high in neuroticism are more likely to experience adverse stress responses (Schneider, Rench, Lyons, & Riffle, 2011). Researchers often chose to focus on neuroticism given the plethora of research linking neuroticism and negative health outcomes, especially as a person ages (Friedman, 2019). Focusing on neuroticism has resulted in a lack of knowledge regarding associations between other personality traits and stress. Hence, exploring all of the Big Five personality variables could help expand our understanding of individual differences in stress responses.

Affect is another variable that is often linked to individual differences in stress responses. Both positive and negative affect have shown strong associations with perceived stress (De Jong, van Sonderen, & Emmelkamp, 1999). Negative affect shows a consistent positive relationship with perceived stress (e.g., Blaxton & Bergeman, 2017; Mroczek & Almeida, 2004), suggesting that individuals high in negative affect would be more likely to perceive stress. Conversely, positive affect has been shown to have a negative correlation with perceived stress (e.g., Blaxton & Bergeman, 2017; Watson, Clark, & Tellegen, 1988). Examining the interactions between variables such as affect and personality traits could help to deepen our understanding of what causes individual differences in stress responses.

Individual differences in stress responses, both perceived and physiological, have been examined. More recently, stress reduction techniques, such as mindfulness, have also been growing in popularity. In 2016, 52% of Australians reported that they try to live every day in the moment (Australian Psychological Society [APS], 2016), which is an aspect of mindfulness training programs. Mindfulness is a relatively new “buzz word”, with newspaper articles and magazines claiming that a mindfulness intervention can help reduce stress and stress-related symptoms, even if only used when faced with a stress task (e.g., New Idea, 2017). Some magazines are now dedicated entirely to being mindful (e.g., <https://www.mindful.org/>). This popularity was captured by Van Dam et al. (2018), who reported that the words 'mindfulness' or 'meditation' were used more than 30,000 times in the media in 2015, and in excess of 1,200 journal articles about mindfulness were also published in the same year. Mindfulness has been found to alter physiological stress responses (e.g., Baer, Carmody, & Hunsinger, 2012), but further research is required to understand the mechanisms through which mindfulness has this impact. For this reason, mindfulness research is burgeoning for both clinical and non-clinical populations, where the focus has typically been on exploring trait mindfulness or mindfulness-based intervention programs in relation to health and wellbeing (e.g., O’Loughlin & Zukeman, 2008). A growing number of brief mindfulness interventions have also been developed, but not as much research evidence exists in relation to these, particularly in comparison to longer, more structured, mindfulness-based programs, such as the Mindfulness-Based Stress Reduction program (Kabat-Zinn et al, 1992).

While stress is a common experience, individual differences in stress responses are associated with a range of debilitating physical and mental health conditions. The Big Five personality traits have been investigated in relation to stress throughout the years due to personality being identified as an individual difference affecting stress responses. It is evident

that other variables, such as affect and mindfulness, may impact on the relationship between personality and stress. Identifying these factors and determining their impact is essential for increasing our understanding of stress responses. In particular, knowledge regarding how specific personality traits, both in isolation and in combination with other factors, influence psychological and physiological responses to stress could help to further our understanding of the stress process, and assist in the development of improved stress reduction techniques.

### **Aims of the dissertation**

#### **General aims**

The current dissertation was designed to clarify the relationship between all of the Big Five personality traits and perceived stress, and to determine whether variables such as affect, and trait mindfulness influence the relationship between personality and stress. Furthermore, the dissertation aimed to examine if a brief mindfulness intervention would successfully reduce the perception of stress and physiological stress responses to help guide future targeted stress reduction techniques, on participants that were matched based on their personality traits.

#### **Specific aims**

The aims of Study 1 were to: 1) investigate the interrelationships among personality, affect, and perceived stress; and, 2) determine if the relationships between the Big Five personality traits and perceived stress are moderated and/or mediated by affect.

The aims of Study 2 were to: 1) examine the interrelationships among personality, trait mindfulness and perceived stress; and, 2) determine if the relationships between the Big Five personality traits and perceived stress are moderated and/or mediated by trait mindfulness.

The aim of Study 3 was to investigate the effectiveness of a brief mindfulness intervention, in comparison to a control condition, on psychological and physiological stress-related outcomes in participants who were matched on the basis of personality traits.

### **Dissertation chapters organisation**

In Chapter 1 (this chapter), an introduction to the topics of stress, mindfulness, and personality is offered. Chapter 2 provides a review of the relevant literature to the dissertation; this is not a chronological overview of the literature, but rather a journey through the stress experience, covering the key physiological and psychological phenomena that occur when an individual is exposed to a stressor. Chapters 3, 4 and 5 focus on the three key inter-connected studies of the dissertation. Each study in this dissertation will begin with an introduction to the relevant literature and rationale for the study design, followed by a detailed review of the methodology used, as well as results and discussion. Each study chapter can be read as a standalone manuscript. Chapter 3 is presented as a journal article that will be submitted for publication after the dissertation is complete. Chapters 4 and 5 are designed to be read as individual chapters that have not yet been prepared for submission to a journal for publication; this work will be completed in the future. Finally, Chapter 6 provides a general discussion to interlink chapters 3, 4 and 5, with implications for future research also covered.<sup>1</sup>

---

<sup>1</sup> The majority of this dissertation was completed when American Psychological Association (APA) 6<sup>th</sup> edition manual was being used, thus, APA 6<sup>th</sup> edition (not 7<sup>th</sup> edition) is the formatting choice throughout.

## **Chapter 2**

### **Review of literature**

Evaluation of strategies to reduce stress in non-clinical populations has been the focus of research for decades (e.g., Baer, Carmody, & Hunsinger, 2012; Carlson, Speca, Faris, & Patel, 2007). Researchers have tried to understand the processes involved in the human stress experience (e.g., Selye, 1950), and the impact stress has on peoples' well-being (Cooper & Quick, 2017). Stress is a risk factor for the development and exacerbation of numerous mental and physical health conditions, including but not limited to depression and anxiety (Lin, Lin, Lin, & Huang, 2011; Van Prang, 2004), insomnia (Linton, 2015), schizophrenia (Gispén-de Wied, 2000), bipolar disorder (Bender, Alloy, Sylvia, Urošević, & Abramson, 2010), degenerative neurological conditions (Karagkouni, Alevizos, & Theoharides, 2013), cancer (Feng et al., 2012), cardiovascular disease (Steptoe & Kivimaki, 2013), Type 2 diabetes (Novak et al., 2013) and obesity (Schellekens, Finger, Dinan & Cryan, 2012).

In addition, the World Health Organisation (WHO) (WHO, 2017) reported a steady rise in deaths related to many conditions linked to stress over the period 2000 to 2016. Cardiovascular-related deaths increased by 20.50% globally while mental health and substance use disorder-related deaths increased by 21.25% globally in the same period). In addition to the impact on people's health, stress also places an economic burden on individuals and industry. For example, in Australia, an average of 58 new WorkCover<sup>2</sup> claims for work-related stress are approved weekly, costing businesses an estimated \$AUD273 million (Toscano, 2014). Stress has an impact on an individual level, in relation to psychological and physical health, but also on a systemic level.

---

<sup>2</sup> WorkCover is a compensation paid to employees should they be unable to work due to physical or psychological related work concerns.

This Chapter provides an overview of how stress has been conceptualised and defined over time. Physiological and psychological responses to stress, including individual differences in the stress experience, are also covered. Personality is the primary individual difference variable of interest, with differential associations between the Big Five traits and perceived stress being a central focus of this Chapter. This is followed by consideration, in turn, of affect and mindfulness, which are examined as potential mediators and/or moderators of the relationships between the Big Five personality traits and perceived stress. Hence, this review of the literature aims to explore pre-existing knowledge relating to the complex interrelationships between personality and perceived stress, while also evaluating evidence that may shed light on how variables such as affect and mindfulness impact the relationship between personality and stress.

## **Stress**

The definition of stress is widely debated among researchers and academics (The American Institute of Stress [AIS], 2011), with some taking a biological view of stress (e.g., Selye, 1977) and others looking at the cognitions associated with stress (e.g., Lazarus & Folkman, 1984). Selye (1977) described stress as the “nonspecific response of the body to any demand” (p.1). Selye later defined stress as wear and tear on the body, suggesting that longer or more frequent exposure to stress would have a greater impact on the body (AIS, 2011). Selye noted that not all stress exposure is problematic, because stress is a normal part of daily living and, while many individuals view stress as a source of despair, stress often also has benefits. In particular, stress is a vital part of human survival, being essential to our ability to adjust and adapt to situations. For example, before giving a presentation or sitting an exam, stress can enhance memory and performance (Selye, 1977), and increase survival chances (Gruner, 2006). While stress has adaptive benefits, it can also be problematic, such as where there is a need for readjustment of the body’s hormones. Problematic stress

responses occur when individuals are exposed to stressful situations for extended periods (Selye, 1977). For the purpose of this dissertation, the prolonged exposure to damaging stress, defined as any event (physical, mental, or emotional) that goes beyond an individual's social or personal resources to effectively manage or overcome the event (AIS, 2011) will be examined.

When an individual is experiencing stress, all aspects of life can be impacted. The signs of stress an individual may experience are broken into four categories: emotional, physical, cognitive, and behavioural (AIS, 2019). Emotional stress responses impact directly on an individual's feelings, including feeling overwhelmed, having difficulty relaxing, feeling worried or anxious, and experiencing low self-esteem (Moksnes, Bradley Eilertsen, Lazarewicz, 2016). Physical stress symptoms affect the body in an observable way, such as low energy, aches and pains, insomnia, and dry mouth. Cognitive stress influences an individual's reasoning and perceptions of events, such as, constant worrying, forgetfulness, inability to focus, poor judgement, and being pessimistic. Behavioural symptoms affect the actions of an individual, such as changes in appetite, procrastinating, and possible increased use of drugs or alcohol (AIS, 2019). The symptoms of stress are visible in many ways, and are often present at varying levels.

Researchers have distinguished between healthy and productive stress responses and those that are damaging to an individual. Teigen (1994) explained how Yerkes and Dodson's (1908) Inverted U-hypothesis can be used to explain healthy stress responses. Essentially the Inverted U-hypothesis proposes that optimal performance will occur at an intermediate level of stress. Lowered performance will be seen when stress levels are too high or too low (Teigen, 1994). Healthy stress responses to situations include an increased level of arousal, motivation, and performance. However, once the optimal level of performance is reached, if persistent exposure to stress continues, this could result in fatigue and a decline in

performance (Yerkes & Dodson, 1908). Individuals will achieve the best results and optimal task performance when the ideal level of stress is reached (Le Fevre, Matheny, & Kolt, 2003). Reduction in performance is observed if stress levels continue to rise (Teigen, 1994). For example, some stress concerning an upcoming exam may be beneficial, in that it might encourage students to study, however, stress levels that are too high may lead to avoidance of study or a cognitive inability to concentrate. McNally (2002) proffered several criticisms of the Yerkes and Dodson's inverted-U as an explanation for performance. One criticism related to what he considered its' simplistic explanation of the stress response, which does not allow for the complexities associated with the stress experience, such as individual differences. The stress process is a multidimensional response and is divided into several elements: exposure to the stress event, cognitive appraisal of the event, physiological stress response, and coping behaviour (Everly & Lating, 2019; see Figure 2.1). Each of these components will be reviewed in detail throughout this chapter.

### **Stress events or stressors**

Gruner (2006) described a stressful event or stressor as any incident that can lead to wear and tear on an individual's physical or mental resources. According to Everly and Lating (2013), stressors can be organised into two separate categories: biogenic, also known as biological, and psychosocial stressors. Biogenic stressors affect the body directly without requiring interpretation from an individual's perception. Biogenic stressors do not require input from coping mechanisms and always elicit a physiological stress response (explored later in this Chapter) when exposed to them. Examples of biogenic stressors include caffeine, nicotine, drugs, alcohol, and extreme heat or cold (Everly & Lating, 2013; Segerstorm & O'Connor, 2012). Biogenic stressors, unlike psychosocial stressors, will produce a physical stress response without conscious appraisal of the event (Andreou et al., 2011).



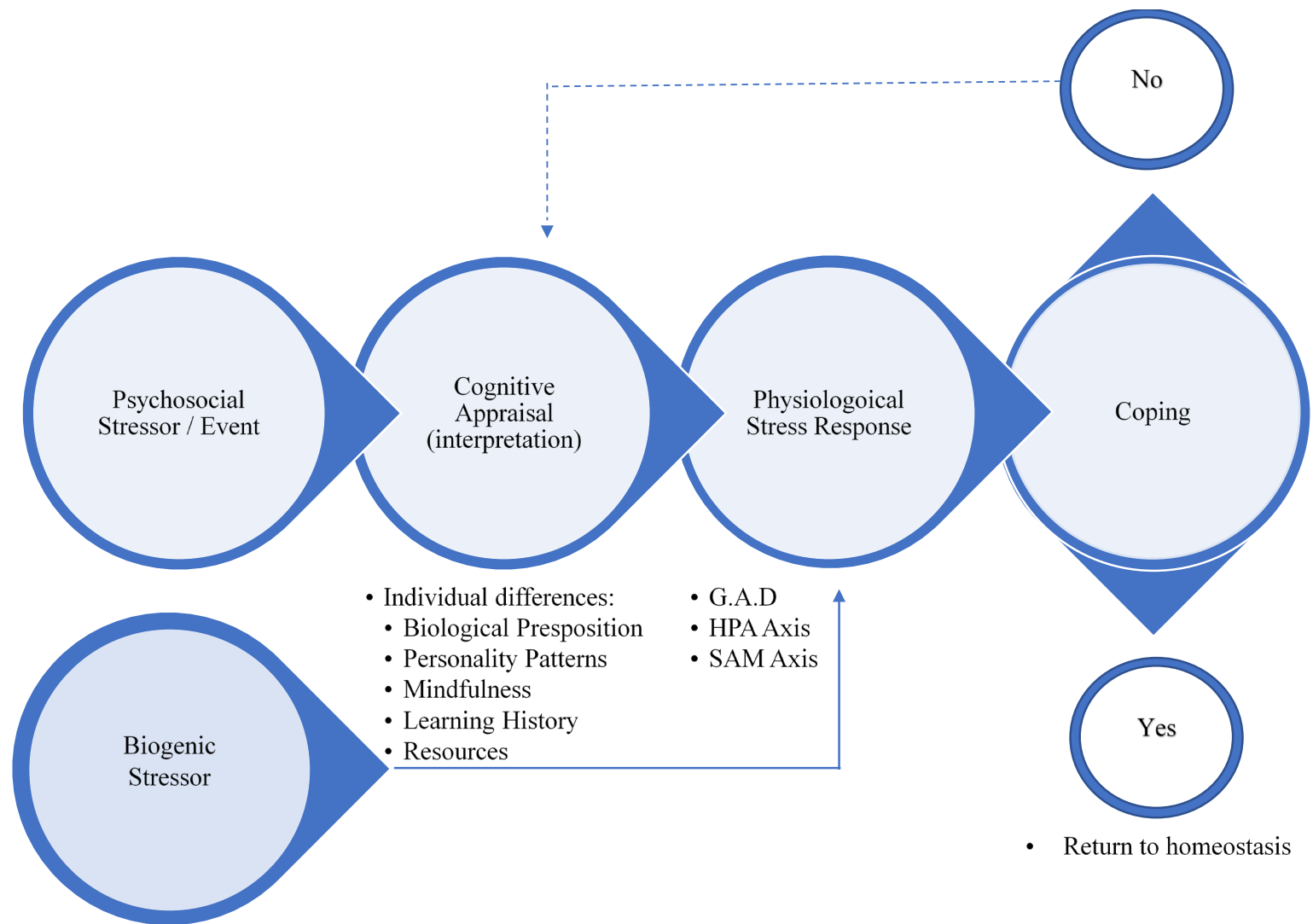


Figure 2.1<sup>3</sup>. The stress process (adapted from Everly & Lating, 2013).

<sup>3</sup> Figures are titled by chapter number, followed by location within the chapter.

Psychosocial stressors require cognitive appraisal to be determined as stressful. Lazarus and Folkman (1984) argued that these events can be real or imagined events that cause distress, such as job interviews, the death of a loved one, or lack perceived of social support (Öhlin, Nilsson, Nilsson, & Berglund, 2004). Andreou et al. (2011) furthered that psychological stressors are an individual's interpretation of how stressful their life or an event is, or how often they are exposed to stress. Psychosocial stressors are events that impact interactions with others or could result in an individual being perceived poorly by others.

Everly and Lating (2013) proposed two types of stressors, Andreou et al. (2011) argued that there is a third, environmental stressors. Environmental stressors are assessed as demanding events that cause a change in an individual's life, such as a new job, break-up of relationships, or even arguments with others (Andreou et al., 2011; Guski, 2001).

While biogenic stressors are measured without the need for interpretation, environmental and psychological stressor measurements often involve observation or self-reports by individuals. Appraisal of how stressful events are could lead to individual differences in environmental and psychological stress assessments. Everly and Lating (2013) stated that "stressors, like beauty, reside in the eye of the beholder" (p. 27), emphasising the importance of cognitive appraisal to the stress response process.

### **Cognitive appraisal**

Cognitive appraisal is the evaluation process that ascertains why and to what degree an event is determined to be stressful (Lazarus & Folkman, 1984). Cognitive appraisal is crucial in understanding why individual differences can be seen in stress responses (Lazarus & Folkman, 1984), for example, a psychosocial stressor may progress from being a mundane event (without physiological activation) to eliciting a physiological stress response (Everly & Lating, 2013). Appraisal of a potential stressor can determine if an event is considered a

threat or mundane. Cognitive appraisal involves two processes: primary and secondary appraisal. Lazarus and Folkman (1984) explained that there are three types of appraisal, irrelevant, benign-positive, and stressful. Numerous factors will be considered when determining if an event is stressful, including (but not limited to) the importance of the event, individual values, and beliefs (Schneider, Rench, Lyons, & Riffle, 2011), the potential to damage the body, or the event likely resulting in failure (Yeager, Lee, & Jamieson, 2016). If an event is viewed as irrelevant an individual has no investment in the possible outcomes of the event, essentially it holds no value to them (Lazarus & Folkman, 1984). Benign-positive events are those that are deemed to enhance an individual's well-being. Often these events will have some prospect of apprehension, but generally the possible positive outcomes will be more desirable than possible later harms.

The third type of appraisal proposed by Lazarus and Folkman (1984) is when an event is considered stressful. Stress appraisals include three components: harm or loss, threat, and challenge. Harm or loss events can be anything from injury and illness to loss of self-esteem or a loved one (Lazarus & Folkman, 1984). Dickerson and Kemeny (2004) found that events that resulted in being viewed negatively by others were more likely to elicit stress responses than other types of event. A threat refers to harms or losses that have not yet taken place but are anticipated. As such, when encountering a threat, an individual can foresee the potential difficult situation, enabling them to prepare for coping. In contrast, a harm or loss has generally already occurred (Lazarus & Folkman, 1984). The third type of stress appraisal is a challenge, which involves invoking coping mechanism with the potential for gain or growth. Lazarus and Folkman (1984) note that threat and challenge are not mutually exclusive, and often an event can form both a threat and a challenge.

If a situation is perceived as a threat, secondary appraisal will take place (Lazarus & Folkman, 1984). During secondary appraisal, individuals determine if they possess the

necessary resources for coping with the potential stressor (Gaab, Rohleder, Nater, & Ehlert, 2005). If an individual perceives that they do not have the necessary skills to cope with the potential stressor, it will be perceived as a stressor, although this may be dependent on individual differences in perception (which will be explored later). Coping refers to an individual's attempt to reduce stress responses (both psychological and physical) and return the body to homeostasis, which is the body's state of stable internal, physical, and chemical levels (Betts et al., 2017). If an individual determines that they have the necessary resources to cope with a potential stressor, a physiological stress response may not be elicited, however, if an individual believes they cannot effectively cope with a pending stressor, then physiological stress responses will take place.

### **Physiological stress response**

During cognitive appraisal, the hippocampus is activated and the physiological stress process starts taking place (Dresden, 2017). The hippocampus is the area of the brain primarily involved in memories; it forms part of the limbic system with the hypothalamus and the amygdala, which are important in the stress response process (Dresden, 2017). Activation of the hippocampus during cognitive appraisal helps an individual to recall similar stressors with which they have coped effectively in the past, or with which they were not able to cope, which can impact the likelihood of an event being appraised as stressful (Everly & Lating, 2013).

Cognitive appraisal is an individual experience and can be influenced by biological predispositions, personality types, learning, prior experience dealing with similar stressors, and the available resources for coping with the stressor (Everly & Lating, 2013). If an individual can deal with the potential stressor, it may create a positive experience and the stress response will dissipate after activation of the hippocampus occurs. If it is determined

through cognitive appraisal, however, that the stimuli are stressors, then the hypothalamus is activated and the physiological stress response occurs.

The General Adaptation Syndrome (GAS; Selye, 1977) describes the process the body goes through physically when exposed to a stressor. GAS is broken into three phases. The first phase is the alarm reaction, which is the body's immediate reaction to the stressor. Changes during this phase are a disruption to homeostasis. During alarm reaction, the Sympathetic-Adrenal Medullary (SAM) axis activates many of the key organs, such as the adrenal glands, in a process commonly known as the 'fight-or-flight' response. This is the immediate reaction of the body to stress, often occurring before an individual is even consciously aware of the stressor. The activation of the adrenal glands stimulates the release of epinephrine and norepinephrine into the bloodstream (Sarafino & Smith, 2011).

Epinephrine and norepinephrine are hormones that influence the stress response (Nall, 2018) and separate parts of the body to activate the central nervous system. Epinephrine, also known as adrenalin, affects both the alpha and beta-receptors within the body. Alpha receptors work to increase blood sugar levels, heart rate, and improving breathing and oxygen intake, while the beta-receptors work to return the body to homeostasis (Nall, 2018). Norepinephrine, or noradrenaline, increases blood sugar levels, heart rate, and blood pressure. The key difference between these two hormones is that norepinephrine can increase blood pressure while epinephrine does not (Nall, 2018). The activation of both hormones works to prepare the body for immediate response to a stressor.

After epinephrine and norepinephrine have been released into the body, the hypothalamic-pituitary-adrenal (HPA) axis activates. The HPA axis does not activate as quickly as the release of epinephrine and norepinephrine, though it still forms part of the alarm reaction response to stress (Sarafino & Smith, 2011). The HPA axis is the body's

central stress response system and comprises of the hypothalamus, pituitary gland, and the adrenal cortex (Veldhuis, Sharma, & Roelfsema, 2013). The hypothalamus is the primary link between the endocrine and nervous system, with its primary purpose being to maintain homeostasis (Johnson, 2018). The hypothalamus maintains homeostasis by controlling several different bodily functions, such as body temperature, appetite, blood pressure, and heart rate (Johnson, 2018). The pituitary gland is under the middle part of the brain and produces several different hormones, including growth hormones and oxytocin. The pituitary gland is also responsible for releasing a hormone to control the adrenal glands, which is important to the stress response process (Health Direct, 2018). The adrenal cortex is the outermost layer of the adrenal glands and is the largest part of the gland (John Hopkins Medical, n.d.).

When the hypothalamus is activated, the pituitary gland is also stimulated. The pituitary gland releases corticotropin-releasing hormones (CRH), which stimulates the anterior pituitary gland. Activation of the anterior pituitary gland secretes adrenocorticotropic hormone (ACTH), which is responsible for the regulation of corticosteroid, commonly known as cortisol. Once the ACTH is released, the adrenal gland releases cortisol into the bloodstream (Every & Lating, 2013), increasing heart rate and blood pressure (Gruner, 2006). Cortisol also controls blood pressure levels and improves memory, which is designed to help improve an individual's ability to overcome the potential stressor (Gruner, 2006). The hypothalamus and the pituitary gland can sense whether there is an appropriate amount of cortisol circulating throughout the blood (John Hopkins Medical, n.d.) if there is too much or too little cortisol the glands will respond appropriately to address the stressor, which is referred to as a negative feedback loop (John Hopkins Medical, n.d.).

Phase two of GAS, called the resistance phase, occurs if exposure to a stressor remains for an extended period. During the resistance phase, individuals start to make the

necessary changes to return to homeostasis (Selye, 1984). If an individual is repeatedly exposed to the same stressor, their ability to adjust and respond can increase, possibly resulting in returning to homeostasis more rapidly (Selye, 1950). As the body is attempting to adapt to the stressor, fewer outward signs of stress will be evident (Sarafino & Smith, 2011), as the reactions that were initially started by the sympathetic nervous system start to dissipate and heart rate, breathing and blood pressure begin to return to normal levels (Sarafino & Smith, 2011; Selye, 1980). This does not mean the stress response has completely subsided. HPA activation remains continuous during the resistance phase if exposure to the stressor does not cease. The continued physiological stimulation can cause impairment in coping abilities if a new stressor becomes present, which can cause individuals to experience adverse health conditions, such as cardiovascular disease (Selye, 1977; Steptoe & Kivimaki, 2013). This inability to cope with new stressors is known as the disease of adaption (Sarafino & Smith, 2011; Selye, 1980). If an individual successfully addresses a stressor, then the stress response dissipates, and the body begins to rebuild its stores of cortisol, which were secreted into the blood during the alarm phase (Selye, 1977).

Prolonged (or constant) exposure to stress can lead to an individual entering the exhaustion phase of GAS. The continued activation of the HPA axis and an inability to return to homeostasis will have long-term implications for an individual (Selye, 1980). Specifically, the body becomes exhausted from functioning with higher levels of physiologic arousal, which is characterised by the complete loss of resistance. The toll on the body becomes noticeable; the individual may suffer from heart attacks, strokes and possibly death (Selye, 1950). Constant exposure to stressors can, however, result in lower HPA activation when faced with a stressful situation, which leads to less cortisol being secreted into the bloodstream (blunted cortisol reactions), possibly leaving the body unprepared to cope with the presented stressor (Ouellet-Morin, 2011). The exhaustion phase can be avoided; if an

individual believes that they can cope with the stressor, they will not enter the exhaustion phase. If a coping strategy is successful, then the body will return to homeostasis. However, if the coping strategy is not effective, then a negative feedback loop will develop, and individuals will return to cognitive appraisal. If the negative feedback loop occurs regularly, then individuals are more likely to reach the exhaustion phase (Every & Lating, 2013).

## **Coping**

A major component of cognitive appraisal is an individual's perceived ability to cope with the stressor. Coping is the effort to manage (e.g., tolerate, master, reduce, minimize) the resources that are required to deal with a potential stressor (Every & Lating, 2013; Folkman & Lazarus, 1980). In short, coping can be viewed as a person's attempt to return to homeostasis (Every & Lating, 2013). Coping can change from one point to another, based on personal circumstance or environmental factors. Secondary appraisal involves an individual determining if they have the necessary skills to cope with a potential stressor, if an individual has successfully coped with a similar stressor in the past then it is possible an event will not be viewed as a stressor (Lafferty & Dorrell, 2006) and stress responses will not take place.

Folkman and Lazarus (1980) suggested that coping can be either problem-focused or emotion-focused. Problem-focused is defined as actively altering the environment to eliminate the stressor (Folkman & Lazarus, 1980). Productive problem-focused coping strategies might include goal setting, practising the desired outcome (e.g., rehearsing a presentation), or seeking support from a health professional. Emotion-focused coping is defined as attempting to adjust the feelings related to the stressor, which may include strategies such as mindfulness and meditation (Folkman & Lazarus, 1980). While some coping mechanisms are positive and increase the likelihood of overcoming a stressor (e.g., studying for an exam), there are maladaptive coping mechanisms, such as indulging, denial, avoidance, repression, and alcohol or drug use, which may have positive short-term benefits



but can cause long-term damage (Lafferty & Dorrell, 2006). These strategies can cause biogenic stress responses, which cause physiological stress responses and reactivation of a possibly already depleted HPA system. As with cognitive appraisal, coping strategies are also subject to individual differences and involve the perception of coping ability. Exposure to stress is inevitable, yet the frequency and severity of the stress experience is individualistic. Three specific individual differences are important to this dissertation, personality, affect, and mindfulness, all of which have been linked to stress. Affect and mindfulness are specifically examined as possible moderating and/or mediating factors influencing the relationship between personality and stress.

### **Individual differences in the experience of stress**

#### **Personality**

When discussing personality, many different theories and descriptions have been offered (e.g., Engler, 2014; Matz, Chan, & Kosinski, 2016). The general public might describe personality in relative terms such as “good” or “bad”. A boring person might be defined as someone who lacks a personality, which is a reference to charisma rather than personality (Cervone & Pervin, 2008). Personality theorists agree that personality is the psychological underlying qualities that influence an individual’s enduring and distinctive patterns of feeling, thinking, and behaving (Cervone & Pervin, 2008; Cloninger, 2008). Cervone and Pervin (2008) expand the definition of personality by suggesting that the psychological underlying qualities that comprise a personality trait must also be enduring, influential and distinctive. To be viewed as enduring these qualities must be relatively stable and consistent across time and situations. To be distinctive, they must differentiate one person from another. These underlying qualities must also be influential, meaning that these qualities must contribute to an individual’s tendencies. Personality should refer to all aspects

of an individual's lives, including their mental health, emotional experiences, and social behaviours.

Personality theories help to answer questions on why individuals react differently in the same situation. There are many different theories to describe personality, some explore personality from a biological underpinning, such as the genetic and evolutionary theory, these theories focus on the links between personality development, Deoxyribonucleic Acid (DNA), and processing in the brain (Engler, 2014). Other theories claim that personality develops from behavioural learning and conditioning, such as classical conditioning, claiming that an individual's personality is a result of their learned experiences, gained through their interactions with others and the environment (Matz et al., 2016). Trait theories, which propose that individual cognitions, emotions, and behaviours are determined by several consistent and reliable traits, are the most widely accepted of the personality theories (Matz et al., 2016). Traits are the determining tendency or predisposition for an individual to respond to the world in a specific way (Engler, 2014).

The Big Five is a contemporary, trait-based, theory of personality that has inspired a plethora of research, including the relations of the Big Five to depression (Miller, Brady, & Dean, 2020), loneliness (Buecker, Maes, Denissen, & Luhmann, 2020), and stress (Engler, 2014). The Big Five personality traits are neuroticism, extraversion, openness to experience, conscientiousness, and agreeableness, and each trait comprises six key facets that are used to further understand an individual's personality. Personality traits influence the appraisal of stressors and also determinations relating to the available resources for coping (Vollrath, 2001). A plethora of research has linked personality and stress (Costa & McCrae, 1992; Grant & Langan-Fox, 2006; Penley & Tomaka, 2002; Schneider, Rench, Lyons, & Riffle, 2011; Vollrath, 2001). Individuals score high on some traits and low on others, with the pattern of these scores encompassing an individual's personality profile. Understanding a person's

profile on the Big Five can help to predict how likely it is that they will interpret events as potential stressors, and also what coping mechanisms they are most likely to utilise (Cloninger, 2008).

**Neuroticism.** Neuroticism is the most researched of the Big Five personality traits in relation to stress (Schneider et al., 2011). Neuroticism is described as a contrast between adjustment (or emotional stability) and maladjustment (Costa & McCrae, 1992). Individuals who present high in neuroticism are generally anxious, self-conscious, and tend to cope poorly with stress, when compared to those low in neuroticism (Giluk, 2009). High neuroticism can be a manifestation of emotional vulnerability, which is associated with greater reporting of medical symptoms (O'Loughlin & Zukeman, 2008), greater anxiety and depression (Carver & Connor-Smith, 2010), and poor coping with stress (Penley & Tomaka, 2002). People high in neuroticism often show higher reactivity to negative emotions and greater brain reactivity when exposed to negative stimuli (Feltman, Robinson, & Ode, 2009). Highly neurotic individuals often feel less control over a stressful situation compared to individuals who score highly on the other Big Five traits, such as extraversion (Bibbey, Carroll, Roseboom, Phillips, & Rooij, 2012). Individuals high in neuroticism are often plagued by negative emotions, such as worry and insecurity, and suffer from low self-esteem (Cloninger, 2008).

Researchers often focus on the relationship between neuroticism and stress. Consistently, neuroticism is positively correlated with perceived stress (Ebstrup et al., 2011; Penley & Tomaka, 2002; Schneider et al., 2011). Individuals high, compared to those low, in neuroticism tend to report relationships in a more negative manner, and are more likely to view a potential situation as stressful, and less likely to believe they have the necessary skills to address the potential stressor (Cloninger, 2008). Possible explanations for the high correlation between neuroticism and perceived stress could be low self-esteem, possibly due

to individuals lacking confidence in their ability to cope with the pending stressor (Moksnes, Moljord, Espnes, & Bryne, 2010).

Individuals high in neuroticism have different physiological responses to stress than those high in agreeableness and openness to experience (the other personality traits measured in the study; Bibbey et al., 2012). Individuals high in neuroticism showed a smaller cortisol response to stress, compared to those high in agreeableness and openness to experience, suggesting that they have blunted cortisol reactions. Blunted cortisol responses are generally the result of regular exposure to stressors, and have been linked with significant long-term implications, such as heart disease (Ouellet-Morin, 2011). Prolonged exposure to stress can result in diminished or blunted cortisol responses to stress. Blunted cortisol responses could be because individuals who score high on neuroticism have a restricted range of cortisol responses, possibly because they tend to perceive events more generally as stressors (Bibbey et al., 2012). Those high in neuroticism are more likely to perceive stressors each time they are presented with an event, which could cause chronic activation of the HPA axis, depleting cortisol supplies (Bibbey et al., 2012).

**Extraversion.** Extraversion refers to the extent to which someone is outgoing and sociable (Costa & McCrae, 1992). Individuals generally score on a scale ranging between extravert and introvert (Costa & McCrae, 1992). Extraverts are often talkative and social; they feel a need to be active and thirst for excitement and stimulation (Giluk, 2009). Extraverts compared to their low scoring counterparts report having more control over events and intimacy with others (Cloninger, 2008). Individuals who score high in extraversion are less likely to report feelings of prolonged stress (Ebstrup et al., 2011; Penley & Tomaka, 2002), this could be due to their increased social connectiveness or self-esteem (Costa & McCrae, 1992; Giluk, 2009).

Extraversion has been negatively linked with the perception of stress, suggesting that individuals who score high on extraversion are less likely to report perceiving stressful events (Ebstrup et al., 2011; Penley & Tomaka, 2002). The low correlations between extraversion and stress could be explained through differences in extravert's cognitive appraisal processes, including their perception of their ability to complete tasks or tackle a stressor. Specifically, because extraverts tend to have higher self-esteem than introverts (Costa & McCrae, 1992) and self-esteem has been linked with greater perceived coping resources when exposed to a stressor (Ouellet-Morin, 2011), it is possible that extraverts are less likely than introverts to perceive a potential stressor as a threat. Since extraverts are more outgoing, they may also be less likely to view events as overwhelming during primary appraisal, perhaps, experiencing fewer stressors. Jackson and Schneider (2014) found that extraverts use active and problem-focused coping and have reported less subjective stress and fear following a stressor.

Extraversion has been positively linked with one aspect of the stress process, specifically, positive coping ability (Jackson & Schneider, 2014). Penley and Tomaka (2002) noted that extraversion was positively associated with control over a three-minute speech task, pre-task and negatively associated with perceived stress post-task. Extraversion was also positively linked with perceived performance in the task and the observer rating of the speech given, suggesting that their confidence in performance ability was noticed by others. This result is not surprising when the facets that make up extraversion are considered. Individuals high in extraversion are more sociable, assertive, experience positive emotions, and have higher levels of self-esteem (Costa & McCrae, 1992). Suggesting extraverts may be more likely to enjoy public speaking and less likely to experience adverse outcomes because of being asked to do a presentation (Penley & Tomaka, 2002), compared to introverts.

Not all researchers have found a correlation between extraversion and stress. While most studies indicate a negative association between extraversion and stress (e.g., Ebstrup et

al., 2011; Penley & Tomaka, 2002), Jackson and Schneider (2014) argued that measures comparing extraversion to stress are difficult to compare directly due to the questions being used to measure the construct of extraversion. If a scale measuring extraversion includes items about seeking support from peers, the scale may have a higher correlation with stress responses compared to measures that do not include questions around seeking support. Seeking support from peers is not a defining characteristic of extraversion, rather, it is a coping strategy that is more commonly utilised by extraverts than introverts. Hence, it is possible that this scale development issue could help to explain some of the differences in findings between studies regarding associations between extroversion and stress. Brouwer, van Schaik, van Erp, and Korteling (2013) aimed to investigate the links between neuroticism, extraversion, and stress sensitivity. They induced a stress related task on 47 participants (aged 18-45; 49% male). Participants were asked to complete a computer task that was designed, by the experimenters, to make the participants fail, inducing stress. Brouwer et al. found that high extraversion influenced stress responses, but only for participants that were also low in neuroticism, indicating that the associations between extraversion and stress might be influenced by levels of neuroticism.

**Conscientiousness.** Conscientiousness refers to how well individuals manage their impulses, and they are often described as being diligent and careful (Costa & McCrae, 1992). Those who score high on conscientiousness are dependable and responsible, conversely those with lower scores tend to have less ability to prioritise meeting their responsibilities over acting on their desires, and are, therefore, often viewed as being lazy and unmotivated (Giluk, 2009). Individuals high in conscientiousness achieve more and set higher goals, especially in the workplace (Cloninger, 2008), exhibit lower depressive symptoms (Chen, Peng, Ma, & Dong, 2017), display higher levels of self-esteem (Robins, Tracy, Trzesniewski, Potter &

Gosling, 2001) and job satisfaction (Cloninger, 2008), compared to those low in conscientiousness.

Conscientiousness has been negatively associated with stress and positively associated with perceived ability to cope with a stressful task, specifically with speech-related performance tasks (Penley & Tomaka, 2002). High scores on conscientiousness are often linked with good academic performance and success (Costa & McCrae, 1992), therefore, a task focused on performance and ability to perform might be well suited for these individuals. Conscientiousness has also been linked with lower heart rate responses in a stress task (Brouwer, van Schaik, Korteling, van Erp, & Toet, 2015), suggesting that individuals high in conscientiousness have lowered physiological stress responses and less stress-related outcomes compared to those who are low in conscientiousness.

**Openness to experience.** Openness to experience (i.e., openness) is defined by attentiveness to inner feelings and a preference for variety (Costa & McCrae, 1992). Individuals who score high on openness are curious and imaginative, at times they can be unconventional but are generally accepting of new experiences. People high on openness are known to find creative and intelligent solutions when presented with potential stressors (Cloninger, 2008), but they are also flexible and do not have highly structured methods to obtain goals (George & Zhou, 2001). Individuals low on openness are generally closed to new experiences. Openness has been linked with better health outcomes for chronically ill individuals (Williams, Rau, Cribbet, & Gunn, 2009).

Fewer studies have examined the relationship between openness in relation to the stress response (Williams et al., 2009) and of the few studies that explore this relationship, there have been inconsistent results. Individuals who scored high on openness had less blood pressure reactivity in response to a stressor when compared to those that scored low in

openness, suggesting that they experience less physiological stress responses (Williams et al., 2009). Consistent with the finding of Williams et al., Penley and Tomaka (2002) concluded that there was a negative correlation between perceived stress and positive performance during a stress task. Openness has also shown a positive correlation with perceived ability to cope with pending stressors (Penley & Tomaka, 2002), which could suggest that a stressor is still perceived during primary appraisal, but that people high in openness may have the necessary resources to cope with the potential stressor, such that they do not perceive potential stressors as big a threat. This belief may reduce physiological arousal during a stress task.

Not all studies have shown a significant negative relationship between openness and stress; Ebstrup et al.'s (2011) found no significant correlation. One possible explanation for these results could be the type of experiment. Ebstrup et al. examined perceived stress in life in general but asking participants to recall stressful situations could mean they were specifically recalling events they found stressful, rather than engaging in a stress enhancing situation. Ebstrup et al.'s results could, therefore, be directly comparing openness with a stressor, rather than a situation that these individuals did believe they had the necessary skills to cope with. The non-significant result could be due to those high in openness being more at ease with their feelings and more accepting of negative events, such as stressors.

**Agreeableness.** Agreeableness is often described as the interpersonal trait (Costa & McCrae, 1992) because individuals high in agreeableness relate well to others. Individuals high in agreeableness are good-natured, cooperative, supportive (Giluk, 2009), and forgiving (Costa & McCrae, 1992), but when conflict with others occurs it impacts on their self-esteem negatively (Cloninger, 2008). Agreeable individuals try to avoid hostility and often get along with others (Cloninger, 2008). Alternatively, people who score low on agreeableness are generally more hostile towards others (Costa & McCrae, 1992).



In contrast to their openness results, Penley and Tomaka (2002) found no significant association between stress responses and agreeableness, stating that during a stress inducing task those high in agreeableness did not feel as much stress as people high in the other four personality traits. However, Ebstrup et al. (2011) found a significant negative correlation between perceived stress in the past month and agreeableness. These different findings could be a result of the facets that make up the agreeable trait and the experimental design of the two studies. That is, those who score high on agreeableness are more compliant and trusting in others, which could result in them willingly going along with a laboratory stress experiment, in comparison to participants lower in agreeableness who may be more likely to recall events that they perceived as stressful in the past.

**Big Five and stress research.** To date, few researchers have investigated all Big Five personality traits in one study, in relation to stress. Primarily, researchers have focused on the links between neuroticism and stress (Penley & Tomaka, 2002; Schneider et al., 2011), but researchers have provided limited investigations on the other personality traits, especially when examining a non-clinical population. Of the few studies investigating all five personality traits together, conflicting results have been found. Consistent positive bivariate correlations have been reported between neuroticism and stress, with negative correlations between extraversion and perceived stress and between conscientiousness and perceived stress also being reported consistently (e.g., Ebstrup et al., 2011), but the strengths of these relationships often vary. Mixed results have been found between agreeableness and openness (e.g., Penley & Tomaka, 2002), however, these are also the least researched traits in relation to stress. Table 2.1 offers a comparison between results found between the Big Five personality traits and stress and the strengths of these relationships.

Table 2.1<sup>4</sup>.

*The Big Five personality types and past research in associations with stress and mindfulness.*

	Study	n	Measures used	Personality Traits				
				N	E	C	O	A
Perceived	Ebstrup et al. (2011)	3471	- NEO-PI-R	+	-	-	No sig.	-
Stress			- General Self-efficacy	( <i>r</i> = .65)	( <i>r</i> = -.31)	( <i>r</i> = -.39)	( <i>r</i> = -.01)	( <i>r</i> = -.10)
			- Perceived Stress Scale					
	Penley & Tomaka (2002)	170	- 75-item version of the NEO-PI	+	-	-	-	No sig.
			- Participants performed an oral presentation in front of an audience	( <i>r</i> = .21)	( <i>r</i> = -.24)	( <i>r</i> = -.20)	( <i>r</i> = -.21)	( <i>r</i> = -.01)
			- Self-reported stress post-task					
	Schneider et al. (2011)	152	- International Personality Item Pool	+	No sig.	Not	-	Not
			- The Positive and Negative affect scale	( <i>r</i> = .24)	( <i>r</i> = -.15)	measured	( <i>r</i> = -.20)	measured
			- Vocal arithmetic task to induce stress					

<sup>4</sup> Tables are titled by chapter number, followed by their place within the chapter.

Study		<i>n</i>	Measures used	Personality Traits				
				N	E	C	O	A
Mindfulness	Latzman & Masuda (2013)	429	- The Mindfulness Attention Awareness scale	- ( <i>r</i> = -.44)	+ ( <i>r</i> = .19)	+ ( <i>r</i> = .50)	No sig ( <i>r</i> = .09)	+ ( <i>r</i> = .41)
			- The acceptance and action questionnaire					
			- The Big Five Inventory					
	Thompson & Waltz (2007)	167	- Mindfulness Attention Awareness scale	- ( <i>r</i> = -.41)	no sig ( <i>r</i> = .05)	+ ( <i>r</i> = .28)	No sig ( <i>r</i> = .04)	+ ( <i>r</i> = .29)
			- Cognitive and Affective Mindfulness Scale-Revised					
			- The Toronto mindfulness scale					
			- International Personality Item Pool					
			- Positive and negative affect schedule					

Study	<i>n</i>	Measures uses	Personality Traits				
			N	E	C	O	A
Walsh et al. (2009)		- Freiburg mindfulness inventory	Not	Not	Not	+	Not
		- State-Trait Anxiety Inventory	measured	measured	measured	( $r = .16$ )	measured
		- Openness to experience 5 questions					
		from the NEO-FFI					

Methodology differences could help explain the variance in results between personality traits and perceived stress. Ebstrup et al. (2011) required participants to complete the Perceived Stress Scale, which asked participants to recall stressful events in the preceding 30-days. Asking participants to recall specific events that they deemed stressful may result in different types of events being recalled. Penley and Tomaka (2002) requested that participants complete a stress related activity in a laboratory setting and then asked participants to recall how stressful they found the task. Essentially, comparing memory recall and an experimental design. Experimental studies may not consider the individual differences in perception of stress, which is an important part of the stress process (Lazarus & Folkman, 1984). Schneider et al. (2011) employed a similar research design to Penley and Tomaka, measuring stress following a stress induction exercise. The results of Schneider et al. mirrored those of Penley and Tomaka, with the exception of extraversion (see Table 2.1), though the differences were small. Ebstrup et al. (2011) surveyed over 3400 participants from the Danish population (age range 18-69 years, 44.74% males), with a large majority of their sample employed (98%). In contrast, Penley and Tomaka (2002) conducted their experiment on 97 undergraduate psychology students (aged 17-42; 34% male) from the University of Texas. The population groups sampled could help to explain the differences in results. Schneider et al. also conducted their research on a university undergraduate population, though had a slightly larger sample size ( $N = 152$ ; 28% male) with similar results being found. As Penley and Tomaka's and Schneider et al.'s studies both used undergraduate samples, they were both assessing variables on people who were educated, and from within a closed sample group (i.e., the university in which the research was taking place), which makes generalizability of the results more difficult.

In summary, personality can impact on the stress response in several ways: via primary and secondary appraisal (Lazarus & Folkman, 1984), and the coping mechanisms

employed. Individuals who present high on neuroticism may be more likely to perceive stress compared to those low on neuroticism (Shewchuk, Elliot, MacNair-Semands, & Harkins, 1999). Personality traits can influence primary appraisal by impacting what can be viewed as a potential stressor and has also been linked with perceived ability to cope with potential stressors. For example, those high on conscientiousness may be more likely to perceive they have the appropriate practical skills to address a stressor compared to those low in conscientiousness (Shewchuk et al., 1999). Types of coping mechanisms used have also been linked with personality, with Connor-Smith and Flachsbart (2007) indicating that individuals high in neuroticism were more likely to withdraw from situations (using avoidance coping) that might cause potential stress responses compared to those low in neuroticism.

Hence, while most knowledge about the link between personality and stress has come through the examination of bivariate relationships between personality traits and perceived stress, via studies that are commonly cross-sectional and correlational in design, it is evident that a range of other factors are at play. These factors include personality-related differences in cognitive appraisals and coping methods, the impacts of which on stress responses are typically inferred rather than being investigated directly. Another way of gaining insight into the factors influencing the relationship between personality and stress is to develop and test mediation and/or moderation models. In the present research program, two possible mediators and/or moderators of the relationships between Big Five personality traits and perceived stress were investigated: affect and mindfulness. These factors are discussed below, in turn.

## **Affect**

Affect is conceptualized as comprising of two key components: positive affect and negative affect. Affect is noted as being a state of being, which fluctuates. An individual who

is high on positive affect is enjoying engaging with the environment and are often enthusiastic (Crawford & Henry, 2004). In contrast, an individual who is experiencing high levels of negative affect is said to experience distress and unpleasurable engagements (Crawford & Henry, 2004). While the relationship between stress and affect has been established, little is known about the way in which affect, either positive or negative, impacts the relationship between stress and personality. Many researchers have found links between each of the Big Five personality traits and affect (e.g., DeNeve & Cooper, 1998; Izard et al., 1993), with a consensus that on a day when an individual is to experience stress, they report higher negative affect and lowered positive affect (Leger, Charles, Turiano, & Almeida, 2016). Literature documenting current knowledge of associations between stress and affect, and also that relate to personality and affect, are reviewed and discussed in depth in Chapter 3.

### **Mindfulness**

Mindfulness has become more popular in Western civilization since the turn of the 21<sup>st</sup> century but has been the feature of daily life in many Eastern cultures for thousands of years (Chiesa & Serretti, 2010). Mindfulness takes its roots from the ancient Buddhist concept of Zen meditation and is believed to share many aspects with ancient Vipassana medication rituals (Chiesa & Serretti, 2010). Mindfulness is often linked with relaxation techniques such as Yoga, however, in its entirety mindfulness is a form of mental training with the aim of reducing cognitive vulnerability and distress (Bishop et al., 2004). Like personality, mindfulness has been linked to individual differences in perceived stress (Chiesa, Serretti, & Jakobsen, 2012) and could help to explain differences in stress responses.

Walsh, Balint, Smolira, Fredericksen, and Madsen (2009) described mindfulness as “a state of enhanced attention to, and awareness of, what is taking place in the present” (p. 94).

Their definition has echoed throughout most of the Western research investigating mindfulness (Brown & Ryan, 2003; Giluk, 2009; Thompson & Waltz, 2007). Mindfulness has been linked with the reduction of stress-related ailments such as headaches (O'Loughlin & Zukeman, 2008), substance use (Bowen et al., 2006; Zgierska et al., 2009), depression and anxiety (Hofmann, Sawyer, Witt, & Oh, 2010), and insomnia (Gross et al., 2011).

Researchers (e.g., Bishop et al., 2004; Brown & Ryan, 2003) who investigate mindfulness have often debated the exact definition of the term, however, most consistent definitions have broken mindfulness into two key components: attention and acceptance (Coffey, Hartman, & Fredrickson, 2010). Coffey et al. (2010) explained that the *attention* component of mindfulness refers to consciously regulating attention. That is, deliberately focusing on observing one's thoughts, feelings, physical sensations, and other stimuli as they occur in the present moment. *Acceptance* refers to maintaining an openness towards these experiences without judgment. As part of acceptance, an individual should not ignore or minimize the stimuli even if the stimuli are unpleasant (Coffey et al., 2010).

There is growing debate regarding the nature of mindfulness, particularly whether it is a state, that is a temporary way of being, or if it is a trait, that is enduring, and stable. Bishop et al. (2004) argued that mindfulness is more of a state than a trait as it involves paying attention to experiences. If an individual is to bring deliberate attention to a situation taking place, then this causes it to be a state, something that will cease when attention is extinguished. Conversely, Feltman, Robinson, and Ode (2009) argued that trait mindfulness, also referred to as dispositional mindfulness, is equally as important as state-based mindfulness. Trait mindfulness is an individual's natural predisposition to pay attention to their thoughts in a non-judgmental manner (Feltman et al., 2009; Reb, Narayana, & Chaturvedi, 2014). Essentially, if mindfulness is practiced, such as through guided meditation or forced attention, then this would be considered a state, however, trait mindfulness would



be how much attention and awareness an individual pays to events without deliberation.

Kiken, Garland, Bluth, Palsson and Gaylord (2015) explained that as an individual practices state-based mindfulness for ongoing periods, trait mindfulness can also increase. For the purpose of this dissertation, both state and trait mindfulness will be examined in relation to stress and personality.

### **Stress and mindfulness**

Researchers have disagreed in relation to whether that mindfulness influences an individuals' ability to interpret stressful events. . It has been argued that trait mindfulness impacts cognitive appraisal (Garland et al., 2010), possibly during both primary and secondary appraisal. Trait theories of mindfulness, similar to those of personality, indicate that if an individual has higher trait mindfulness, then they are less likely to perceive stimuli as potential stressors (primary appraisal) or are more likely to believe that they have the required skills to cope with the potential stressor (secondary appraisal, e.g., Ellis, Brown, Thorsteinsson, & Perrott, 2014). Conversely, both trait and state mindfulness may act as a coping strategy, engaging in mindfulness techniques to deliberately lower reactivity to already established stimuli, which would be consistent with a state-based mindfulness approach (Chiesa et al., 2012).

Mindfulness-based stress reduction (MBSR; Baer et al., 2012) is a state-based program, which usually involves weekly, one to two-hour mindfulness sessions for at least eight weeks. During the eight-week program, there is often a one-day mindfulness retreat, where individuals come together and engage in a full day of mindfulness training. MBSR programs (which have been empirically validated) are designed to help with coping with potential stressors (e.g., Baer et al., 2012). Different programs tailor their workshops for specific client groups, for example, breast cancer patients (Sarenmalm et al., 2013). Baer et al. (2012) examined the changes in self-reported trait mindfulness and perceived stress levels

in individuals following an 8-week MBSR program. In total, 75 individuals with problematic stress-related conditions, including chronic pain and illness, completed the MBSR program. Results from their study showed that a minimum of four sessions of mindfulness training are needed for reduction in perceived stress to occur. The results found by Baer et al. are promising; however, caution when interpreting the results is necessary as the study lacked a control group and the researchers used a shortened, non-psychometrically validated version of a commonly used mindfulness measure; the Five Facet Mindfulness Questionnaire. MBSR programs have also been criticized, with participants needing to attend sessions conducted over an 8-week period, which is time-consuming and can lead to substantial drop out.

Issues with attrition rates have been evident in other studies. In Kluepfel et al.'s (2013) study, for example, less than half of their original participants completed all 8-weeks of the MBSR training. It might be that participants who completed the full 8-week course were already naturally more mindful and accepting before commencing the program compared to those who dropped out before completion. There is evidence to indicate that a range of factors can impact the likelihood of mindfulness interventions being successful, including personality and a predisposition to be mindful (Giluk, 2009). There are many online mindfulness programs, as well as “apps” where good results have been promised, however reviews conducted on these apps indicate little evidence supporting the effectiveness of increasing levels of mindfulness or promoting stress reduction (Daudén Roquet & Sas, 2018).

### **Personality and mindfulness**

There is limited research on the relationship between the Big Five personality traits and mindfulness. Generally, individuals who present high on neuroticism have been found to display lower levels of trait mindfulness (Giluk, 2009; Thompson & Waltz, 2007).

Conversely, the conscientiousness and agreeableness traits have been found to have a positive

correlation with trait mindfulness (Giluk, 2009). This positive correlation is not surprising given that conscientiousness involves self-discipline and deliberation while agreeableness is about being tender-minded and caring. Extraversion and openness to experience have also produced conflicting results, with researchers reporting both positive and negative correlations, or the lack of a significant association at all (Brown & Ryan, 2003; Giluk, 2009; Thompson & Waltz, 2007; Walsh et al., 2009) in relation to mindfulness. Such mixed findings may be linked to methodological differences between studies, such as the use of different measures to assess the personality traits and mindfulness, or there being confounding in relation to demographic differences. However, it is not possible to make such determinations with appropriate levels of certainty due to the relatively limited number of studies investigating these associations. Hence, additional studies are required to improve the knowledge base in this area.

Understanding the associations between mindfulness and personality could help increase our understanding of the effectiveness of mindfulness for different people, such as explaining differences between those who find mindfulness practice useful and those who do not (Giluk, 2009). MBSR has been found to successfully lower stress-related condition, such as depression and anxiety (e.g., Hofmann et al., 2010), though the impact of personality on these relationships is still largely uninvestigated. Nyklicek and Irmischer (2017) examined the effectiveness of MBSR on four personality traits concerning changes in the mood of participants. Their results showed that neuroticism was the only personality trait significantly correlated with a change in depressive mood scores, even after a mindfulness intervention. Their results showed significant decreases in depression and anxiety post-task that were still evident at a three-month follow-up. Nyklicek and Irmischer also noted a reduction in depression and anxiety symptoms for those who presented with high neuroticism, however, when controlling for mood, they found that the higher the baseline levels for mood problems,

the stronger the reduction. These results indicate that mindfulness interventions might simply be improving mood levels or affect, rather than decreasing stress responses. Understanding if mindfulness is changing mood levels or feelings of depression, is an important distinction given the long-term health impacts of prolonged exposure to stress. The interactions between stress, personality and mindfulness are still largely unknown.

### **Stress, personality, and mindfulness**

To date, little research has investigated the association between stress, personality, and mindfulness concurrently. A previous study (de Vibe et al., 2013) investigated whether those scoring high on neuroticism, extraversion, or conscientiousness traits would benefit most from mindfulness training to reduce distress, study stress, and improve subjective wellbeing. The sample consisted of 288 medical and psychology students who were randomly allocated to a treatment and control group. The treatment group completed seven weeks of mindfulness training in combination with at-home training, while the control group received no intervention, and continued with their studies as usual. Results showed that participants who scored high on neuroticism benefited the most from mindfulness training, in that they reported lower levels of mental distress post intervention while those in the control group remained stable. Although these results are encouraging, only three of the Big Five personality traits were investigated, using only a student sample which may be a limitation of the study.

While there seems to be a compelling argument for the links between stress and mindfulness and stress and personality, a dearth of research has investigated these three variables together. Tang and Posner (2013) called for a greater understanding of individual differences in levels of mindfulness, to allow for better understanding in how mindfulness can impact on stress. Not enough is known about personality differences in mindful practices, either experienced or novice, and the interactions or effects this could have on the stress

response system. The need for a more in-depth investigation into the benefits of mindfulness training and its relationship to all Big Five personality traits is required to understand how targeted mindfulness interventions could benefit a range of different people and personality types experiencing stressful situations.

### **Summary of literature review and justification for research program**

Psychosocial stress has long been one of the most commonly reported issues experienced by people world-wide, including Australians (Australian Psychological Society [APS], 2015). The reported prevalence and severity of stress has been further exacerbated by the Coronavirus (COVID-19) pandemic and lockdowns taking place throughout the world (Asmundson et al., 2020; Taylor et al., 2020). This is of concern because stress, particularly when chronic, is associated with the development and exacerbation of many serious psychological disorders and physical health conditions and diseases, including major depression, schizophrenia, cancer, and cardiovascular disease (e.g., Everly & Lating, 2013). As such, it is critical that we increase our ability to accurately identify people who are currently affected by, or at high risk of experiencing, prolonged stress so that appropriate preventative actions, interventions and treatment programs can be administered, with the aim being to prevent the development or exacerbation of mental or physical health conditions.

The incidence and severity with which perceived stress and physiological stress responses are experienced is affected by a range of individual differences. For example, associations between some personality traits, such as neuroticism, and stress have been well documented (e.g., Penley & Tomaka, 2002). Though there is still some uncertainty about the exact nature of these relationships, personality is argued to influence cognitive appraisal and perceived coping, following post-stress exposure (Vollrath, 2001). Personality is enduring by definition (Cervone & Pervin, 2008), therefore, there is a need to identify variables that can influence the relationship between personality and stress, such as through mediation or

moderation, to help lower stress responses for those more likely to experience adverse stress responses (i.e., those high in neuroticism). Since affect is known to be associated with both personality and perceived stress, affect may be a mediator or moderator of the relationship between these variables. Similarly, trait mindfulness, which has been found to impact on cognitive appraisal (Garlan et al., 2010) and coping ability (Ellis et al., 2014), is another possible mediator or moderator of the relationship between personality and stress. Such investigations into the influences of affect and mindfulness on the relationships between Big 5 personality traits and perceived stress are presented in Chapters 3 and 4, respectively.

Mindfulness-based stress reduction training reduces perceived stress levels in some clinical populations (e.g., Baer et al., 2012), though the benefits of short mindfulness interventions on stress responses are largely unknown. Additionally, the impact of mindfulness and personality is rarely examined, and not concurrently, in relation to physiological stress-related outcomes. Here it should also be noted that, while lowering an individual's perception of stress is important, this could have a detrimental impact on the individual if a physiological stress response continues within their body. As such, understanding the variables that influence the relationship between personality and both perceived and physiological stress responses could help to understand how and when stress reduction interventions should be utilized, and for whom they are beneficial. A study examining the influence of personality and a brief mindfulness intervention on both perceived and physiological stress responses is presented in Chapter 5.

## **Chapter 3**

### **An investigation of associations between personality, affect and perceived stress**

Leanne Duggan<sup>a</sup>, Elizabeth Temple<sup>b</sup>, & Christopher Mesagno<sup>a</sup>

<sup>a</sup> School of Science, Psychology, and Sport, Federation University, Ballarat, Australia

<sup>b</sup> School of Psychology, University of New England, Armidale, Australia

### **Highlights**

- 56% of variance in perceived stress was explained by personality and affect
- Neuroticism and negative affect were both significantly, positively correlated with perceived stress, while positive affect was significantly, negatively correlated with perceived stress.
- Neither negative nor positive affect moderated the relationship between neuroticism and perceived stress
- Positive affect mediated the relationship between neuroticism and perceived stress, but negative affect did not.



## **Abstract**

Individual differences in perceived stress are associated with differences in personality and affect. Researchers have mainly focused on only two of the Big Five personality traits: neuroticism and extraversion. Additionally, minimal work has explored the role of affect and its possible mediating/moderating result on the relationship between personality factors and perceived stress. The present study aimed to increase understanding of these complex relationships by exploring the associations between the Big Five Personality traits, affect, and perceived stress, and investigating the possible mediating or moderating role of affect (positive and negative) on the personality-perceived stress relationship. A total of 290 adults (71% female; age range: 18-64 years;  $M_{age} = 35.0$ ,  $SD = 12.92$ ) participated by completing an online questionnaire. A hierarchical multiple regression indicated that 56% of the variance in perceived stress was explained by personality and affect. Higher levels of perceived stress were significantly associated with higher levels of neuroticism and negative affect, and lower levels of positive affect. While no moderation effects were found, results indicated that positive affect partially mediated the relationship between neuroticism and perceived stress, while negative affect did not. Results from the current study indicate that individuals who are high in neuroticism and low in agreeableness could benefit from learning stress management techniques that focus on emotion regulation.

*Keywords:* Stress; Personality; Affect; Moderation; Mediation; Exploratory.

## Introduction

The reported prevalence and severity of psychosocial stress continue to increase yearly in many countries, including Australia (Australian Psychological Society [APS], 2015), the United States of America (American Psychological Association [APA], 2018), and Germany (Techniker Krankenkasse [TK], 2016). Since stress is a risk factor for the development and exacerbation of numerous mental and physical health conditions, such as schizophrenia (Gispén-de Wied, 2000), cancer (Feng et al., 2012), and obesity (Schellekens, Finger, Dinan & Cryan, 2012). These increases were already a concern, but this has now been exacerbated due to the COVID-19 pandemic and lockdowns taking place throughout the world (Asmundson et al., 2020; Taylor et al., 2020).

A vast range of situational and psychosocial factors can be potential stressors, such as, job interviews and public speaking. Perceived stress is experienced when an individual appraises an event as potentially harmful or threatening to their wellbeing while also believing that they lack the resources necessary to deal with the threat successfully (Lazarus & Folkman, 1984). Hence, individual differences in the perception of potential stressors stress determines whether someone experiences stress and, if so, how severely they experience it (Gaab, Rohleder, Nater, & Ehlert, 2005).

Personality factors are known to account for some of the observed individual differences in the perception of stress (e.g., Penley & Tomaka, 2002). One of the major theoretical approaches in trait theory is Costa and McCrae's (1992) Five Factor Model (FFM) of personality. The FFM consists of five overarching traits, neuroticism, extraversion, openness to experience, conscientiousness, and agreeableness, commonly known as the Big Five.

The bivariate correlations between personality traits and affect, personality traits and perceived stress, and affect and perceived stress, have long been studied (Costa & McCrae, 1980; Ebstrup, Eplov, Pisinger, & Jørgensen, 2011; Lench et al., 2011; Penley & Tomaka,

2002; Watson, Clarke & Tellegen, 1988; Watson, Clarke, McIntyre & Hamaker, 1992). Yet, interrelationships among the Big Five personality traits, affect, and perceived stress have rarely been investigated concurrently. In particular, the possible mediating or moderating influences of affect on the relationships between all Big Five personality traits and perceived stress have not been investigated. What is known about these bivariate relationships will be discussed prior to the current study's methodology and results being discussed.

### **Personality and perceived stress**

Neuroticism, which is characterized by an increased likelihood of feeling negative mood states, including anger, guilt, and disgust (Costa & McCrae, 1992), is frequently investigated in relation to perceived stress, with which it is positively correlated. However, the reported strength of this association has been reported as varying from weak ( $r = .14$  to  $.24$ ; Mroczek & Almeida, 2004; Penley & Tomaka, 2002; Schneider, Rench, Lyons & Riffle., 2011) to strong ( $r = .55$  to  $.65$ ; De Jong, van Sonderen & Emmelkamp, 1999; Ebstrup et al., 2011) based on Cohen (1988). Such differences in strength of association may be due to methodological differences between studies. For example, the strong association between neuroticism and perceived stress reported by Ebstrup et al. (2011) was based on a cross-sectional correlational study of over 3,400 participants from a population-based group of Danish citizens. In contrast, Penley and Tomaka (2002), who reported a weak relationship, investigated the associations between neuroticism and acute stress in a laboratory setting. In this study, participants were exposed to a contrived high-pressure scenario, where they completed a three-minute talk in front of a laboratory assistant who prompted participants to continue talking if they ceased within the three-minute time, which elicited perceived stress. The difference in results between these two studies is, therefore, unsurprising, with Penley and Tomaka investigating stress responses in an acute stress task, while Ebstrup et al. examined retrospective accounts of perceived stress, as experienced over the past 30 days. On the basis of their findings, Penley

and Tomaka concluded that neuroticism was negatively associated with a person's perceived ability to cope with a stressor, and was positively associated with negative emotions, such as anxiety, fear, and guilt. This analysis of the influence of neuroticism on an individual's ability to cope with an acute stressor can help to further the understanding of the role of individual differences in the stress experience.

Extraversion is another highly investigated personality trait in relation to perceived stress, though the strength of this relationship also differs. Individuals high in extraversion are sociable and talkative, and often assertive and active (Costa & McCrae, 1992). Researchers agree that there is a negative relationship between extraversion and perceived stress, however, the reported strength of this relationship varies from weak ( $r = -.15$  to  $-.24$ ; Penley & Tomaka, 2002; Schneider et al., 2011), to moderate ( $r = -.31$ ; Ebstrup et al., 2011), to strong ( $r = -.62$ ; Shukla & Bala Panwar, 2015). As for neuroticism, it is likely that the differences in findings are associated with different study methodologies. Specifically, these findings are from studies that were a mixture of questionnaire-based responses, reflecting retrospective accounts of experiences in the past 30 days, and laboratory-based research. The differences in personality results could be in part due to the instructions of the questionnaires. For example, researchers (e.g., Penley & Tomaka; Schneider et al., 2011) investigated stress following a stress-induced task, therefore the stressor is fresh in the memory of those who are completing the questionnaire, measuring stated based stress. Other researchers (e.g., Ebstrup et al. 2011; Shukla & Bala Panwar, 2015) asked participants to reflect on the past 30-days when completing their stress measures. The difference in recalling stressful events in the past month, as opposed to acute recall, could be influenced by affect rather than actual stressors, which may explain the results.

The association between conscientiousness and perceived stress is rarely investigated, and varying results have been reported. Individuals who present high on conscientiousness are

organized and actively plan processes, can be strong-willed, and are often described as determined (Costa & McCrae, 1992). Conscientiousness is negatively associated with perceived stress; ranging from a weak association ( $r = -.20$ ; Penley & Tomaka, 2002) to moderate ( $r = -.39$ ; Ebstrup et al., 2011). Events viewed as stressful to those high in conscientiousness could be those of perceived lack of control or ability to plan for; individuals high in conscientiousness may not perceive a laboratory task as being stressful.

The limited research on the relationships between agreeableness and perceived stress is inconclusive. Individuals who score high in agreeableness are unselfish, are always willing to help others, and are cooperative (Costa & McCrae, 1992). Ebstrup et al. (2011) reported a weak negative association between agreeableness and perceived stress ( $r = -.10$ ), while Penley and Tomaka (2002) found no significant association ( $r = -.01$ ). Individuals high in agreeableness enjoy being helpful and are sympathetic to the needs of others (Costa & McCrae, 1992), thus, a laboratory-based design may be perceived as an ability to help others rather than a potential stress-inducing situation.

Minimal research has investigated the link between openness to experience (i.e., openness) and perceived stress. Individuals high in openness are curious and attentive to their feelings and are often characterized as having independence of judgement (Costa & McCrae, 1992). Openness has a non-significant relationship with perceived stress ( $r = -.01$ ; Ebstrup et al., 2011) or a weak negative association ( $r = -.20$  to  $-.21$ ; Penely & Tomaka, 2002; Schneider et al., 2011). The differences in strength of relationship could be found in different study's method. Individuals high in openness often experience both positive and negative emotions more intensely than those low in openness (Costa & McCrea, 1992). This could suggest that negative emotions due to the laboratory-based design may have caused those high in openness to score the significant correlation rather than the trait itself. An investigation into moderating

effects on the relationship between personality traits and perceived stress could explain some of these differences.

### **Affect and perceived stress**

Affect has been consistently associated with perceived stress (e.g., Blaxton & Bergeman, 2017). Affect is usually theorized as consisting of two factors: positive affect and negative affect. An individual in a state of high positive affect enjoys engaging with the environment and is enthusiastic and alert. Positive affect includes feelings such as: happiness and joy. In contrast, negative affect relates to distress and unpleasurable engagement with stimuli (Crawford & Henry, 2004), including anger, irritation, and sadness. Associations between negative affect and perceived stress have consistently been found to be positive in direction, ranging from moderate ( $r = .30$  to  $.44$ ; Blaxton & Bergeman, 2017; Mroczek & Almeida, 2004; Watson et al., 1988) to strong ( $r = .51$  to  $.66$ ; Civitci, 2015; De Jong et al., 1999; Schneider et al., 2011), suggesting that participants experiencing high negative affect will also experience higher levels of perceived stress. Conversely, associations between positive affect and perceived stress have consistently been reported as negative in direction and ranging from weak ( $r = -.20$  to  $-.22$ ; Blaxton & Bergeman, 2017; Watson, Clark, & Tellegen, 1988) to moderate ( $r = -.32$  to  $-.46$ ; Civitci, 2015; De Jong et al., 1999; Schneider et al., 2011).

### **Personality and affect**

Research conducted on the relationship between personality traits and affect has been increasing. Positive associations have consistently been reported between neuroticism and negative affect, ranging in strength from weak ( $r = .23$ -. $.28$ ; DeNeve & Cooper, 1998; Geukes, Nestler, Hutteman, Kufner & Back, 2017; Penley & Tomaka, 2002) to moderate ( $r = .30$ -. $.47$ ; Costa & McCrae, 1980; David, Green, Martin & Suls, 1997; Izard, Libero, Putnam & Haynes, 1993; Mroczek & Almeida, 2004; Myer & Shack, 1989; Schneider et al., 2011; Schutte, Malouff, Segrera, Wolf & Rodgers, 2003) and strong ( $r = .54$ -. $.69$ ; Emmons & Diener, 1985;

Gross, Sutton & Ketelaar, 1998; Rustling, 1999; Saklofske, Austin, Mastoras, Beaton & Osborne, 2012; Suh, Diener & Fujita, 1996; Watson et al., 1992; Wilt, Bleidorn & Revelle, 2017). The positive correlation between neuroticism and negative affect is expected; negative affect is feeling afraid, scared, and distressed, all dimensions that are linked with neuroticism (Costa & McCrae, 1992). Neuroticism has also been found to be negatively associated with positive affect, with relationships typically ranging from weak ( $r = -.14$  to  $-.28$ ; Costa & McCrae, 1980; David et al., 1997; DeNeve & Cooper, 1998; Myer & Shack, 1989; Saklofske et al., 2012; Schneider et al., 2011; Watson et al., 1992) to moderate ( $r = -.31$  to  $-.40$ ; Emmons & Diener, 1985; Izard et al., 1993; Rustling, 1999; Schutte et al., 2003; Suh et al., 1996). Other researchers have found very weak/non-significant associations between neuroticism and positive affect ( $r = -.03$  to  $.05$ ; Geukes et al., 2017; Gross et al., 1998; Penley & Tomaka, 2002). A non-significant result is unexpected given the facets of neuroticism and positive affect. Mixed results on how affect and neuroticism influence the stress response warrants further investigation.

Extraversion has a negative relationship with negative affect and a positive relationship with positive affect. Typically, a weak negative relationship between extraversion and negative affect ( $r = -.13$  to  $-.29$ ; Costa & McCrae, 1980; Geukes et al., 2017; Izard et al., 1993; Myer & Shack, 1989; Penley & Tomaka, 2002; Rustling, 1999; Saklofske et al., 2012; Schneider et al., 2011; Schutte et al., 2003) exists. Suh et al. (1996) reported a moderate negative association ( $r = -.40$ ). In contrast, other researchers have found weak/non-significant associations between extraversion and negative affect ( $r = -.07$  to  $.03$ ; David et al., 1997; DeNeve & Cooper, 1998; Emmons & Diener, 1985; Gross et al., 1998; Watson et al., 1992). Individuals high in extraversion do not put much thought into negative mood states, often associated with negative affect. Positive associations between extraversion and positive affect have also varied from weak ( $r = .13$  to  $.27$ ; Costa & McCrae, 1980; David et al., 1997; DeNeve & Cooper, 1998;

Geukes et al., 2017; Penley & Tomaka, 2002) to moderate ( $r = .31$  to  $.46$ ; Emmons & Diener, 1985; Gross et al., 1998; Izard et al., 1993; Saklofske et al., 2012; Schutte et al., 2003; Schneider et al., 2011; Suh et al., 1996; Watson et al., 1992; Wilt et al., 2017) and strong ( $r = .50$  to  $.59$ ; Lucas & Fujita, 2000; Myer & Shack, 1989; Rustling, 1999). Positive associations between extraversion and positive affect are to be expected, given that extraversion is characterized by feelings of positive emotions, suggesting individuals who score highly on extraversion are more likely to feel positive emotional states.

Conscientiousness has shown weak associations with both positive and negative affect. Typically, conscientiousness has had a weak negative association with negative affect ( $r = -.10$  to  $-.29$ ; DeNeve & Cooper, 1998; Geukes et al., 2017; Saklofske et al., 2012; Schutte et al., 2003; Watson et al., 1992), however, Penley and Tomaka (2002) reported a non-significant negative association ( $r = -.03$ ). Penley and Tomaka suggest that high levels of conscientiousness may result in lower levels of negative affect. Conversely, conscientiousness has a positive relationship with positive affect, with reported associations ranging from weak ( $r = .14$  to  $.22$ ; DeNeve & Cooper, 1998; Geukes et al., 2017; Saklofske et al., 2012) to moderate ( $r = .33$ ; Penley & Tomaka, 2002) and strong ( $r = .56$ ; Schutte et al., 2003). Weak associations between conscientiousness and both positive and negative affect could be a result of those high in conscientiousness preferring order and deliberation. They may see positive or negative emotions as unrelated to their goals and place preference on self-discipline rather than emotions.

Openness also shares weak relationships with both positive and negative affect, with many studies failing to replicate a significant correlation. Openness has a weak negative association with negative affect ( $r = -.14$  to  $-.27$ ; Penley & Tomaka, 2002; Schneider et al., 2011), however, the majority of researchers have found a very weak/non-significant relationship ( $r = -.06$  to  $.05$ ; DeNeve & Cooper, 1998; Geukes et al., 2017; Saklofske et al.,



2012; Schutte et al., 2003; Watson et al., 1992). The association between openness and positive affect has typically been positive and weak ( $r = .12$  to  $.22$ ; DeNeve & Cooper, 1998; Penley & Tomaka, 2002; Saklofske et al., 2012; Schneider et al., 2011) or moderate ( $r = .36$ ; Schutte et al., 2003) in strength. Researchers (e.g., Geukes et al., 2017; Watson et al., 1992) however, have reported finding a very weak/non-significant association between openness and positive affect ( $r = -.02$ ). Individuals who score high on openness are in touch with their inner-feelings and often experience positive and negative emotions more readily than individuals who score low on openness (Costa & McCrae, 1992) possibly resulting in those high in openness not scoring highly on positive or negative affect as they tend to sit between the two affect states.

Agreeableness has found similar results to openness with the magnitude of the effect size varying between studies. Agreeableness is typically reported to have a weak negative association with negative affect ( $r = -.10$  to  $-.24$ ; DeNeve & Cooper, 1998; Geukes et al., 2017; Saklofske et al., 2012; Schutte et al., 2003; Watson et al., 1992), however, a very weak association ( $r = -.08$ ) has also been reported (Penley & Tomaka, 2002). A negative association should be expected between agreeableness and negative affect; individuals high on agreeableness tend to encompass a 'forgive and forget' attitude (Costa & McCrae, 1992) suggesting they would not dwell on feelings of distress. The association between agreeableness and positive affect is positive and weak ( $r = .12$  to  $.22$ ; DeNeve & Cooper, 1998; Geukes et al., 2017; Penley & Tomaka, 2002; Saklofske et al., 2012) or moderate ( $r = .33$ ; Schutte et al., 2003) in strength with Watson et al. (1992) reporting no association between these variables ( $r < .01$ ). As individuals increase in their levels of agreeableness levels of positive affect will also increase slightly.

### **Aims and purpose of the study**

Our understanding of the interrelationships between personality, affect and perceived stress is limited due to most researchers investigating the links only in relation to neuroticism

and extraversion, rather than all of the Big Five traits, and not examining relationships between stress, affect and personality concurrently. Hence, the possible moderating or mediating impacts of affect on the relationship between personality traits and perceived stress are unknown. As such, the present study aimed to increase our understanding of individual differences in perceived stress by determining the individual and cumulative explanatory power of all Big Five personality traits and positive and negative affect. This paper expands on the understanding of how (or if) affect moderates or mediates the relationship between personality and perceived stress.

It is hypothesized that all personality variables will be differentially associated with perceived stress (Penley & Tomaka, 2002) and affect (Blaxton & Bergeman, 2017). Exploratory regression, moderation and mediation analyses will be conducted to investigate the way the Big Five personality traits and positive and negative affect are associated with perceived stress. As such, three possible models are examined: 1) that personality and affect have independent and direct effects on perceived stress; 2) that the effect of personality on perceived stress is indirect, being mediated through affect; and, 3) that the effect of personality on perceived stress is variable, being moderated by affect. The decision to examine these three possible patterns of association was based on the lack of available theory or evidence to determine which model type is most likely. On the basis of current knowledge, as discussed above, all three models possible are feasible.

## **Method**

### **Participants**

Using G\*Power (Faul, Erdfelder, Buchner & Lang 2009) with a medium effect size (.05), a power of 0.8, and  $\alpha = .05$ , it was estimated that a minimum of 89 participants would be required to ensure adequate power for the planned analyses. A total of 290 adults, ranging from 18 to 64 years of age ( $M_{age} = 35.00$ ,  $SD = 12.92$ ), participated in the study. Most participants

were female (71%), married/in a cohabiting relationship (55%) or single (27%) and from Australia (97%). Most commonly, participants worked full-time (46%), with 20% employed part-time/causally, 11% current students, and 6% unemployed. Most participants had a university degree (30%), completed high school (26%) or a vocational degree (20%).

## Measures

A SurveyMonkey online questionnaire (see Appendix A) was used to collect data for this study. Participants provided basic demographic information initially (e.g., gender, age, education level, marital status, and country of residence) and then completed a battery of questionnaires that included the Perceived Stress Scale, Big Five Inventory, and the Positive and Negative Affect Schedule.

**Perceived stress scale.** The Perceived Stress Scale (PSS; Cohen, Kamarck & Mermelstein, 1983) was used to assess the participants' experience of psychosocial stress during the past week. The PSS consists of 10 items (e.g., *In the last week, how often have you felt nervous and stressed?*), to which participants respond on a 5-point Likert-scale (0 = *Never* to 4 = *Very Often*). Total scores ranged from 0-40, with higher scores indicative of greater perceived stress. The PSS has shown good reliability, with Cronbach's  $\alpha$  of .75 and .85 for two study groups (Lavoie & Douglas, 2012), and being .89.

**The Big Five inventory.** The Big Five Inventory (BFI; John & Srivastava, 1999) was used to assess the participants' personality. The BFI consists of 44 items to which participants respond on a 5-point Likert-scale (1 = *Disagree Strongly* to 5 = *Agree Strongly*). Scores are calculated for each Big Five Personality trait: neuroticism (8 items, e.g., *I see myself as someone who worries a lot*; current study  $\alpha$  = .84); extraversion (8 items, e.g., *I see myself as someone who is talkative*; current study  $\alpha$  = .87); agreeableness (9 items, e.g., *I see myself as someone who is helpful and unselfish with others*; current study  $\alpha$  = .78); conscientiousness (9 items, e.g., *I see myself as someone who is a reliable worker*; current study  $\alpha$  = .81); and

openness to experience (10 items, e.g., *I see myself as someone who is original, comes up with new ideas*; current study  $\alpha = .72$ ). For each of the scales, a mean score is calculated, with all scores ranging from 1.0-5.0; higher scores indicating a higher level of that personality trait. In previous studies, the BFI has been reported to have good reliability with  $\alpha$  levels of ranging from .84 -.85 (Hill, Billington, & Krageloh, 2013; Soto & John, 2009).

**The positive and negative affect schedule.** The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) measures participants' emotional state over the past week. The PANAS consists of 20 items, to which participants respond on a 5-point Likert-scale (1 = *Very slightly or not at all* to 5 = *Extremely*) to indicate how often they have felt a certain way within the specified time frame. Scores are calculated for two domains: Positive Affect (10 items, e.g., *Interested*;  $\alpha = .93$ ) and Negative Affect (10 items, e.g., *Distressed*;  $\alpha = .92$ ). For each of the domains, total scores range from 10-40, with higher scores indicating a higher level of that affective state. The PANAS scale is a reliable measure of negative affect ( $\alpha = 0.82$ ) and positive affect ( $\alpha = 0.86$ ; Vollrath & Torgersen, 2000).

## **Procedure**

Before data collection commencement, the University's Human Research Ethics Committee approved this study (see Appendix B). Social media (e.g., Facebook), workplace employee emails, and undergraduate psychology classes were used to recruit participants. Advertisements were placed on the University's psychology research noticeboard and students were offered credit towards their research participation requirement. A workplace employee e-mail was sent faculty-wide within the University inviting staff to participate.

Within the recruitment materials, participants were provided with a SurveyMonkey link to the study questionnaires. Before commencing the study, participants were presented with a plain language statement and indicated their informed consent to participate. In total, the study

questionnaire took approximately 30-45 minutes to complete, and data collection took place over six months.

Prior to data analysis taking place, the data was reviewed to ensure participants had not completed the questionnaire on more than one occasion. This was completed by comparing Internet Protocol (IP) addresses and demographic information, specifically age and gender. No duplicate cases were evident.

## **Results**

Normality, linearity, and homoscedasticity were confirmed for all variables being used. No outliers were evident in the data. Missing data points (two participants) were excluded, ensuring all assumptions were met for the analyses being performed.

Given the large number of analyses required to test all three possible models with all five personality traits, and that this would increase the risk of Type 2 errors, the decision was made to include all five traits in the regression model, but to then focus on a single trait for the mediation and moderation analyses. This personality trait will be determined following the regression model.

The regression model posits that personality and affect both have independent direct effects on perceived stress, such that there is no interaction or relationship evident between the trait and affect. If found to be the case, this would mean that, for example, neuroticism and negative affect both explain significant and unique proportions of variance in perceived stress.

In contrast, a mediation model posits that personality acts on perceived stress via affect. If there is full mediation, personality only influences perceived stress indirectly through its impact on affect. If there is only partial mediation evident, personality also influences perceived stress directly. An example of such a mediation model, where the relationship between neuroticism (IV) and perceived stress (DV) is found to be fully mediated by negative affect,

would indicate that a person's high levels of neuroticism leads them to experience high levels of negative affect, which in turn, contributes to the person experiencing high levels of perceived stress.

While a moderation model posits that the strength and/or direction of the relationship between personality and perceived stress differs on the basis of level of affect, such that affect could either exacerbate or mitigate the effects of the personality trait on perceived stress. For example, if the relationship between neuroticism (IV) and perceived stress (DV) is found to be moderated by negative affect, this would indicate that a person with high levels of neuroticism and high negative affect experiences greater perceived stress than someone with high levels of neuroticism and low negative affect, such that high negative affect acts to strengthen (exacerbate) the association between neuroticism and perceived stress, while low level negative affect acts to weaken (mitigate) the association between neuroticism and perceived stress.

These analyses will be conducted separately to facilitate interpretation of the complex interrelationships under investigation. The information gained through this study will increase understanding of how affect might influence the relationship between personality and perceived stress, as to our knowledge, this has not been investigated previously.

### **Bivariate associations between personality, affect, and perceived stress**

Pearson's bivariate correlational analyses were conducted to investigate associations between key variables (see Table 3.1). All personality traits had a significant correlation with perceived stress, with neuroticism being the only trait where there was a positive correlation, which was strong in size. All personality traits were also significantly correlated with both positive and negative affect, except for extraversion and openness, which did not correlate with negative affect. Positive affect shared a moderate correlation with perceived stress, while negative affect had a strong correlation (according to Cohen, 1988).

Table 3.1.

*Bivariate associations between personality, affect, and perceived stress.*

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Perceived Stress	16.83	7.06	-						
2. Positive Affect	25.80	9.26	-.36***	-					
3. Negative Affect	14.40	6.47	.53***	-.12*	-				
4. Extraversion	3.21	.85	-.22***	.24**	-.10	-			
5. Agreeableness	3.85	.60	-.35***	.28***	-.22***	.11	-		
6. Conscientiousness	3.75	.64	-.31***	.32***	-.25***	.26***	.32***	-	
7. Neuroticism	2.95	.82	.69***	-.33***	.47***	-.29***	-.33***	-.28***	-
8. Openness	3.47	.56	-.19**	.18*	-.07	.24***	.13*	.21***	-.19**

*Notes:* \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

## **Multivariate investigation of perceived stress**

A hierarchical multiple regression analysis was used to determine which personality variables would explain a significant proportion of variance in perceived stress scores, when controlling for positive and negative affect (see Table 3.2), prior to completing the regression analysis, age and gender were controlled for as covariates.

At Step 1, positive and negative affect were entered. Both positive and negative affect account for significant amounts of variance in perceived stress; the total variance explained by the model was 38.80%, a medium effect size (Cohen, 1988).

After entering all Big Five personality traits in Step 2, the total variance explained by the model was 56.8%, a large effect size (Cohen 1988). At Step 2, the only personality trait to be significantly associated with perceived stress was neuroticism. Both positive and negative affect still explained a significant proportion of the variance in perceived stress.

## **Moderation analysis**

Neuroticism was chosen for the moderation and mediation analyses due to it being the trait with the strongest reported association with perceived stress, as stated above.

Two separate moderation analyses were conducted to determine if positive or negative affect would moderate the relationship between neuroticism and perceived stress. Hayes' (2013) PROCESS macro was used to determine if negative affect moderated the relationship between neuroticism and perceived stress. The model, as a whole, was significant,  $F(3,287) = 108.50, p < .001, R^2 = .53$ . However, negative affect did not significantly moderate the relationship between neuroticism and perceived stress,  $b = -.03, t(287) = -.57, p = .56$ , as there was no interaction effect evident.

A second moderation analysis was conducted to determine if positive affect would moderate the relationship between neuroticism and perceived stress. While the model was



significant,  $F(3, 284) = 91.62, p < .001, R^2 = .49$ , positive affect did not significantly moderate the relationship between neuroticism and perceived stress,  $b = -.04, t(284) = -.92, p = .35$ , as positive affect did not account for significantly more variance in perceived stress compared to neuroticism alone.

Table 3.2.

*Unstandardised (B) and standardised ( $\beta$ ) regression coefficients and semipartial correlations ( $sr^2$ ) for predictors of perceived stress.*

Variable	Step 1			Step 2		
	B [95% CI]	$\beta$	$sr^2$	B [95% CI]	$\beta$	$sr^2$
Positive Affect	<b>-0.21 [-.30, -.16]***</b>	<b>-.28</b>	<b>.09</b>	<b>-.82 [-.16, -.03]**</b>	<b>-.11</b>	<b>.01</b>
Negative Affect	<b>0.53 [.44, .65]***</b>	<b>.49</b>	<b>.25</b>	<b>.29 [.19, .39]***</b>	<b>.26</b>	<b>.05</b>
Extraversion				.03 [-.68, .72]	.002	<.001
Agreeableness				-.96 [-1.97, .05]	-.08	.005
Conscientiousness				-.53 [-1.30, .64]	-.48	<.001
Neuroticism				<b>3.93 [3.30, 4.99]</b>	<b>.45</b>	<b>.147</b>
Openness				-.38 [-1.52, .56]	-.03	.001
Model Summary	$R^2 = .37, F(2, 283) = 84.85, p < .001$			$R^2 = .56, F(5, 2780) = 51.34, p < .001$		
$R^2$ change				$\Delta R^2 = .18, p < .001$		

Notes: \*  $p < .05$ ; \*\*  $p < .01$ \*\*\*;  $p < .001$ ; significant results bolded

### Mediation analysis

A mediation analysis was also conducted using Hayes' (2013) PROCESS macro to determine if positive and negative affect mediated the relationship between neuroticism and perceived stress. To test the mediating effects of affect between personality and perceived stress, the Hayes (2009) revision of the sequence proposed by Baron and Kenny (1986) regression models were followed. To determine mediation, neuroticism must influence affect,

which in turn must influence perceived stress, and the signs of the relationship must be in the expected direction. Furthermore, the effect of personality on perceived stress must be significantly changed in the three-predictor model including affect, compared with the one-predictor model with personality alone.

The results of these regression analyses are summarized in Figure 3.1. Neuroticism was a significant predictor of perceived stress ( $b = 5.96, t = 16.02, R^2 = .47, p < .0001$ ), positive affect ( $t = -6.14$ ) and negative affect ( $t = 8.98$ ). In the three-predictor model both positive ( $t = -3.63$ ) and negative affect ( $t = 6.17$ ) were found to be significant predictors of perceived stress. The magnitude of the influence of affect was significant ( $t = 10.59$ ).

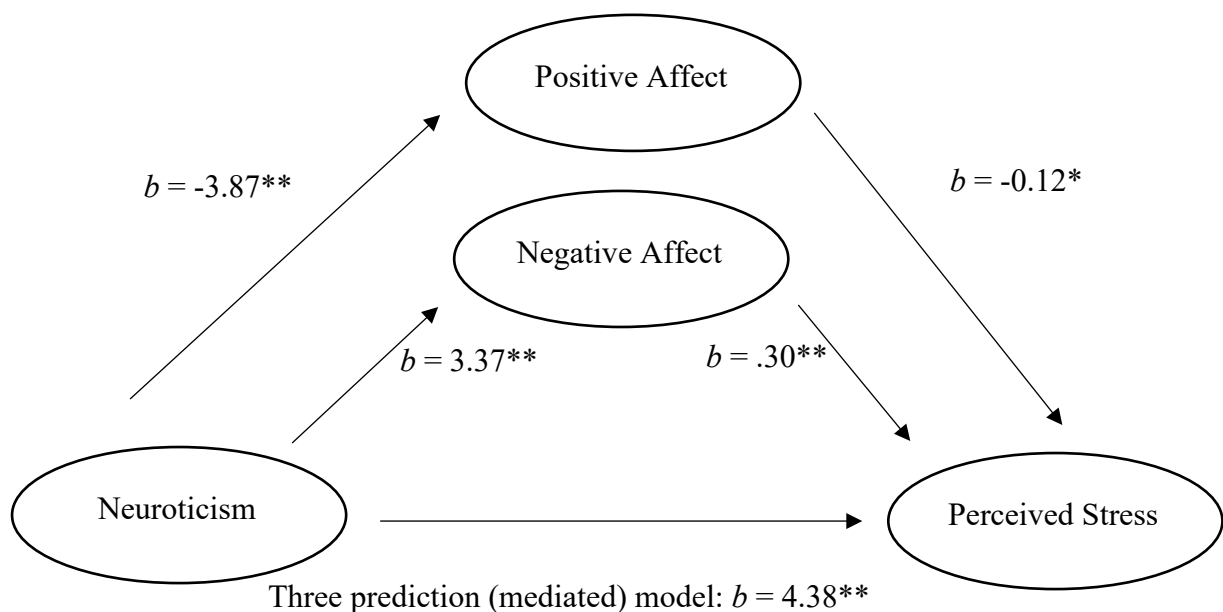


Figure 3.1. Mediation analysis between neuroticism, positive and negative affect, and perceived stress.

Notes: \*  $p < .05$ ; \*\*,  $p < .001$

Using bias-corrected and accelerated bootstrapping (Preacher & Hayes, 2008), the reduction in the association between neuroticism and perceived stress was found to be

significantly attributed to positive affect but not negative affect (95% confidence intervals for indirect affects: positive affect [.15, .79], negative affect [ .68, 1.63], 1000 replications). Effect size was calculated using the  $R^2$  values, 55% of the variation in perceived stress was attributed to neuroticism mediated by affect (positive and negative).

## **Discussion**

The purpose of the current paper was to further investigate the relationship between all Big Five personality traits, affect, and perceived stress. This paper also conducted an exploratory moderation and mediation analyses to further investigate the impact of affect on the relationship between personality and perceived stress. Results showed that all five of the personality traits, and positive and negative affect, were significantly correlated with perceived stress, with neuroticism and negative affect displaying the strongest correlations with perceived stress. The weakest bivariate correlations were observed between extraversion and openness with perceived stress, which were the only two traits to not significantly correlate with negative affect, suggesting that negative affect could be impacting the correlations between personality and perceived stress.

The current study's findings are consistent with previous studies. All five personality traits and positive and negative affect were correlated with perceived stress, which was consistent with previous findings (e.g., Civitci, 2015; De Jong et al., 1999; Schneider et al., 2011). Despite a similar methodology and populated ages between the current study and Ebstrup et al. (2011), our study found a weak negative correlation between openness and perceived stress, consistent with the findings of Penley and Tomaka (2002), however, like Penley and Tomaka we predominantly had a university sample. Our results suggest that methodological differences between Ebstrup et al. and Penley and Tomaka's studies were not the main cause of the conflicting results. Further analyses found that when all five traits were

analysed together neuroticism and agreeableness were the only traits to significantly explain unique proportions of variance in perceived stress. This may explain the differences in results found by previous studies (e.g., Ebstrup et al., 2011; Penley & Tomaka, 2002), which may also indicate that other variables could be influencing the results between personality and perceived stress. Further, neuroticism was the only personality trait to account for a significant proportion of perceived stress in the final model of the regression. However, given the change in beta weights from the first to second models, affect appears to partially impact the effects that agreeableness and neuroticism have on perceived stress. The finding of the regression analysis could imply that targeted interventions for those high in neuroticism and negative affect could help lower the perception of stress.

To our knowledge this study is the first to investigate the moderating and mediating impacts of affect on the relationship between personality and perceived stress. Two exploratory moderation analyses were conducted to investigate if either positive or negative affect would moderate the relationship between neuroticism and perceived stress. The first moderation analysis indicated that the model of neuroticism and negative affect explained the variance in perceived stress, however, negative affect did not moderate the relationship as expected. This may indicate that the relationship between neuroticism and perceived stress is not dependent on the individual's negative mood. Positive affect did not moderate the relationship between neuroticism and perceived stress, which indicates that highly neurotic people will still be more likely to experience perceived stress even when in a positive mood. Even when in a positive mood if a potential stressor presents, then highly neurotic people may be likely to react adversely. The moderation analyses showed that neither negative nor positive affect moderated the relationship between neuroticism and perceived stress. Thus, stress reduction strategies designed to increase positive affect, or decrease negative affect, may not be enough to alter the likelihood of individuals who score high in neuroticism to perceive stress.

Further exploration of the relationship between affect, personality and perceived stress included the mediation analysis indicated that neuroticism might lead to perceived stress through a decrease in positive affect and increase in negative affect. Individuals who present high in neuroticism are less likely to experience positive affect, including feelings of confidence and positivity, which have been linked with better-coping styles with stress (Li, Starr, & Hershenberg, 2017). While affect did not moderate the relationship between neuroticism and perceived stress, the partial mediation shows that other variables impact the relationship between personality and perceived stress. Understanding these variables and how they influence on the relationship between perceived stress, could help guide stress reduction strategies. As personality is enduring by nature if affect is mediating the relationship between personality and perceived stress, strategies that help to change affect could be successful at reducing perceived stress. Findings from the mediation indicate that individuals who are high in neuroticism and low in positive affect could benefit from learning stress management techniques that focus on emotion regulation, strategies such as mindfulness have been shown to increase positive affect, while decreasing negative affect (Schroevers & Brandsma, 2010). These strategies could prove to be successful stress reduction techniques for those individuals high in neuroticism.

### **Limitations and future directions**

These findings must be considered based on the limitations of the study, which include: the use of a cross-sectional, self-report design, and a targeted sample. Self-report data is limited as participants may have answered in ways deemed socially desirable so they will be viewed favourably by others (Van de Mortel, 2008). Furthermore, our participants were gained through a university setting, which may have led to the population being skewed to include individuals with higher education and employment, this makes it more difficult to generalize the results to a larger population sample.

Further research into affect and the impacts on the relationship between personality and perceived stress on a wider (potentially unemployed) populations could be warranted to increase generalizability of results.

## **Conclusions**

Despite these limitations, this study contributes to the existing body of literature, increasing understanding of the univariate and multivariate associations among all Big Five personality traits, positive and negative affect and perceived stress. Perceived stress was explained by individual differences in personality and affect, whereby high levels of neuroticism and negative affect in combination with low levels of agreeableness and positive affect explain more than half of individual variation in perceived stress levels. These findings indicate that individuals who are high in neuroticism and low in agreeableness could benefit from learning stress management techniques that focus on emotion regulation, such as mindfulness.

## References

- American Psychological Association (2018). *Stress in America: Generation Z*. Washington, DC: American Psychological Association.
- Asmundson, G. J., Paluszek, M. M., Landry, C. A., Rachor, G. S., McKay, D., & Taylor, S. (2020). Do pre-existing anxiety-related and mood disorders differentially impact COVID-19 stress responses and coping? *Journal of Anxiety Disorders*, 74, 1-6. doi: 10.1016/j.janxdis.2020.102271
- Armitage, C.J., Conner, M., & Norman, P. (1999). Differential effects of mood on information processing: Evidence from theories of reasoned action and planned behaviour. *European Journal of Social Psychology*, 29, 419-433.
- Australian Psychology Society (2015). *Stress and wellbeing: How Australians are coping with life. The findings of the Australian Psychological Society Stress and Wellbeing in Australia survey 2015*. Melbourne, Australia: Australian Psychological Society.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173.
- Blaxton, J.M. & Bergeman, C.S. (2017). A process-oriented perspective examining the relationships among daily coping, stress, and affect. *Personality and Individual Differences*, 104, 357-361.
- Civitci, A. (2015). The moderating role of positive and negative affect on the relationship between perceived social support and stress in college students. *Education Sciences, Theory & Practice*, 15(5), 565-573.

- Cohen, J.W. (1988). *Statistical power analysis for the behavioral sciences* (2<sup>nd</sup> edn). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24(4), 385-396.
- Connor-Smith, J.K., & Flachsbart, C. (2007). Relations between personality and coping: A meta-analysis. *Journal of Personality and Social Psychology*, 93(6), 1080-1107.
- Costa, P., Terracciano, A., & McCrae, R.R. (2001). Gender differences in personality traits across cultures: Robust and surprising findings. *Journal of Personality and Social Psychology*, 81(2), 322-331.
- Costa, P.T., & McCrae, R.R. (1980). Influences of extraversion and neuroticism on subjective well-being: Happy and unhappy people. *Journal of Social and Social Psychology*, 38(4), 668-678.
- Costa, P.T., & McCrae, R.R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment*, 4(1), 5-13.
- David, J.P., Green, P.J., Martin, R. & Suls, J. (1997). Differential roles of neuroticism, extraversion, and even desirability for mood in daily life: An integrative model of top-down and bottom-up influences. *Journal of Personality and Social Psychology*, 73(1), 149-159.
- De Jong, G.M., van Sonderen, E., & Emmelkamp, P.M.G. (1999). A comprehensive model of stress: The roles of experienced stress and neuroticism in explaining the stress-distress relationship. *Psychotherapy and Psychosomatics*, 68(6), 290-298.
- DeNeve, K.M., & Cooper, H. (1998). The happy personality: A meta-analysis of 137 personality traits and subjective well-being. *Psychological Bulletin*, 124(2), 197-229.



- Ebstrup, J.F., Eplov, L.F., Pisinger, C., & Jørgensen, T. (2011). Association between the five factor personality traits and perceived stress: Is the effect mediated by general self-efficacy? *Anxiety, Stress & Coping*, 24(4), 407-419.
- Emmons, R.A., & Diener, E. (1985). Personality correlates of subjective well-being. *Personality and Social Psychology Bulletin*, 11(1), 89-97.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G\* Power 3.1: Tests for correlation and regression analyses. *Behavior research methods*, 41(4), 1149-1160
- Feng, Z., Liu, L., Zhang, C., Zheng, T., Wang, J., Lin, M., ...& Hu, W. (2012). Chronic restraint stress attenuates function and promotes tumorigenesis. *Proceedings of the National Academy of Science*, 109 (18), 7013-7018. doi: 10.1073/pnas.1203930109
- Gaab, J., Rohleder, N., Nater, U.M., & Ehlert, U. (2005). Psychological determinants of the cortisol stress response: The role of anticipatory cognitive appraisal. *Psychoneuroendocrinology*, 30(6), 599-610.
- Geukes, K., Nestler, S., Hutterman, R., Kufner, A.C.P., & Back, M.D. (2017). Trait personality and state variability: Predicting individual differences in within- and cross-context fluctuations in affect, self-evaluations, and behaviour in everyday life. *Journal of Research in Personality*, 69, 124-138. doi: 10.1016/j.jrp.2016.06.003
- Gispén-de Wied, C.C. (2000). Stress in schizophrenia: An integrative view. *European Journal of Pharmacology*, 405, 375-384. doi: 10.1016/S0014-2999(00)00567-7
- Grant, S., & Logan-Fox, J. (2006). Occupational stress, coping and strain: The combined/interactive effect of the Big Five traits. *Personality and Individual Differences*, 41, 719-732.

- Gross, J.J., Sutton, S.K., & Ketelaar, T. (1998). Relations between affect and personality: Support for the affect-level affectivity-reactivity views. *Personality and Social Psychology Bulletin*, 24(3), 279-288.
- Hayes, A.F. (2009) Beyond Baron and Kenny: Statistical Mediation Analysis in the New Millennium. *Communication Monographs*, 76(4), 408-420. doi: 10.1080/03637750903310360
- Hayes, A.F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York: The Guilford Press.
- Izard, C.E., Libero, D.Z., Putnam, P., & Haynes, O.M. (1993). Stability of emotion experiences and their relations to traits of personality. *Journal of Personality and Social Personality*, 64(5), 847-860.
- John, O.P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. Pervin & O.P. John (Eds.), *Handbook of Personality: Theory and Research* (pp. 102-138). New York: Guilford Press.
- Lavoie, J. A.A., & Douglas, K.S. (2012). The Perceived Stress Scale: Evaluating configural, metric and scalar invariance across mental health status and gender. *Journal of Psychopathology Behavioral Assessment*, 34, 48-57. doi: 10.1007/s10862-011-9266-1
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer Publishing Company.
- Leger, K.A., Charles, S.T., Turiano, N.A., & Almeida, D.A. (2016). Personality and stress-related affect. *Journal of Personality and Social Psychology*, 111(6), 917-928. doi: 10.1037/pspp0000083

- Lench, H.C., Flores, S.A., & Bench, S.W. (2011). Discrete emotions predict changes in cognition, judgment, experience, behaviour, and physiology: A meta-analysis of experimental emotional elicitations. *Psychological Bulletin*, 137(5), 834-855.
- Li, Y., Starr, L.R., Hershenberg. (2017). Responses to positive affect in daily life: Positive rumination and dampening moderate the association between events and depressive symptoms. *Journal of Psychopathology and Behavioral Assessment*, 39, 412-425. doi: 10.1007/s10862-017-9593-y
- Lucas, R.E., & Fujita, F. (2000). Factors influencing the relation between extraversion and pleasant affect. *Journal of Personality and Social Psychology*, 79(6), 1039-1056.
- Matud, M.P. (2004). Gender differences in stress and coping styles. *Personality and Individual Differences*, 37, 1401-1415. doi:10.1016/j.paid.2004.01.010
- Meyer, G.J., & Shack, J.R. (1989). Structural convergence of mood and personality: Evidence of old and new directions. *Journal of Personality and Social Psychology*, 57(4), 691-706.
- Moksues, U.K., Moljord, I.E.O., Espnes, G.A., & Byrne, D.G. (2010). The association between stress and emotional states in adolescents: The role of gender and self-esteem. *Personality and Individual Differences*, 49, 430-435.
- Mroczek, D.K., & Almeida, D.M. (2004). The effect of daily stress, personality and age on negative affect. *Journal of Personality*, 72(2), 355-378.
- Penley, J. A., & Tomaka, J. (2002). Associations among the big five, emotional responses, and coping with acute stress. *Personality and Individual Differences*, 32, 1215-1228.
- Preacher, K.J., & Hayes, A.F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879–891.

- Rusting, C.L. (1998). Personality, mood, and cognitive processing of emotional information: Three conceptual frameworks. *Psychological Bulletin*, 124(2), 165-196.
- Rusting, C.L. (1999). Interactive effects of personality and mood on emotion-congruent memory and judgment. *Journal of Personality and Social and Psychology*, 77(5), 1073-1086.
- Saklofske, D.H., Austin, E.J., Mastoras, S.M., Beaton, L., & Osborne, S.E. (2012). Relationships of personality, affect, emotional intelligence and coping with student stress and academic success: Different patterns of association for stress and success. *Learning and Individual Differences*, 22, 251-257.
- Schellekens, H., Finger, B.C., Dinan, T.G., & Cryan, J.F. (2012). Ghrelin Signalling and obesity: At the interface of stress, mood and food reward. *Pharmacology & Therapeutics*, 135, 316-326. doi: 10.1016/j.pharmthera.2012.06.004
- Schneider, T.R., Rench, T.A., Lyons, J.B., & Riffle, R.R. (2011). The influence of neuroticism, extraversion and openness on stress responses. *Stress and Health*, 28(2), 102-110.
- Schroevers, M.J., & Brandsma, R. (2010). Is learning mindfulness associated with improved affect after mindfulness-based cognitive therapy? *The British Psychological Society*, 101, 95-107. doi:10.1348/000712609X424195
- Schutte, N.S., Malouff J.M., Segrera, E., Wolf, A., & Rodgers, L. (2003). States reflecting the Big Five dimensions. *Personality and Individual Differences*, 34, 591-603.
- Shavitt, S., Cho, Y.I., Johnson, T.P., Jiang, D., Holbrook, A., & Stavrakantonaki, M. (2016). Culture moderates the relation between perceived stress, social support, and mental and

- physical health. *Journal of Cross-Cultural Psychology*, 47(7), 956-980. doi: 10.1177/0022022116656132
- Shukla, A., & Bala Panwar, P. (2015). Stress and personality traits relationship: A study of accounting professionals in Rajasthan. *Indian Journal of Accounting*, XLVII(1), 121-132.
- nippe, E., Dziak, J.J., Lanza, S.T., Nyklíček, I., & Wichers, M. (2017). The shape of change in perceived stress, negative affect, and stress sensitivity during mindfulness-based stress reduction. *Mindfulness*, 8, 728-736. doi: 10.1007/s1267-016-0650-5
- Soto, C.J., & John, O.P. (2009). Ten facet scales of the Big Five inventory: Convergence with NEO PI-R facets, self-peer agreement, and discriminant validity. *Journal of Research in Personality*, 43, 84-90. doi: 10.1016/j.jrp.2008.10.002
- Suh, E., Diener, E., & Fujita, F. (1996). Events and subjective well-being: Only recent events matter. *Journal of Personality and Social Psychology*, 70(5), 1091-1102.
- Taylor, S., Landry, C.A., Paluszek, M.M., Fergus, T.A., McKay, D., & Asmundson, G. J.G. (2020). COVID stress syndrome: Concept, structure, and correlates. *Depression and Anxiety*, 37, 706-714. doi: 10.1002/da.23071
- Techniker Krankenkasse (2016). Entspann dich, Deutschland: TK-Stressstudie 2016 [Relax yourself, Germany: TK stress study 2016]. Germany: Department of Health Management, Techniker Krankenkasse.
- Van de Mortel, T. F. (2008). Faking it: Social desirability response bias in self-report research. *The Australian Journal of Advanced Nursing*, 25(4), 40.
- Vollrath, M., & Torgersen, S. (2000). Personality types and coping. *Personality and Individual Differences*, 29, 367-378. doi: 10.1016/S0191-8869(99)00199-3

- Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-1070.
- Watson, D., Clark, L.A., McIntyre, C.W., & Hamaker, S. (1992). Affect, personality, and social activity. *Journal of Personality and Social Psychology*, 63(6), 1011-1025.
- Wilt, J.A., Bleidorn, W., Revelle, W. (2017). Velocity explains the links between personality states and affect. *Journal of Research in Personality*, 69, 86-95. doi: 10.1016/j.jrp.2016.06.

## **Chapter 4**

### **Study 2: Examining the effects of trait mindfulness on the relationship between personality and perceived stress**

## **Abstract**

Stress reduction techniques, such as mindfulness, have been gaining popularity over the last few decades. Understanding why some individuals are more likely to benefit from stress reduction techniques compared to others, has also become the focus of research. Personality traits have been proposed to help explain some of the individual differences in the perception of stress. The present study aimed to increase our understanding of the relationship between the personality traits, mindfulness, and perceived stress. This was achieved by investigating the possible mediating or moderating role of mindfulness on the personality-perceived stress relationship. A total of 266 adults (70% female; age range: 18-64 years;  $M_{age} = 34.0$ ,  $SD = 12.68$ ) participated by completing an online questionnaire. A hierarchical multiple regression indicated that 58% of the variance in perceived stress was explained by personality and mindfulness. Trait mindfulness attention significantly moderated the relationship between agreeableness and perceived stress. Effect size calculations showed that 57% of the variation in perceived stress was attributed to neuroticism mediated by mindfulness, attention, and acceptance. Furthermore, 51% of the variance in perceived stress was attributed to agreeableness mediated by mindfulness (attention and acceptance). Results from the current study indicate acceptance of thoughts is related to perceived stress, more so than attending to thoughts.



## **Introduction**

Over the last three decades, mindfulness-based research has burgeoned substantially. Primarily this increase is due to research showing mindfulness to be an effective method of stress reduction, and mindfulness being associated with decreased long-term health implications often associated with chronic stress (e.g., Hicks et al., 2020). The increasing number of beneficial health and wellbeing outcomes reported of mindfulness has led to it being recommended as a potential remedy for a vast range of mental and physical health conditions. However, mindfulness does not appear to be ‘one-size-fits-all’, with findings indicating that individual differences in personality may influence levels of mindfulness (e.g., Giluk, 2009). There is a need to increase our understanding of the associations between personality and mindfulness, and to determine how these factors impact on stress. The present study aimed to address this gap in current knowledge by examining interrelationships between the Big Five personality traits, trait mindfulness, and perceived stress. As the literature relating to personality, perceived stress, and their associations was discussed in depth in the previous Chapter, to prevent redundant repetition, the focus on the literature review and discussion below focuses primarily on mindfulness and its associations with both personality and perceived stress.

## **Mindfulness**

There are two concepts of mindfulness, one that originates in the 2500-year-old Buddhist tradition of mindfulness and another more recent, Western conceptualisation that is largely reliant on the work of Kabat Zinn (Vago & Silbersweig, 2012). Hence, mindfulness can be considered as either a state, something practised in the moment such as during mindfulness meditation (e.g., Bamber & Schneider, 2016), or a trait, a predisposition to act mindfully in daily life (Kiken, Garland, Bluth, Palsson, & Gaylord, 2015). Hicks et al. (2020) stated that while mindfulness can be enhanced through practice and training, such as through

mindfulness-based stress reduction programs, there is an innate level of mindfulness for everyone, referred to as trait mindfulness, which will be the primary focus of this paper. Thus, for the purpose of this paper, mindfulness is defined as “a state of enhanced attention to, and awareness of, what is taking place in the present” (Walsh, Balint, Smolira, Fredericksen, & Madsen, 2009, p. 94). In the Western tradition, mindfulness is often described as having two key elements: attention and acceptance. Researchers often focus on the components of mindfulness when trying to define and characterise mindfulness. For example, Baer, Carmondy, and Husinger (2012) reviewed five key components to mindfulness: observing, describing, acting with awareness, nonjudgement of inner experience, and non-reactivity to inner experience. Baer et al. found that with eight weeks of daily mindfulness training mean scores on these five mindfulness components increased when compared to baseline measures. Other researchers (e.g., Bishop et al., 2004; Coffey, Hartman, & Fredrickson, 2010) have stated that there are two key elements of mindfulness i.e., acceptance and attention and all other categories of mindfulness will fit into these elements. Ellis, Brown, Thorsteinsson, and Perrott (2014) explained that attention related to deliberate regulation of an individual’s experience in the moment, which includes thoughts, feelings, and physical sensations. Acceptance is the open and receptive attitude toward these experiences. Importantly, acceptance does not involve minimizing, ignoring, or judging these experiences, especially the negative or distressing ones, but instead it is giving yourself permission to receive these experiences no matter their affective valence.

### **Trait mindfulness and stress**

Hicks et al. (2020) investigated links between trait mindfulness and perceived stress, while also examining skin conductance, a physical stress response, in 59-undergraduate participants. Skin conductivity was obtained during 15-minute resting time, while participants were listening to white noise, which they argued helped to keep the participants present and,

in the moment. Trait mindfulness was measured and tested in a laboratory, with mostly non-Hispanic white, females. Hicks et al. found that participants with higher levels of trait mindfulness reported lower levels of perceived stress and skin conductance, which they concluded reduced perceived, and physical, stress responses. These results seemingly support the negative association between trait mindfulness and stress. It is also possible that relaxing in the chair listening to white noise could have acted as an environmental relaxation technique and in turn, put participants in a more relaxed state than they would be naturally, which may have acted as a state mindfulness technique that could have affected the results.

Other studies have found similar results between trait mindfulness, perceived stress, and physiological stress responses. For example, Zimmaro et al. (2016) investigated the associations between trait mindfulness and perceived stress, and trait mindfulness and physical stress responses in 85-undergraduate students from an introductory psychology course. Participants completed a self-report trait mindfulness measure and perceived stress scale during the experiment and were given saliva kits to collect saliva samples 30-mins after waking and at bedtime to measure cortisol, a stress-related hormone. This process was repeated one month later. Results indicated that participants who reported higher levels of trait mindfulness exhibited lowered levels of perceived stress and cortisol secretion at the two testing points. Higher trait mindfulness resulted in less perception of stress and less physical reaction to stressful events. While Zimmaro et al.'s research provides support for the links between trait mindfulness and both perceived and physiological stress responses, it is possible that other variables could be impacting the relationship between trait mindfulness and stress, such as personality.

### **Trait mindfulness and personality**

Higher trait mindfulness can be beneficial to lower stress responses, however, some individual differences in trait mindfulness are also evident. Researchers have begun to

investigate differences between personality traits and trait mindfulness, with findings consistently indicating that some personality traits are more likely to experience higher levels of trait mindfulness, compared to other personality traits (e.g., Giluk, 2009). The Big Five personality traits (Costa & McCrae, 1992) are a commonly used tool to explain personality and individual differences, which comprise of neuroticism, extraversion, conscientiousness, openness to experience, and agreeableness. Rau and Williams (2016) conducted an in-depth critical review on personality traits and trait mindfulness and found several differences consistently evident between each personality trait and the facets of trait mindfulness, attention, and acceptance. Neuroticism is generally negatively correlated with, attention, acceptance and other measures of trait mindfulness, indicating that individuals with higher neuroticism will generally have lower trait mindfulness (e.g., Giluk, 2009; Latzman & Masuda, 2013).

Extraversion is often the trait that is most weakly correlated with mindfulness and often with mixed results. In a meta-analysis, Giluk (2009) noted that extraversion shared the weakest correlation with trait mindfulness of all the personality traits, with both positive and negative correlations evident in different studies reviewed. More recent studies have claimed a significant positive relationship between extraversion and trait mindfulness (e.g., Hanley, 2015) while others have not found a significant relationship at all (e.g., Rau & Williams, 2016). One possible explanation for this difference in findings, could be that extraverts often crave excitement and sensation-seeking, components that are generally not associated with mindfulness (Giluk, 2009). Researchers have linked extraversion to lowered perceived stress (e.g., Ebstrup, Eplov, Pisinger, & Jørgensen, 2011), however, to date no research has investigated if trait mindfulness moderates or mediates that relationship.

Conscientiousness has shown strong positive correlations with trait mindfulness, which indicates that those higher in conscientiousness demonstrate higher trait mindfulness (Giluk, 2009; Rau & Williams, 2016). A strong correlation between these two variables is not

surprising since a key component of mindfulness is to pay direct and deliberate attention to your thoughts. Giluk (2009) found that conscientiousness was second only to neuroticism in the strength of the relationship with trait mindfulness ( $r=.32$ ).

Agreeableness and trait mindfulness have not been investigated as often as other personality traits, but when investigated, a positive correlation has been observed (Giluk, 2009), with additional research needed. Theoretically, this positive relationship is expected since agreeable individuals are compliant and tend to live by a “forgive and forget” mentality (Costa & McCrae, 1992), perhaps leading to more non-judgmental attachment toward their inner thoughts.

Studies have found conflicting results with the relationship between openness to experience (i.e., openness) and trait mindfulness. Giluk (2009) found that openness was one of the weakest correlations with trait mindfulness ( $r = .15$ ). One possible explanation for these results could be in the facets that make up openness, with these individuals tending to enjoy fantasy and daydreaming, letting their mind wander, which would not be considered part of mindfulness, where a focus is on paying attention to thoughts. The relationship between openness and perceived stress is also unclear, with some researchers finding negative bivariate correlations (e.g., Penley & Tomaka, 2002), and others finding no significant relationship (e.g., Ebstrup et al., 2011). The interactions between perceived stress, trait mindfulness and personality has not been explored in detail.

### **Trait mindfulness, stress, and personality**

The relationship between stress and trait mindfulness has been well documented (e.g., Chiesa & Serretti, 2009). While many researchers have focused on examining the relationship between mindfulness and stress, the structures that could account for this relationship go largely unexplored. Bao, Xue, and Kong (2015) found that trait mindfulness mediated the

relationship between the use of emotions and perceived stress. Use of emotions refers to an individual's ability to channel their feelings for constructive tasks and personal performance (Bao et al., 2015). Bao et al.'s results support the notion of trait mindfulness as a possible mediating variable when viewing relationships with perceived stress.

### **Aims and purpose of the study**

To date, no study to our knowledge has investigated the mediating and moderating effects of trait mindfulness on the relationship between the Big Five personality traits and perceived stress. The associations between personality and perceived stress are not straightforward and trait mindfulness as a mediator or moderator might help to explain the links between personality traits and perceived stress. Understanding the links between trait mindfulness, personality and stress can help to guide stress reduction programs with personality traits and trait mindfulness being considered to develop a program to minimise stress further.

The current paper aims to examine the differential association between trait mindfulness and all the Big Five personality traits and reconfirm the correlation between trait mindfulness and perceived stress. This paper also aims to investigate if mindfulness acceptance or mindfulness attention moderates or mediates the relationship between each of the personality traits and perceived stress. Based on past research, it is hypothesised that mindfulness attention, and mindfulness acceptance will be correlated with all big five personality traits and perceived stress.

Exploratory regression, moderation and mediation analyses will be conducted to examine how trait mindfulness attention and trait mindfulness acceptance influence the relationship between personality and stress. As with Study 1, three possible models are examined: 1) that personality and mindfulness have independent and direct effects on perceived stress; 2) that the effect of personality on perceived stress is indirect, being mediated through mindfulness;

and, 3) that the effect of personality on perceived stress is variable, being moderated by mindfulness. The decision to examine these three possible patterns of association was based on the lack of available theory or evidence to determine which model type is most likely. On the basis of current knowledge, as discussed above, all three models are feasible.

## **Method**

### **Participants**

Using G\*Power (Faul, Erdfelder, Buchner & Lang 2009) with a medium effect size (.05), a power of 0.8, and  $\alpha = .05$ , it was estimated that a minimum of 89 participants would be required to ensure adequate power for the planned analyses. A total of 266 adults took part in the current study. Participants ranged in age from 18 to 64 years of age ( $M_{age} = 34$ ,  $SD_{age} = 12.68$ ). Majority of the participants were female (70%), married / in a cohabiting relationship (54%), with university education (48%) and from Australia (97%). Majority of participants were employed (64%) or students (27%).

### **Measures**

Study 2 included The Big Five Inventory and Perceived Stress Scale, as described in Study 1, but Study 2 also employed the Carolina Empirically Derived Mindfulness Inventory (see Appendix A).

**Carolina empirically derived mindfulness inventory (CEDMI; Coffey et al., 2010).** The CEDMI was used to measure trait mindfulness and consists of 22-items, relating to internal thought patterns, acceptance of thoughts and individual feelings toward thoughts. It was derived from combining features of the Five Factor Mindfulness Questionnaire and the Difficulties in Emotional Regulation Scale (DERS). The CEDMI also provides participants scores of mindfulness attention and mindfulness acceptance. The mindfulness attention scale consists of 8-items measured on a five-point Likert-scale (1 = *never or very rarely true* to 5 =

*very often or always true*). Mindfulness attention measures how much conscious consideration individuals put on daily experience with questions such as *I notice how foods and drinks affect my thoughts, bodily sensations, and emotions*. A mean score was calculated ranging from 1.0 – 5.0 (current study,  $M = 3.23$ ,  $SD = .74$ ) with higher scores indicating a higher level of mindfulness attention. The current study showed acceptable reliability for this measure with Cronbach  $\alpha = .84$ .

Mindfulness acceptance consists of 14 items in total, which showed strong reliability (current study  $\alpha = .95$ ). This measure relates to thoughts about how abnormal or bad an individual's cognitions may be and emotional experiences associated with cognitions. This scale included questions such as *I criticize myself for having irrational or inappropriate emotions* and *I become angry with myself for feeling that way*. A mean score was calculated for the mindfulness acceptance measure with possible scores ranging from 1.0 to 5.0 ( $M = 3.65$ ,  $SD = .91$ ), higher scores indicating higher levels of mindfulness acceptance.

## **Procedure**

The University's Human Research Ethics Committee approved this study (see Appendix B). Social media (e.g., Facebook), workplace employee emails, and undergraduate psychology classes were used to recruit participants. Advertisements were placed on the University's psychology research noticeboard and students were offered credit towards their research participation requirement if they were currently completing a first-year psychology course.

Within the recruitment materials, participants were provided with a SurveyMonkey link to the study questionnaires. Before commencing the study, participants were presented with a plain language statement and indicated their informed consent to participate. In total, the study questionnaire took approximately 30-45 minutes to complete, and data collection took place over a six-month period.



Prior to data analysis taking place, the data was reviewed to ensure participants had not completed the questionnaire on more than one occasion. This was completed by comparing IP addresses and demographic information, specifically age and gender.

## **Results**

Normality, linearity, and homoscedasticity were confirmed for all variables being used. All data observations were independent of one another, meaning all assumptions were met for the analyses being performed.

Given the large number of analyses required to test all three possible models with all five personality traits and both trait mindfulness acceptance and attention, and that this would increase the risk of Type 2 errors, the decision was made to include all five traits in the regression model, but to then focus on just two traits for the mediation and moderation analyses. This personality trait will be determined following the regression model.

The regression model posits that personality and mindfulness both have independent direct effects on perceived stress, such that there is no interaction or relationship evident between the trait and affect. If found, this would mean that, for example, neuroticism and acceptance both explain significant and unique proportions of variance in perceived stress.

In contrast, a mediation model posits that personality acts on perceived stress via mindfulness. If there is full mediation, personality only influences perceived stress indirectly through its impact on mindfulness. If there is only partial mediation evident, personality also influences perceived stress directly. An example of such a mediation model, where the relationship between neuroticism (IV) and perceived stress (DV) is found to be fully mediated by acceptance, would indicate that a person's high levels of neuroticism leads them to experience low levels of acceptance, which in turn, contributes to the person experiencing high levels of perceived stress.

While a moderation model posits that the strength and/or direction of the relationship between personality and perceived stress differs on the basis of level of mindfulness, such that mindfulness could either exacerbate or mitigate the effects of the personality trait on perceived stress. For example, if the relationship between neuroticism (IV) and perceived stress (DV) is found to be moderated by acceptance, this would indicate that a person with high levels of neuroticism and low levels of acceptance experiences greater perceived stress than someone with high levels of neuroticism and high acceptance, such that high negative affect acts to strengthen (exacerbate) the association between neuroticism and perceived stress, while high level acceptance acts to weaken (mitigate) the association between neuroticism and perceived stress.

These analyses will be conducted separately to facilitate interpretation of the complex interrelationships under investigation. The information gained through this study will increase understanding of how mindfulness might influence the relationship between personality and perceived stress, as to our knowledge, this has not been investigated previously.

### **Correlations between personality, mindfulness, and perceived stress**

Pearson's bivariate correlational analyses were conducted to investigate associations between key variables (see Table 4.1). All personality traits had a significant correlation with perceived stress and total mindfulness. Agreeableness, and openness were the only personality traits to correlate with mindfulness – attention, while all personality traits significantly correlated with mindfulness acceptance.

Table 4.1.

*Bivariate correlations between trait mindfulness, stress and the Big Five personality traits.*

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Trait mindfulness attention	3.20	.74	-							
2. Trait mindfulness acceptance	3.65	.91	-.15*	-						
3. Perceived stress	16.78	7.00	-.00	-.69**	-					
4. Extraversion	3.22	.83	.09	.20**	-.20**	-				
5. Agreeableness	3.83	.61	.15*	.24**	-.35**	.08	-			
6. Conscientiousness	3.75	.66	.11	.32**	-.31**	.26**	.33**	-		
7. Neuroticism	2.95	.82	.01	-.69**	.69**	-.28**	-.34**	-.29**	-	
8. Openness to experience	3.47	.55	.42**	.12*	-.21**	.27**	.15*	.25**	-.20**	-

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

## **Multivariate investigation of perceived stress**

A hierarchical multiple regression analysis was used to determine which personality variables would produce a significant correlation with perceived stress, even when controlling for mindfulness attention and mindfulness acceptance (see Table 4.2), prior to conducting the regression, age and gender were controlled for as covariates.

At Step 1, mindfulness attention and mindfulness acceptance were entered, both variables were significantly associated with perceived stress; the total variance explained by the model was 45%, a moderate effect size (Cohen, 1988).

After entering all the Big Five personality traits in Step 2, the total variance explained by the model was 58%, a large effect size (Cohen, 1988). Neuroticism and agreeableness were significantly associated with perceived stress, as was trait mindfulness acceptance but not trait mindfulness attention.

## **Moderation**

Neuroticism and agreeableness were chosen due to being the traits with the strongest reported associations with perceived stress following the regression, as stated above. In total four moderation analyses were conducted. These were to investigate if either trait mindfulness attention or trait mindfulness acceptance moderated the relationship between neuroticism and perceived stress, or agreeableness or perceived stress. Hayes' (2013) PROCESS macro was used to determine if mindfulness attention moderated the relationship between neuroticism and perceived stress. The model as a whole was significant  $F(3,262) = 82.95, p < .001, R^2 = .49$ . However, trait mindfulness attention did not significantly moderate the relationship between neuroticism and perceived stress,  $b = .89, t(262) = 1.77, p = .08$ , as it did not account for significantly more variance in perceived stress than just neuroticism alone.

Table 4.2.

*Unstandardised (B) and standardised ( $\beta$ ) regression coefficients and semipartial correlations ( $sr^2$ ) for predictors of perceived stress*

	Step 1			Step 2		
Variable	<i>B</i> [95% CI]	$\beta$	<i>sr</i> <sup>2</sup>	<i>B</i> [95% CI]	$\beta$	<i>sr</i> <sup>2</sup>
Mindfulness-Attention	<b>-.90 [-1.74,-.07]*</b>	<b>-.10</b>	<b>.011</b>	-.15 [-1.01, .71]	-.02	<.001
Mindfulness-Acceptance	<b>-5.30 [-6.02,-4.62]**</b>	<b>-.69</b>	<b>.483</b>	<b>-3.13 [-4.01, -2.25]**</b>	<b>-.41</b>	<b>.08</b>
Extraversion				.05 [ -.78, .69]	.01	<.001
Agreeableness				<b>-1.45 [-1.490, -.50]*</b>	<b>-.05</b>	<b>.01</b>
Conscientiousness				-.49 [ -1.49, .50]	-.46	<.001
Neuroticism				<b>2.73 [1.71, 3.76]**</b>	<b>.32</b>	<b>.06</b>
Openness				-.64 [-1.81, .53]	-.51	.003
Model Summary	<i>R</i> <sup>2</sup> =.49, <i>F</i> (2,262) = 122.60, <i>p</i> < .001			<i>R</i> <sup>2</sup> =.59, <i>F</i> (2,255) = 51.79, <i>p</i> <.001		
<i>R</i> <sup>2</sup> change				$\Delta R^2$ =.09, <i>p</i> < .001		
Notes: * <i>p</i> < .05; ** <i>p</i> <.001; significant results bolded						

The second moderation analysis was conducted to determine if trait mindfulness acceptance would moderate the relationship between neuroticism and perceived stress. The model, as a whole, was significant  $F(3, 262) = 21.54$ ,  $p < .001$ ,  $R^2 = .56$ . However, trait mindfulness acceptance did not significantly moderate the relationship between neuroticism and perceived stress,  $b = -.20$ ,  $t(262) = -0.55$ ,  $p = .58$ , as it did not account for significantly more variance in perceived stress than just neuroticism alone.

The third moderation analysis was used to determine if trait mindfulness attention would moderate the relationship between agreeableness and perceived stress. The model, as a whole, was significant,  $F(3,262) = 15.37, p < .001, R^2 = .15$ . Trait mindfulness attention significantly moderated the relationship between agreeableness and perceived stress,  $b = -2.00, t(262) = -2.75, p < .05$ . The conditional effect of agreeableness on perceived stress showed corresponding results. At low levels of attention, there was a significant relationship between agreeableness and perceived stress ( $b = -2.78, t(262) = -3.61, p < .05$ ). For moderate levels of attention there was a significant relationship between agreeableness and perceived stress ( $b = -4.27, t(262) = -5.82, p < .001$ ). At high levels of trait mindfulness attention there was a significant relationship between agreeableness and perceived stress ( $b = -5.75, t(262) = -5.64, p < .001$ ). Figure 4.1 shows the interactions plots for this analysis.

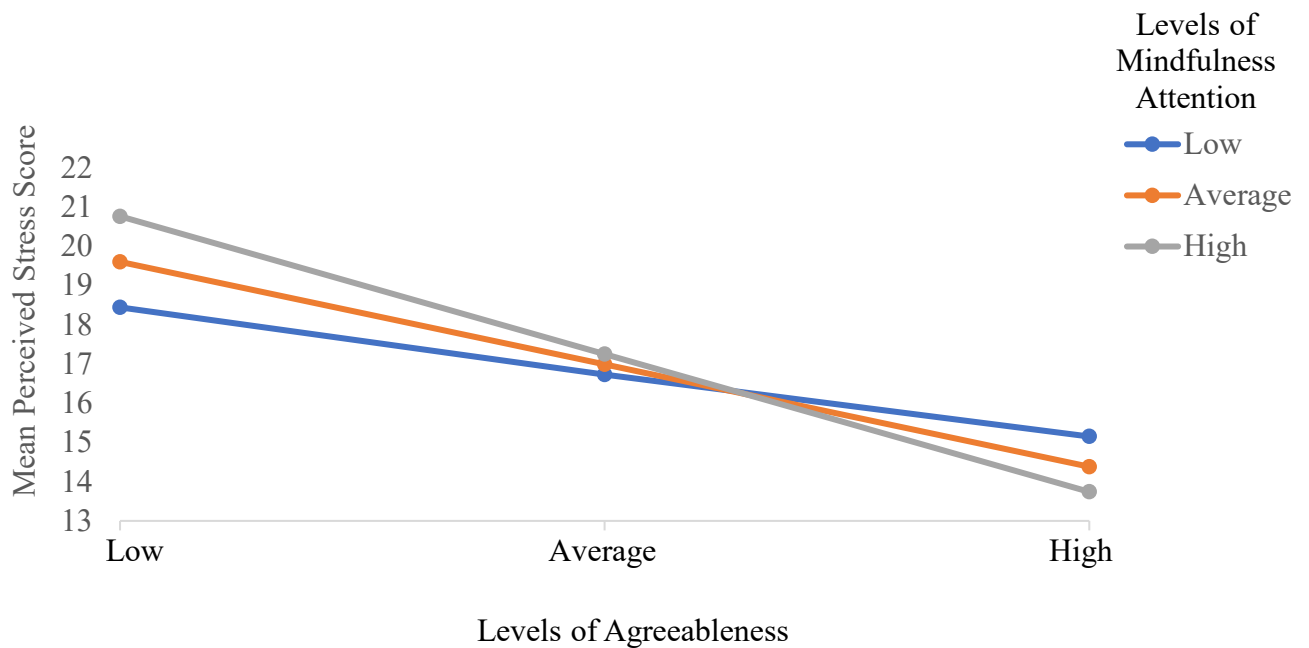


Figure 4.1. Interactions and slopes graphs for agreeableness and trait mindfulness attention.

The final moderation analysis was used to determine if trait mindfulness acceptance would moderate the relationship between agreeableness and perceived stress. The model, as a whole, was significant,  $F(3,262) = 24.34, p < .001, R^2 = .51$ . Trait mindfulness acceptance did not significantly moderate the relationship between agreeableness and perceived stress,  $b = 0.08, t(262) = .16, p = 0.87$ , as it did not account for significantly more variance in perceived stress than just agreeableness alone.

## Mediation

Mediation analyses were conducted to examine the effect of total trait mindfulness on the relationship between personality traits and perceived stress; separate mediation analyses were conducted for neuroticism and agreeableness. Following the revisions by Hayes (2009) to the Baron and Kenny (1986) recommendations, a sequence of regression models is evaluated for each mediation model: (i) perceived stress is predicted by the personality trait; (ii) total trait mindfulness is predicted by the personality trait (a path); (iii) perceived stress is predicted by total trait mindfulness and the personality trait (b and c paths). To determine mediation, the personality trait must influence total trait mindfulness, which in turn must influence perceived stress, and the signs of the relationships must be in the expected direction. Furthermore, the effect of the personality trait on perceived stress must be significantly changed in the model including total trait mindfulness, compared with the one-predictor model with personality trait alone. This final criterion is not tested directly; rather, it is equivalent to the product of the regression coefficients of the two mediation paths (a and b) being significantly different from zero, which is tested, but because of non-normality caused by the multiplicative process, it requires bootstrap methods.

Neuroticism was a significant predictor of perceived stress ( $b = 5.89, t = 15.64, p < .0001$ ), a significant predictor of mindfulness acceptance ( $t = -15.48$ ), but not mindfulness attention ( $t = 0.23$ ). As can be seen in Figure 4.2, the three-predictor model mindfulness

attention was not a significant predictor of perceived stress ( $t = -1.67$ ) but mindfulness acceptance was ( $t = -7.28$ ). The magnitude of the influence of mindfulness was significant ( $t = 7.22$ ). Using bias-corrected and accelerated bootstrapping (Preacher & Hayes, 2008), the reduction in the association between neuroticism and perceived stress was found to be significantly attributed to mindfulness acceptance but not mindfulness attention (95% confidence intervals for indirect affects: mindfulness acceptance [1.65, 3.21], mindfulness attention [ -.12, .07], 1000 replications). Effect size was calculated using the  $R^2$  values, 57% of the variation in perceived stress was attributed to neuroticism mediated by mindfulness (attention and acceptance).

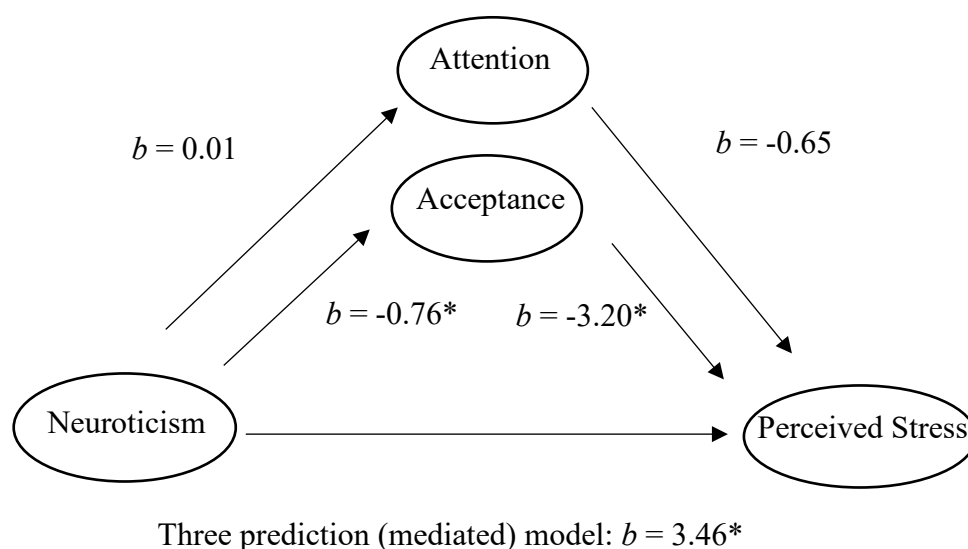


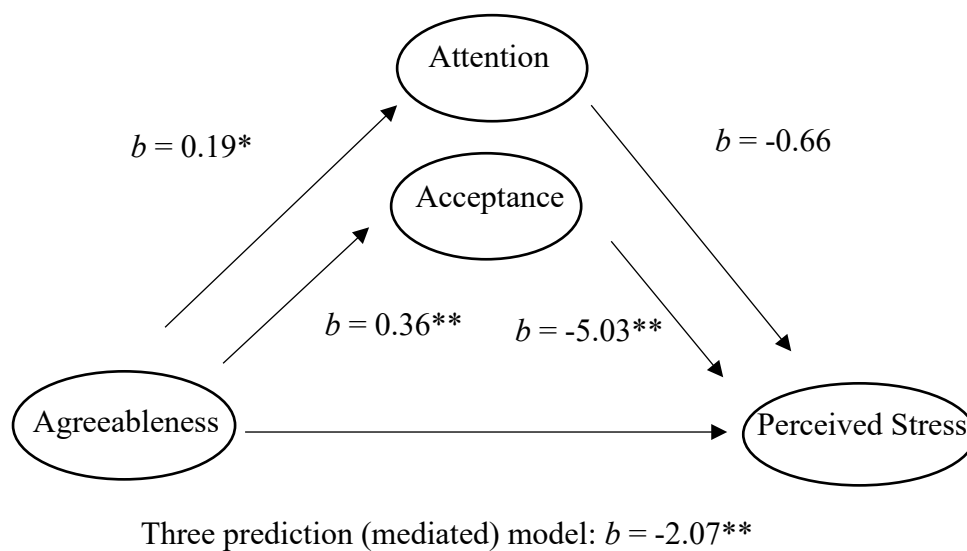
Figure 4.2. Mediation model – mindfulness as a mediator between neuroticism and perceived stress.

Notes: \*  $p < .001$

Agreeableness significantly predicted perceived stress ( $b = -4.01$ ,  $t = -6.01$ ,  $p < .0001$ ) and was also a significant predictor of mindfulness attention ( $t = 2.53$ ) and mindfulness acceptance ( $t = 4.05$ ). As seen in Figure 4.3, the three-predictor model mindfulness attention was not a significant predictor of perceived stress ( $t = -1.57$ ) but mindfulness acceptance was



( $t = -14.42$ ). The magnitude of the influence of mindfulness was significant ( $t = -3.99$ ). Using bias-corrected and accelerated bootstrapping (Preacher & Hayes, 2008), the reduction in the association between agreeableness and perceived stress was found to be significantly attributed to mindfulness acceptance but not mindfulness attention (95% confidence intervals for indirect affects: mindfulness acceptance  $[-2.78, -0.90]$ , mindfulness attention  $[-0.40, 0.01]$ , 1000 replications). Effect size was calculated using the  $R^2$  values, 51% of the variation in perceived stress was attributed to agreeableness mediated by mindfulness (attention and acceptance).



*Figure 4.3.* Mediation model – mindfulness as a mediator between agreeableness and perceived stress.

Notes: \*  $p < .05$ ; \*\*  $p < .001$

## Discussion

This study aimed to further examine the associations between trait mindfulness, the Big Five personality traits, and reconfirm the relationship between trait mindfulness and perceived stress. It also aimed to conduct an exploratory investigation to determine if trait

mindfulness would mediate or moderate the relationship between personality and perceived stress.

The hypothesis that, mindfulness attention and mindfulness acceptance would be correlated with all the Big Five personality traits and perceived stress was partially supported. While trait mindfulness acceptance had strong negative correlations (according to Cohen, 1988) with perceived stress, trait mindfulness attention did not share a significant correlation with perceived stress. Researchers investigating mindfulness suggest that individuals with high trait mindfulness are less likely to perceive stress (e.g., Zimmaro et al., 2016). These results were supported by this study's strong negative correlation between total trait mindfulness and perceived stress. The correlation further suggested that paying attention to thoughts was not likely to impact on the experience of perceived stress, rather the acceptance of these thoughts is what matters in the relationship between trait mindfulness and perceived stress. Researchers have also been examining the links between individual differences in trait mindfulness with the Big Five personality traits (e.g., Giluk, 2009), again supported by the current correlation analysis.

Openness shared a weak correlation with most variables. However, of all personality traits openness correlated strongest with trait mindfulness attention, while having the weakest correlation with trait mindfulness acceptance, compared to the other personality traits. The correlation could show links between ideas and values that are strong traits linked with openness and attention to inner thoughts (Costa & McCrae, 1992). Openness also had the weakest correlation with perceived stress, when compared to the other personality traits. These results further indicate that paying attention to the thoughts an individual has may not be enough to influence the likelihood of experiencing stress; mindfulness interventions that focus on teaching individuals to pay attention may not be an effective stress reduction technique.

Extraversion had a significant, but weak, positive correlation with mindfulness acceptance, but not mindfulness attention. Individuals high in mindfulness are often optimistic and cheerful (Costa & McCrae, 1992); though the weak correlation may indicate these associations are small, it supports the notion that extraverts may regard their inner thoughts in a positive manner, when compared to those with low levels of extraversion. These findings are somewhat consistent with previous research (e.g., Latzman & Masuda, 2013; Thompson & Waltz, 2007), which also found weak positive correlations between extraversion and mindfulness. Our results furthered the understanding of some discrepancies in the literature. Specifically, it is possible that if a questionnaire measuring mindfulness focuses more on attention to thoughts rather than acceptance of them, such as the Mindful Attention Awareness Scale (Brown & Ryan, 2003), extraversion would show a non-significant result.

Mindfulness attention had the least significant correlations of all mindfulness categories. It was not correlated with conscientiousness or neuroticism, suggesting that these personality traits are not related to the likelihood of paying attention to thoughts. Mindfulness attention was also the only variable to not be correlated with perceived stress, which indicates that paying attention to thoughts does not impact on the perception of stress. In contrast, mindfulness acceptance had a strong correlation with perceived stress, further, supporting the notion that being accepting of thoughts is more important in the stress process than simply attending to thoughts. The lack of a significant correlation between mindfulness attention and neuroticism could explain why individuals high in neuroticism experience more anxiety (Carver & Connor-Smith, 2010) and tend to be more impulsive (Costa & McCrae, 1992), possibly because they do not take the time to focus on their thoughts. The strong association between openness and trait mindfulness attention and the weak link between openness and perceived stress, and trait mindfulness attention and perceived stress may indicate that

mindfulness plays a mediating role in the relationship between personality and perceived stress.

The regression analysis indicated that agreeableness and neuroticism were the only personality traits to explain significant unique proportions of the variance in perceived stress when all five personality traits were viewed concurrently. When mindfulness acceptance and mindfulness attention were added to the model, both agreeableness and neuroticism still made significant contributions to the explanation of variance in perceived stress. While the unique contribution of neuroticism on perceived stress decreased, the unique contribution of agreeableness on perceived stress remained the same. These results suggest that mindfulness does not seem to impact levels of perceived stress for individuals high in agreeableness, to date, no other studies have shown this link. To further investigate the way the mindfulness impacts the relationship between personality and perceived stress exploratory moderation and mediation analyses were conducted.

To date, no study has investigated the moderating impacts of mindfulness attention or mindfulness acceptance on the relationship between personality and stress. While mindfulness attention was not significantly correlated with perceived stress during the final stage of the regression it was included in the moderation analysis for the purpose of fully exploring the relationship.

The relationship between neuroticism and perceived stress was not moderated by either trait mindfulness attention or trait mindfulness acceptance. While, both models were significant neither trait mindfulness attention or acceptance contributed to significant variance in the relationship between neuroticism or perceived stress. Increasing levels of trait mindfulness may not be enough to reduce the perception of stress for those individuals high in neuroticism.

Trait mindfulness attention did significantly moderate the relationship between agreeableness and perceived stress, which indicates that the relationship between agreeableness and perceived stress is dependent on levels of trait mindfulness attention. Individuals high in agreeableness and high in trait mindfulness attention would be less likely to report perceived stress; this could help shape targeted stress reduction strategies. Results from the correlation suggested that trait mindfulness attention and agreeableness were weakly correlated, increasing levels of mindfulness attention could help to reduce perceived stress for individuals high in agreeableness. Trait mindfulness acceptance, did not moderate the relationship between agreeableness and perceived stress, suggesting that for those high in agreeableness paying attention to inner thoughts is more important than accepting them.

The possibility of trait mindfulness attention or trait mindfulness acceptance mediating the relationship between personality and perceived stress was yet to be explored, though could help to further explain the conflicting results between personality traits and perceived stress (e.g., Ebstrup et al., 2011). Individuals who present high in neuroticism seemed to have lower levels of trait mindfulness acceptance. No significant relationship was found between neuroticism and trait mindfulness attention; however, the relationship was in a positive direction, suggesting that individuals high in neuroticism are more likely to pay attention to inner thoughts. These results could relate to the characteristics that make up mindfulness, such as self-consciousness and anxiety (Costa & McCrae, 1992). While no full mediation was found, bootstrapping results suggested that trait mindfulness acceptance partially mediated the relationship between neuroticism or perceived stress, while trait mindfulness attention did not seem to have any significant mediation effect. Thus, individuals high in neuroticism are more likely to pay attention to their thoughts but less likely to be accepting of them; mindfulness strategies for those high in neuroticism should focus on teaching acceptance rather than attention to help reduce stress responses.

The relationship between agreeableness and perceived stress showed partial mediation. Individuals who were higher in agreeableness also seemed to be higher in trait mindfulness attention and trait mindfulness acceptance, suggesting that individuals high in agreeableness are more likely to pay attention to their thoughts and be accepting of them. Partial mediation was found between for trait mindfulness acceptance but not trait mindfulness attention. However, given that trait mindfulness attention was shown to moderate the relationship between agreeableness and perceived stress, which is unsurprising since the relationship between agreeableness and perceived stress was reliant on trait mindfulness attention. Trait mindfulness acceptance partially mediated the relationship between agreeableness and perceived stress, thus, stress reduction techniques that increase levels of acceptance could be beneficial to help reduce perceived stress.

### **Limitations and future directions**

These findings must be considered based on the limitations of the study, which, similar to Study 1 include: the use of a cross-sectional, self-report design, and a targeted sample. Participants were gained through a university setting, which may have led to the population being skewed to include individuals with higher education and employment, which makes it more difficult to generalize the results to a larger population sample.

While the current study offered a brief investigation into the ways trait mindfulness impacts the relationships between personality traits and perceived stress future research could aim to replicate these results with a wider population sample, including a more culturally diverse sample, this could allow for better generalizability of the results. Future research could also examine the impact of state-based mindfulness interventions on the relationship between perceived stress and personality. This could help guide mindfulness-based stress reduction programs and ensure that they are being used with individuals who will benefit most from them.

## **Conclusion**

The current study contributes to the existing body of literature investigating the relationships between personality, trait mindfulness, and perceived stress. It helps to bring all three components together and examine the ways trait mindfulness may be influencing the relationship between personality and stress. The results of the study suggest that mindfulness-based interventions aimed at reducing perceived stress should focus more on teaching acceptance of thoughts rather than attention to thoughts.

## References

- Baer, R.A., Carmody, J., & Husinger, M. (2012). Weekly change in mindfulness and perceived stress in a mindfulness-based stress reduction program. *Journal of Clinical Psychology, 68*(7), 755-765. doi: 10.1002/jclp.21865
- Bamber, M.D., & Schneider, J. K. (2016). Mindfulness based meditation to decrease stress and anxiety in college students: A narrative synthesis of the research. *Educational Research Review, 18*, 1-32. doi: 10.1016/j.edurev.2015.12.004
- Bao, X., Xue, S., & Kong, F. (2015). Dispositional mindfulness and perceived stress: The role of emotional intelligence. *Personality and Individual Differences, 78*, 48-52. doi: 10.1016/j.paid.2015.01.0070191-8869
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173.
- Bishop, S.R., Lau, M., Shapiro, S., Carlson, L., Anderson, N.D., Carmody, J., ... Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*(3), 230-241. doi: 10.1093/clipsy/bph077
- Brown, K.W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*(4), 822-848. doi: 10.1037/0022-3514.84.4.822
- Carver, C.S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology, 61*, 679-704. doi: 10.1146/annurev.psych.093008.100352



- Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. *The Journal of Alternative and Complementary Medicine*, 15(5), 593-600. doi: 10.1089/acm.2008.0495.
- Coffey, K.A., Hartman, M., & Fredrickson, B.L. (2010). Deconstructing mindfulness and constructing mental health: Understanding mindfulness and its mechanisms of action. *Mindfulness*, 1, 235-253. doi: 10.1007/s12671-010-0033-2
- Cohen, J.W. (1988). *Statistical power analysis for the behavioral sciences* (2<sup>nd</sup> edn). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Costa, P.T., & McCrae, R.R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment*, 4(1), 5-13.
- Ebstrup, J.F., Eplov, L.F., Pisinger, C., & Jørgensen, T. (2011). Association between the five factor personality traits and perceived stress: Is the effect mediated by general self-efficacy? *Anxiety, Stress & Coping*, 24(4), 407-419.
- Ellis, S., Brown, R.F., Thorsteinsson, E.B., & Perrott, C. (2014). Trait mindfulness, affective symptoms and quality of life in people with non-hodgkin's lymphoma. *Journal of Cancer Therapy*, 5, 1114-1126. doi: 10.4236/jct.2014.512115
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G\*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41, 1149-1160.
- Feltman, R., Robinson, M.D., & Ode, S. (2009). Mindfulness as a moderator of neuroticism-outcome relations: A self-regulation perspective. *Journal of Research in Personality*, 43, 953-961. doi: 10.1016/j.jrp.2009.08.009
- Giluk, T.L. (2009). Mindfulness, big five personality, and affect: A meta-analysis. *Personality and Individual Differences*, 47, 805-811. doi: 10.1016/j.paid.2009.06.026

- Hanley, A.W. (2016) The mindfulness personality: Associations between dispositional mindfulness and the five factor model of personality. *Personality and Individual Differences*, 91, 154-158. doi: 10.1016/j.paid.2015.11.054
- Hayes, A.F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York: The Guilford Press.
- Hicks, A., Siwik, C., Phillips, K., Zimmaro, L.A., Salmon, P., Burke, N., ... Sephton, S.E. (2020). Dispositional mindfulness is associated with lower basal sympathetic arousal and less psychological stress. *International Journal of Stress Management*, 27(1), 88-92. doi: 10.1037/str0000124
- Kiken, L.G., Garland, E.L., Bluth, K., Palsson, O.S., Gaylord, S.A. (2015). From a state to a trait: Trajectories of state mindfulness in meditation during intervention predict changes in trait mindfulness. *Personality and Individual Differences*, 81, 41-46. doi: 10.1016/j.paid.2014.12.044
- Latzman, R.D., & Masuda, A. (2013). Examining mindfulness and psychological inflexibility within the framework of big five personality. *Personality and Individual Differences*, 55(2), 129-134. doi: <http://dx.doi.org/10.1016/j.paid.2013.02.019>
- Medvedev, O.N., Krägeloh, C.U., Narayanan, A., Siegert, R.J. (2017). Measuring mindfulness: Applying generalizability theory to distinguish between state and trait. *Mindfulness*, 8(4), 1036-1046. doi: 10.1007/s12671-017-0679-0
- Penley, J. A., & Tomaka, J. (2002). Associations among the big five, emotional responses, and coping with acute stress. *Personality and Individual Differences*, 32, 1215-1228.
- Preacher, K.J., & Hayes, A.F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879–891.

- Rau, H.K., & William, P.G. (2016). Dispositional mindfulness: A critical review of construct validation research. *Personality and Individual Differences*, 93, 32-43. doi: 10.1016/j.paid.2015.09.035
- Thompson, B.L., & Waltz, J. (2007). Everyday mindfulness and mindfulness meditation: Overlapping constructs or not? *Personality and Individual Differences*, 43(7), 1875-1885. doi: 10.1016/j.paid.2007.06.017
- Vago, D.R., & Silbersweig, D.A. (2012). Self-awareness, self-regulation, and self-transcendence (S-ART): A framework for understanding the neurobiological mechanisms of mindfulness. *Frontiers in Human Neuroscience*, 6, 296 – 326. doi: 10.3389/fnhum.2012.00296
- Walsh, J.J., Balint, M.G., Smolira, S.J., D.R., Fredricksen, L.K., & Madsen, S. (2009). Predicting individual differences in mindfulness: The role of trait anxiety, attachment anxiety and attentional control. *Personality and Individual Differences*, 46(2), 94-99. doi: 10.1016/j.paid.2008.09.008
- Zimmaro, L.A., Salmon, P., Naidu, H., Rowe, J., Phillips, K., Rebholz, W.N... Sephton, S.E. (2016). Associations of dispositional mindfulness with stress, cortisol, and well-being among university undergraduate students. *Mindfulness*, 7(4), 1-12. doi: 10.1007/s/12671-016-0526-8

## **Chapter 5**

### **Study 3: Examining the effectiveness of a brief mindfulness intervention on perceived and physiological stress-related outcomes: A Pilot Study**

## Abstract

Physiological and psychological responses to stress have been the focus of a plethora of research. It has been well documented that prolonged exposure to stress has negative physiological health outcomes for individuals, as such stress reduction techniques, such as mindfulness, have become popular. Not only for academic research but also being promoted through magazines and newspaper articles. The present pilot study aimed to examine why some people benefit more from a short mindfulness intervention than others. It compared two personality matched groups, one receiving a brief mindfulness intervention before a stress task, and a control group. A total of 20 adults (6 female; age range: 18-59 years;  $M_{age} = 35.41$ ,  $SD = 12.76$ ) completed the experiment. Cortisol and heart rate measures were taken throughout the course of the experiment, and Mann-Whitney U was used to compare the results between groups. No significant difference was found between any of the variables measured. Wilcoxon signed-rank tests were completed for both groups, with negative affect being the only variable to change significantly pre- to post-intervention. No significant differences were found between groups for heart rate or cortisol readings. Results from the current study conclude that the stress intervention was successful at increasing levels of negative affect within groups.

## **Introduction**

The physiological and psychological effects of stress have been well documented (e.g., van Eck, Berkhof, Nicolson, & Sulon, 1996), including that the impacts of prolonged exposure to stress can cause long-term health implications, such as lowered immune functioning (Kuster & Merkle, 2009), depression and anxiety (Lin, Lin, Lin, & Huang, 2011). Some stress can be beneficial, but prolonged or repeated exposure to stress can have damaging long-term health implications (Le Fevre, Matheny, & Kolt, 2003; McEwen, 2000). The effects of stress are evident in all aspects of life including, for example, reduced sleep (Dahlgren, Kecklund, & Åkerstedt, 2005), lowered appetite (Oliver, Wardle, & Gibson, 2000), and decreased physical health (e.g., Feng et al., 2012). Interventions to help alleviate the influence of stress, such as mindfulness, have been investigated (e.g., Abou, Elmagd, 2016).

Both psychological and physiological responses to stress are important when investigating the benefits of stress reduction interventions (Lupien, Maheu, Tu, Fiocco, & Schramek, 2007). Several factors can alter the stress response experience including (but not limited to) the appraisal of the stress events (Everly & Lating, 2013), coping mechanisms (Gaab, Rohleder, Nater, & Ehlert, 2005), and experiences with similar stressors (Everly & Lating, 2013). If an individual does not believe they can effectively overcome a stressor or an event has been considered potentially stressful, a physiological stress response may be elicited in the body.

### **Physiological stress responses**

Upon immediate exposure to a stressor, cognitive appraisal occurs, and the hippocampus activates, which helps with memory recall. The first and immediate response of a stressor involves epinephrine (i.e., adrenalin) and norepinephrine (i.e., noradrenaline) being released into the bloodstream through activation of the adrenal glands (Sarafino & Smith,

2011). The release of these two hormones increases heart rate, blood sugar levels and blood pressure (Nall, 2018).

Following the release of epinephrine and norepinephrine, the hypothalamic-pituitary-adrenal (HPA) axis activates, which causes the blood to divert resources from other bodily functions to supply energy to combat stress, lowering immune system functioning (Kemeny, 2003). During activation of the HPA axis, the pituitary gland is also activated, which releases corticotropin-releasing hormone (CRH), and stimulates the anterior pituitary gland. Anterior pituitary gland activation results in the release of adrenocorticotrophic hormone (ACTH), which stimulates the release of corticosteroid, also called cortisol (Everly & Lating, 2013). Cortisol measurement helps determine the impact on stressors on the body and the physiological stress response that is elicited (e.g., Dickerson & Kemeny, 2004). When trying to examine physiological changes within the body, in response to stress, researchers will often investigate cortisol and / or heart rate changes (e.g., Hellhammer, Wüst, & Kudielka, 2008; Taelman, Vandeput, Spaepen, & Huffel, 2008) as these measures are often non-invasive and offer the ability to view changes in the stress response system. When examining the stress response system, it is also important to examine the psychological stress response.

### **Psychological stress response**

Researchers often focus on the measurability of the physiological stress response through cortisol or blood pressure, however, the process of psychological arousal during the stress process could be as important as the eventuating physical stress response. Cognitive appraisal is the process of evaluating what is determined to be a stressor (Lazarus & Folkman, 1984), but without an event being stressful, no physiological stress response occurs. Cognitive appraisal involves two parts: primary and secondary appraisal. During primary appraisal, an individual evaluates an event to determine its importance. If the event is deemed

important, then secondary appraisal occurs. During secondary appraisal, an individual determines if they have the resources to overcome the stressor. If they perceive they do not have the resources to cope with the stressor, during secondary appraisal, then the stress response will be increased. Oldehinkel et al. (2011) explained that the psychological process involved in stress appraisal could be the bridge between a psychosocial stressor and the physiological stress response, suggesting that appraisal of an event may be the most important part of the stress process.

Understanding why some individuals are more likely to experience stress compared to others can help determine appropriate interventions for stress reduction techniques. Dickerson and Kemeny (2004), who conducted a meta-analysis of 208 laboratory-based studies of acute relative stressors, found that some specific situations are more likely to elicit stress responses than others. Of most interest was that events that could lead to being judged negatively by others, or uncontrollable outcome events were found to be more likely to result in a physiological stress response., Dickerson and Kemeny also found that psychological perception of stress was a good indicator of physiological stress responses. Individual differences in the perception of what events would cause individuals to be viewed negatively, or that have uncontrollable outcomes, could help explain why some individuals perceive stress more readily than others.

## **Personality**

The relationship between personality variables and perceived stress has been the focus of a plethora of research (e.g., Brouwer, van Schaik, Korteling, van Erp, & Toet, 2015). The Big Five personality traits of neuroticism, extraversion, conscientiousness, agreeableness, and openness to experience have been differentially associated with the stress process. Personality is linked with the perceptions of stress (e.g., Penley & Tomaka, 2002) and physiological stress responses (e.g., Oswald et al., 2006). Researchers investigating personality and cortisol



differences in response to stress have reported mixed results. Bibbey, Carroll, Roseboom, Phillips, and de Rooij (2012) found that individuals who scored high on neuroticism showed smaller cortisol secretion compared to those who scored low. However, other studies (e.g., Laceulle, Nederhof, van Aken, & Ormel, 2014) have shown little associations between personality and cortisol stress responses.

All personality traits have been linked with stress responses, with gender differences also found. Oswald et al. (2006) investigated the links between all Big Five personality traits and cortisol responses following a laboratory-based stress-inducing task. A total of 68 adults completed the Trier Social Stress Test (TSST), with heart rate measured throughout, and six blood cortisol samples taken via an intravenous catheter, one shortly after arrival to act as a baseline, and five following the stress task. Oswald et al. found neuroticism to be negatively, and extraversion positively, associated with cortisol responses in males but not females, suggesting that gender could play a role in the stress response process.

Other strong positive links between neuroticism and stress have been found (e.g., Giluk, 2009; Penley & Tomaka, 2002). These include that lowered cortisol responses are associated with neuroticism, which supports the theory that long term stress exposure results in lowered levels of cortisol secretion or blunted cortisol responses, such that individuals high in neuroticism may be more likely to experience adverse long-term stress health complications associated with long term stress, such as depression (Carver & Conner-Smith, 2010). Oswald et al. concluded that the TSST was successful at eliciting a stress response in participants due to cortisol secretion, yet it is possible that subjecting participants to multiple blood tests over the course of the experiment could have impacted the results, due to an aversion of having blood taken. As differences in personality traits are evident in stress responses, it can be helpful to try to control for these potential differences. This could help explain conflicting results found between studies in the past. For instance, using the example

from Oswald et al., it is possible that people high in neuroticism may have a stronger negative response to having their blood taken during a study than people who are low in neuroticism. As such, reducing possible confounding through controlling for personality variables that may impact on outcome results, could offer a more in-depth understanding of the stress response, both physiological and psychological.

Other factors can also influence the stress response process. Mindfulness meditation, for example, has been explored as an intervention that may reduce the adverse effects of stress exposure.

### **Mindfulness interventions and physiological stress responses**

Short mindfulness interventions have been offered as an effective coping method for dealing with stressful situations (e.g., Baer, Carmody, & Hunsinger, 2012). Mindfulness involves enhancing attention to, and awareness of, what is taking place in the present moment (Walsh, Balint, Smolira, Fredericksen, & Madsen, 2009), however, Coffey, Hartman, and Fredrickson (2010) argue that it is also about acceptance of current thoughts. Research around the effectiveness of, and intervention with, mindfulness is burgeoning.

Researchers have investigated the effects of mindfulness training in reducing perceived stress amongst both clinical and non-clinical samples (e.g., Baer et al., 2012). Morton, Helminen, and Felver (2020) conducted a meta-analysis reviewing studies that have examined the TSST and impacts of a short mindfulness intervention on the stress response. Of the 12 studies found that measured cortisol, only three showed that a mindfulness intervention was able to demonstrate stress-buffering effects. Morton et al. concluded that while mindfulness interventions successfully reduce self-reported stress (e.g., Chiesa & Serretti, 2009), no conclusive evidence exists that mindfulness interventions successfully reduce or buffer physiological stress responses. Physiological stress responses may be influenced by other variables, such as the interaction between personality and mindfulness, as

Study 1 and 2 showed differences between personality, trait mindfulness, and perceived stress. Therefore, it is important to match participants in each group to ensure that differences in personality traits and trait mindfulness will not impact the physiological stress outcomes.

Thus, this study aimed to investigate the effectiveness of a brief state-based mindfulness intervention on the physiological and psychological stress response, on participants matched based on their personality traits. It was hypothesised that the experimental group would display lower psychological stress scores following the TSST compared to the control group. It was also hypothesised that the experimental group would show less physiological stress reactivity during and following the stress task compared to the control group. Additionally, it was expected that the TSST would elicit both psychological and physiological stress responses from the control and experimental group.

## **Method**

### **Participants**

Using G\*Power (Faul, Erdfelder, Buchner & Lang 2009) with a medium effect size (.05), a power of 0.8, and  $\alpha = .05$ , it was estimated that a minimum of 90 participants would be required to ensure adequate power for the planned analyses, though we did not reach the required number of participants, this was a pilot study and forms a good starting point for future studies. Following Studies 1 and 2, participants were asked if they would agree to take part in further testing as part of this pilot study. Of those that completed the online questionnaires, 69 participants agreed to be contacted for further testing. 10 of these participants were ruled out from further participation due to high scores on the screening questionnaire (discussed in the Measures section below). A further eight were ruled out as they engaged in regular mindfulness training. 51 participants were invited to take part in the current study, with a total of 22 participants, ranging in age from 18 to 59 years of age ( $M_{age} = 35.41$ ,  $SD_{age} = 12.76$ ), completing the study. Two participants were excluded due to

missing cortisol responses; 20 total participants were included in the final analysis, with 10 participants (six females and four males) in each of two (i.e., control & experimental) groups. The control group's age range was 18 to 59 years ( $M_{age} = 34.60$ ,  $SD_{age} = 14.68$ ); the experimental group's age ranged from 20 to 53 years ( $M_{age} = 34.00$ ,  $SD_{age} = 11.57$ ).

## Measures

A pre- and post- intervention questionnaire package was primarily completed, via the SurveyMonkey online questionnaire package. The NEO personality inventory revised (described below) was completed using pen and paper.

**Screening questionnaire.** The Brief Fear of Negative Evaluation Scale (BFNES; Leary, 1983) measures the extent to which an individual experiences dread at the possibility of being judged negatively by others (see Appendix A). The BFNES consists of 12 items (e.g., *I am afraid that others will not approve of me*) on a 5-point Likert-scale (1 = *not at all characteristic of me* to 5 = *extremely characteristic of me*). The participant rated how characteristic the statement was of them. Total scores ranged from 12-60, with higher scores indicating more likelihood of feeling dread. This questionnaire was completed during Studies 1 and 2 of this dissertation and, consistent with previous studies (e.g., Koydemir-Ozden & Demir, 2009), reported good reliability in that study ( $\alpha = .94$ ), with the intention of using it for participant selection for the current study. If participants scored highly on this questionnaire, suggesting they had higher levels of fear of negative evaluation, they were excluded from the current study. This was done as an ethical consideration to not intentionally force participants into situations that could trigger ongoing unpleasant events for the individual.

**Pre-intervention questionnaire.** The pre-intervention questionnaire (see Appendix C) included the Perceived Stress Scale (PSS), Carolina Empirically Derived Mindfulness Inventory (CEDMI) and the Positive and Negative Affect Schedule (PANAS), which were all

described in detail in relation to Study 1 of this dissertation (Chapter 3). Each participant also completed the NEO Personality Inventory, Revised (NEO PI-R; Costa & McCrae, 1992).

**NEO PI-R.** The NEO PI-R is a 240-item questionnaire, which measures the Big Five personality traits and the six sub-facets of each trait (see Appendix D). The participant was given Form-S, and a self-report paper copy of the scoring form to complete with questions measured on a 5-point Likert scale (1 = *Strongly Disagree* to 5 = *Strongly Agree*). Form-S has appropriate scoring for each item on a carbon-copy underneath. Each of the six sub-facets was calculated from answers provided to eight questions within the NEO PI-R, these six sub-facet scores were added together to give a total score for each on the five personality traits. The raw scores for each of the facets and personality traits were then transformed into T-values, which have been standardised and offer values ranging from 20 to 80, which are categorised from very low to very high. Different standardised values are used depending on gender (Costa & McCrae, 1992). Each personality trait was comprised of 48 items: neuroticism (e.g., *I am not a worrier*; current study  $\alpha = .85$ ), extraversion (e.g., *I really like most people I meet*, current study  $\alpha = .81$ ), openness (e.g., *I have a very active imagination*; current study  $\alpha = .75$ ), agreeableness (e.g., *I believe that most people are basically well-intentions*; current study  $\alpha = .81$ ), and conscientiousness (e.g., *I'm known for my prudence and common sense*; current study  $\alpha = .88$ ), good reliability of the scales was consistent with previous studies (Oswald et al., 2006).

**Post-intervention questionnaire.** The post-intervention questionnaire package (see Appendix E) consisted of the PANAS and the PSS, reworded to reflect the participant's feelings relating to the intervention.

**PANAS-post measure.** The PANAS (Watson, Clark, & Tellegen, 1988) questionnaire was altered with instructions to measure participants emotional state in the present moment, rather than in the last week. Scores were calculated for both positive affect

(10 items, current study  $\alpha = .85$ ) and negative affect (10 items, current study  $\alpha = .84$ ), with higher scores indicating higher emotional state on that scale.

**PSS – post measure.** The PSS (Cohen, Kamarck & Mermelstein, 1983) was also altered to reflect how participants felt during the preparation time and the task. The instructions stated *during the task and preparation time, how often...* with participants rating each of the original PSS questions on a 5-point Likert scale (0 = *Never* to 4 = *Very Often*). Total scores ranged from 0-40, with higher scores indicating that participants perceived the TSST as stressful. The post measure PSS showed good reliability for the current study ( $\alpha = .91$ ).

## **Equipment**

Specific equipment was used throughout the course of the study.

**Heart rate.** Heart rate was monitored in the laboratory using Polar RS800CX heart rate monitors. An electrode strap was fitted to participants, and a wristwatch was used to monitor heart rate throughout. Following completion of the study, the data was downloaded from the watch to a computer using the Polar ProTrainer 5 software package available on the Polar website ([https://support.polar.com/au-en/support/polar\\_protrainer\\_5\\_free\\_download](https://support.polar.com/au-en/support/polar_protrainer_5_free_download)). This provided a printout of every heart rate reading collected. Due to technical difficulties with the heart rate monitors, heart rate was not collected for four participants in the experimental group and five participants in the control group.

**Cortisol.** Saliva samples were collected in sterile sealable tubes (provided by HealthScope Pathology, Melbourne), which were labelled with the participants' identity codes and the time the sample was collected to compare results of pre- and post-intervention.

## **Assessing physiological stress responses**

Physical health was measured using heart rate monitors and cortisol sampling.

**Heart rate.** Heart rate was recorded at five-second intervals throughout the course of the study. After the data was downloaded an average heart rate reading was calculated for each participant for each phase of the study. Baseline heart rate measures were gathered upon arrival to the venue. Since the initial stages of the experiment (completing the questionnaire packages) took around one hour to complete, this offered a good baseline heart rate level to compare rates during the stress task and afterwards.

**Cortisol.** During testing, participants were limited by the amount of liquid they could drink to not dilute the saliva samples given. Participants could drink 200ml of water throughout the course of the 2-hour study, but not 5-minutes before a saliva sample was taken. As saliva samples can be impacted by food consumption, smoking and caffeine intake (Matousek et al., 2010), baseline samples were collected approximately one hour after arrival, with participants only being offered limited amounts of water throughout the study. Waiting one hour to take the first sample helps to reduce cross-contamination if participants had eaten or smoked tobacco (or other substances) before testing (Matousek et al., 2010). To mitigate the impact of diurnal variation, test sessions were scheduled carefully to reduced time differences in saliva collection points between members of matched pairs, when possible. Test sessions were not conducted before 10am to reduce the likelihood of results being affected by the cortisol awakening response.

**Stress induction task.** The Trier Social Stress Test (TSST; Kirschbaum, Pirke & Hellhammer, 1993) was used to induce psychological stress. During the task, participants were informed of the nature of the task, where the task would take place, that there would be a panel of two judges (confederates) seated behind a desk, and that a video camera would be set up behind the judges. The video camera was on throughout the entirety of the testing; however, it was not recording. The participant was asked by a judge to prepare a five-minute presentation, which was framed as being part of an “ideal” job interview (see Appendix F).

The participant was then taken to another room, where paper and a pen were provided to allow them to prepare their talk. Each participant was given 10 minutes of preparation time. Upon leaving the preparation room to return to the presentation room, notes were taken from the participant without prior notification. During the five-minute presentation, the judges observed the participant without comment and with a neutral facial expression. If the participant ceased talking before five minutes had elapsed, the participant was asked to continue, being prompted as necessary (see Appendix G) until the full time had elapsed. The presentation was immediately followed by the second part of the stress task, during which each participant was asked to count backwards from 1,022 in steps of 13 (see Appendix H). If a mistake was made, the nominated judge prompted the participant to start again from the beginning, continuing in that way until five minutes had passed.

## **Procedure**

Participants who had already completed Study 1 and indicated an interest in taking part in the current study were invited to participate. Figure 5.1 shows the procedure flow for the current study.

**Inclusion and exclusion criteria.** Participants from Studies 1 and 2 were excluded if they indicated that they engaged in mindfulness training, which included Yoga classes or meditation practices. Any participant who scored high in social anxiety (above 45) on the BFNES were also excluded to minimise adverse outcomes to the participant due to the social evaluation component of the TSST. It is also possible that fear of negative evaluation could be more stressful than the TSST itself and could make the results less generalisable.

***Participant Matching.*** Eligible participants were first divided into two groups based on gender (either male or female). Each participant's score on total trait mindfulness, perceived stress, and each of the personality traits were categorised as being either high,



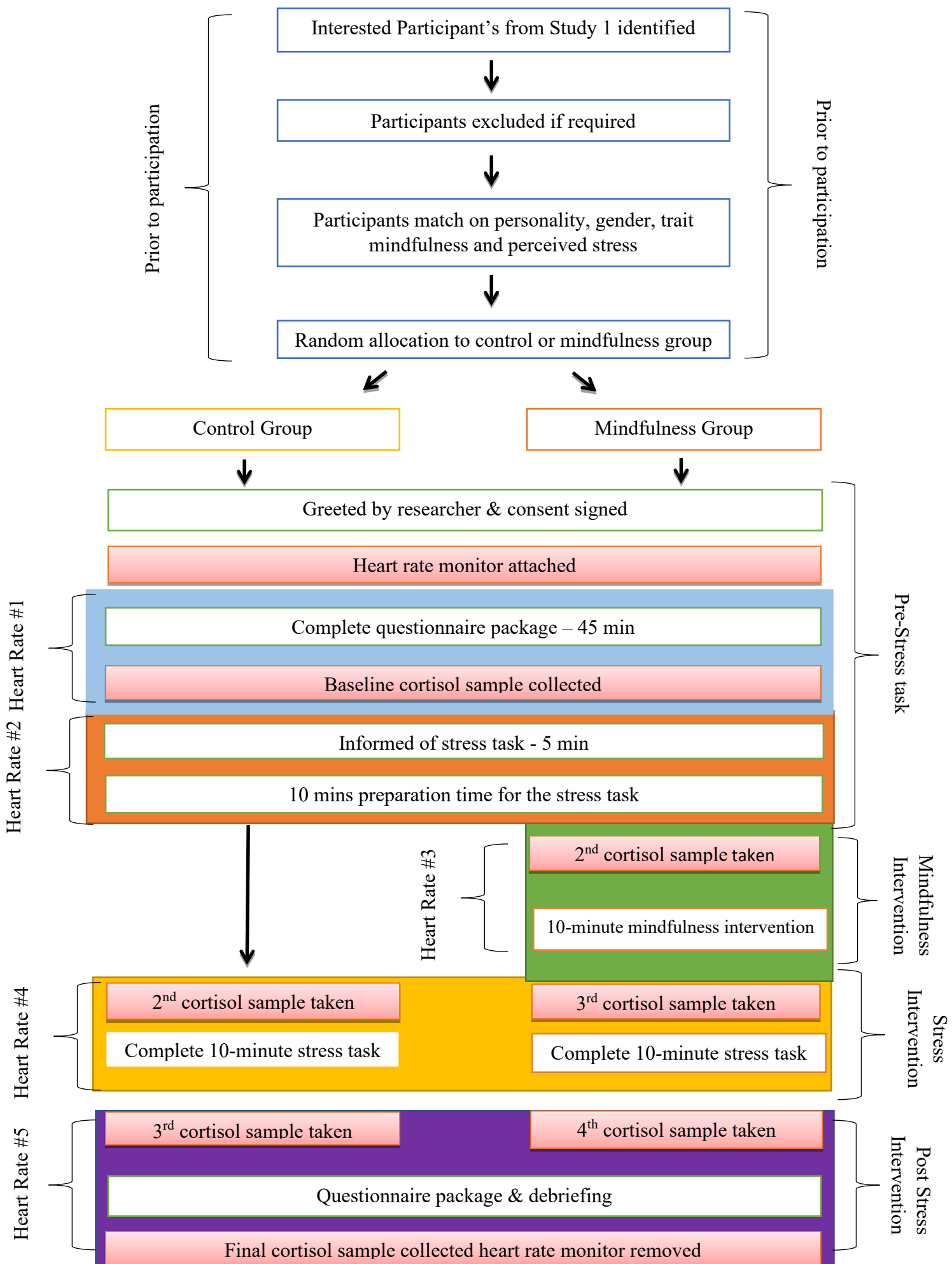


Figure 5.1. Timeline of the experiment.

moderate, or low based on the guide in Table 5.1. Participants were then matched on their levels of neuroticism since this was the personality trait found to have the strongest correlation with stress in Studies 1 and 2 of this dissertation. Agreeableness was also reviewed to ensure that participants were matched as best as possible on this trait, which is consistent with the results of Study 2. Participants were then matched on levels of perceived stress and trait mindfulness, given the strong correlations between these two variables with neuroticism in Study 1 and Study 2 of this dissertation. Once participants were matched, the group was randomly allocated to either the control or experimental group. This matching procedure was determined as a method to control potential confounding of the results due to personality, trait mindfulness, perceived stress, or gender differences.

Table 5.1.

*The score ranges for matched participants.*

	High	Moderate	Low
Perceived Stress	26-40	15-25	0-14
Trait Mindfulness	3.5-5.0	2.50 – 3.49	1.0-2.49
Personality	3.5-5.0	2.50-3.49	1.0-.2.49

**Pre-intervention.** Upon arrival at the testing location, I met the participant and ensured he/she had read and understood the Plain Language Information Statement (see Appendix I), which was emailed to the participant prior to testing session, and through which they were informed that this study received University ethics approval (see Appendix J). Each participant had an opportunity to ask questions before and after reading the document, after which they signed a consent form. The participant was provided with a label with an ID number to stick on his/her shirt and was fitted with a heart rate monitor. The participant then

completed the pre-intervention questionnaire package before providing a first saliva sample. The TSST then commenced.

**Control and experimental groups.** The experimental group completed a 10-minute mindfulness intervention, after their 10-minute presentation preparation task, and before their presentation for the judges. This exercise involved listening to a 10-minute mindfulness intervention narrated by Jon Kabat-Zinn, which involved completing a body scan exercise that focused on getting participants to reconnect with their physical body and notice sensations without judgment. The mindfulness intervention starts with bell sounds and instructions on how to position yourself to be comfortable throughout the exercise. It encourages listeners to become aware of their breath and the sensation of the breath coming into the body and leaving the body. The mindfulness intervention was completed in a room where participants were made to feel comfortable and at ease. After completing this mindfulness intervention, experimental group participants provided another saliva sample and were taken to the presentation room to complete the rest of the TSST.

After the control group was informed of the TSST they were taken to complete the 10-minute preparation task with no intervention. Following the preparation task, a cortisol sample was taken, and participants went into the room with the judges and completed the TSST immediately. After completing the TSST another cortisol sample was taken.

**Post-intervention.** Immediately after the TSST was completed, the participant completed the post-intervention questionnaires. This was then followed by debriefing, during which the purpose of the task, to induce stress, was explained. The participant was informed that the video was not recording during the presentation and the role of the judges was explained (e.g., to show no emotion as a means to increase the participant's stress response). Assurances were given concerning the participant's performance on the task not reflecting

actual abilities to undertake public speaking during usual (i.e., non-manipulated) conditions, and any questions were answered. At the end of debriefing, a final saliva and heart rate sample was collected, and the heart rate monitors were removed. Participants were given a \$20 gift card in recompense for their time. The confederates acting as judges were also debriefed at the end of their role in the study.

## **Results**

Given the small sample size, normality, linearity, and homoscedasticity could not be confirmed for all pre- and post-intervention variables, which is not uncommon (Pallant,2007). Thus, non-parametric tests were used to help alleviate the small sample size impact.

### **Descriptive statistics**

Table 5.2 provides an overview of the pre- and post-intervention scores for perceived stress and positive and negative affect along with mean scores on the personality and trait mindfulness measures. Mean readings for cortisol and heart rate throughout the course of the study are also reported.

### **Self-reported measures**

To determine if there was a statistically significant difference between the control and experimental group for the self-reported measures, a Mann-Whitney U test was conducted (see Table 5.3). No statistically significant differences between groups pre- to post-intervention for any measures of total mindfulness or stress were evident.

To determine if there were statistically significant differences within groups for the self-reported measures, a series of Wilcoxon signed-rank test were completed for both the control and experimental groups.

Table 5.2.

*Mean (M) and standard deviation (SD) for the control and experimental groups for key variables.*

	Control Group ( <i>n</i> = 10)		Experimental Group ( <i>n</i> = 10)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Trait Mindfulness	3.51	0.65	3.61	0.56
Neuroticism	58.80	13.53	59.1	13.79
Extraversion	49.40	10.43	48.90	13.59
Openness	60.50	10.84	55.00	8.42
Agreeableness	47.90	16.83	44.7	12.88
Conscientiousness	40.40	15.36	39.20	11.10
Perceived Stress – Pre-Intervention	16.70	7.86	16.5	6.93
Perceived Stress – Post Intervention	20.90	7.96	22.10	4.75
Positive Affect – Pre-Intervention	20.40	9.26	20	6.50
Positive Affect – Post Intervention	19.00	9.15	18.6	6.36
Negative Affect – Pre-Intervention	11.20	2.15	11.5	2.12
Negative Affect – Post Intervention	17.90	9.39	18.80	7.04
Heart Rate – Reading 1	82.70	10.97	81.30	10.88
Heart Rate – Reading 2	89.30	11.30	84.69	11.92
Heart Rate – Reading 3	-	-	75.60	11.35
Heart Rate – Reading 4	98.29	13.94	89.78	15.46
Heart Rate – Reading 5	83.95	8.56	79.46	10.66
Cortisol – Reading 1	26.11	15.73	12.6	6.02
Cortisol – Reading 2	28.70	25.44	11.10	5.26
Cortisol – Reading 3	-	-	12.20	4.98

	Control		Experimental Group	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Cortisol – Reading 4	26.50	22.77	17.30	15.19
Cortisol – Reading 5	27.80	26.17	24.50	28.31

*Note:* Reading 1 = baseline reading, Reading 2 = informed of TSST, Reading 3 = after mindfulness task, Reading 4 = immediately following TSST, Reading 5 = after debriefing.

**Experimental group.** For the experimental group, no significant difference was found in perceived stress scores pre- and post- intervention,  $T = 12.00$ ,  $z = -1.58$  (corrected for ties),  $n - \text{Ties} = 10$ ,  $p = 0.11$ , two-tailed.

Relative to perceive stress scores prior to completing the intervention, seven participants ranked their perceived stress as higher after completing the intervention (Sum of Ranks = 43.00), while only three participants reported lower perceived stress scores (Sum of Ranks = 12.00). This was moderate, although a non-significant effect size,  $r = .50$ .

Positive affect had no significant difference pre- to post-intervention,  $T = 13.50$ ,  $z = 1.07$  (corrected for ties),  $n - \text{Ties} = 9$ ,  $p = .28$ , two-tailed. However, six participants ranked their positive affect as lower after completing the TSST (Sum of Ranks = 5.25), while three participants reported increases to positive affect (Sum of Ranks = 13.50; one participant reported the same levels of positive affect pre- to post- intervention). This was a low, non-significant effect size ( $r = .34$ )

Negative affect showed a significant difference pre- to post-intervention,  $T = 0.00$ ,  $z = -2.81$  (corrected for ties),  $n - \text{Ties} = 10$ ,  $p = 0.005$ , two-tailed. All 10 participants rated their negative affect scores post-intervention higher than those pre-intervention, (Sum of Ranks = 55.00), with a large effect size,  $r = .89$ .

Table 5.3.

*Mann-Whitney U results for control and mindfulness groups.*

Measures	Md (control)	Md (Experimental)	<i>U</i>	<i>Z</i>	<i>P</i>	<i>r</i>
Total Mindfulness	3.52	3.64	48	-.15	.91	.03
Perceived Stress – Pre- Intervention	16	16	48.50	-.11	.91	.02
Perceived Stress – Post Intervention	21.50	21.5	47	-.23	.85	.05
Positive Affect – Pre- Intervention	19	21	45	-.38	.74	.08
Positive Affect – Post Intervention	18	20	43.5	-.49	.63	.11
Negative Affect – Pre- Intervention	10.5	10.5	47.5	-.20	.85	.04
Negative Affect – Post Intervention	14	21.5	37.5	-.95	.35	.21

**Control group.** For the control group, no significant difference was found in perceived stress scores pre- to post-intervention,  $T = 14.50$ ,  $z = -1.33$  (corrected for ties),  $n - \text{ties} = 10$ ,  $p = .18$ , two-tailed. Six of the participants ranked their perceived stress scores higher post- intervention compared to pre-intervention (Sum of Ranks = 40.50), while four participants ranked their perceived stress scores lower post-intervention (Sum of Ranks = 14.50), with moderate effect size,  $r = .42$ .

Positive affect showed no significant difference pre- to post- intervention,  $T = 5.50$ ,  $z = -1.44$  (corrected for ties),  $n - \text{ties} = 7$ ,  $p = .15$ , two-tailed. Six participants reported a decrease in positive affect scores post – TSST (Sum of Ranks = 22.50), while one participant reported an increase in positive affect post – TSST (Sum of Ranks = 5.50; three participants reported identical positive affect scores pre – to post – intervention). The effect size was moderate,  $r = .46$ .

Negative affect showed a significant difference in scores pre- to post- intervention,  $T = 1.50$ ,  $z = -2.65$  (corrected for ties),  $n - \text{ties} = 10$ ,  $p = 0.01$ , two-tailed. Nine of the control group participants reported an increase in negative affect scores post-intervention (Sum of Ranks = 53.50), while one participant reported a lower negative affect scores (Sum of Ranks = 1.50), with a large effect size,  $r = .84$ .

### **Physiological stress measures**

The Shapiro-Wilk,  $F_{max}$  and Levene's test statistics were used to test the assumptions of normality and homogeneity of variance and these assumptions were not violated, therefore, a mixed model ANOVA was appropriate to use, despite the small sample size. I took five heart rate and cortisol readings, but since the control group did not need the middle reading (3) due to moving straight from note taking into completed the TSST and no comparison was available, I eliminated that reading from the analysis. Since there were two physiological stress variables, two mixed model (2: Group x 4: Reading) ANOVA's were used to determine differences between heart rate and cortisol levels separately throughout the study.

**Heart rate.** A significant main effect was found for heart rate reading,  $F(3,27) = 15.11$ ,  $p = .000$ , partial  $\eta^2 = .63$ . Pairwise comparison indicated that the baseline reading (1) was significantly lower than the reading during the TSST (4). The reading taken during the participant being informed of the TSST (2) was significantly lower than that taken during the



TSST (4) but significantly higher than the reading following debriefing (5). The TSST reading was significantly higher than all other readings taken (see Table 5.4).

Table 5.4.

*Mean difference in heart rate readings (total group).*

Heart Rate		Mean Difference	<i>P</i>	95% Confidence Interval for Difference	
Reading				Lower Bound	Upper Bound
1	2	-4.993	.121	-10.960	.974
	4	-12.035*	.024	-22.559	-1.510
	5	.293	1.000	-5.850	6.437
2	1	4.993	.121	-.974	10.960
	4	-7.041*	.025	-13.241	-.842
	5	5.287*	.026	.587	9.986
4	1	12.035*	.024	1.510	22.559
	2	7.041*	.025	.842	13.241
	5	12.328*	.002	4.944	19.712
5	1	-.293	1.000	-6.437	5.850
	2	-5.287*	.026	-9.986	-.587
	4	-12.328*	.002	-19.712	-4.944

*Note:* 1 = baseline reading, 2 = informed of TSST, 4 = immediately following TSST, 5 = after debriefing.

No significant Group main effect was found,  $F(1,9) = .496, p = .499$ , partial  $\eta^2 = .05$ .

No significant Group x Reading interaction was evident,  $F(3,27) = .96, p = .46$ , partial  $\eta^2 = .10$ .

**Cortisol.** No significant Reading main effect was found for cortisol,  $F(3,51) = 2.22$ ,  $p = .098$ , partial  $\eta^2 = .12$ . No significant Group main effect occurred,  $F(1,17) = 1.82$ ,  $p = .194$ , partial  $\eta^2 = .10$ . No significant Group x Reading interaction for cortisol was evident,  $F(3,51) = .44$ ,  $p = .72$ , partial  $\eta^2 = .03$ .

## Discussion

The current study aimed to examine the effectiveness of a brief mindfulness intervention, specifically a mindfulness exercise focused on completing a body scan, on reducing both perceived and physiological stress responses following a stress induction task. Participants were matched based on their personality traits and trait mindfulness levels prior to the intervention, to minimise the impact of personality traits, specifically neuroticism, which was shown to impact on perceived stress during Study 1 and Study 2 of this dissertation.

### Measures of stress

The hypothesis, that the experimental group would report lowered perceived stress scores compared to the control group, following the TSST, was unsupported. These results were unexpected given previous success mindfulness interventions have shown in reducing the perception of stress (e.g., Baer et al., 2012) and the personality matching procedures used. One possible explanation for this could be the timing of the mindfulness intervention. Participants may have become so relaxed during the mindfulness intervention that they felt less prepared to undertake the stress task, compared to the control group, who still had their notes fresh in their minds. A heart rate reduction was evident during the mindfulness intervention, which seemingly supports the notion that the mindfulness intervention offered a form of relaxation and a calming effect, consistent with other research (Baer et al., 2012). However, during the stress task no significant difference was evident between the control or

experimental group, suggesting that the mindfulness intervention did little to improve stress related responses during the stress intervention. To our knowledge no other researchers have used personality matched groups as part of the experimental design and this could explain why I did not find a difference when others did.

In terms of physiological stress responses, the mindfulness intervention offered little difference in the scores seen by the two personality-matched groups. In relation to cortisol no significant differences between any of the readings or within groups was found, suggesting that cortisol stress responses were not impacted by the intervention. Heart rate, however, showed some significant changes throughout the course of the study. One possible explanation for the differences in the current study compared to that of others (e.g., Baer et al., 2012; Chiesa & Serretti, 2009) is that the participants in this study were purposefully accepted to take part based on responses given in Studies 1 and 2. Participants were deliberately ruled out based on specific measures then matched on personality traits, perceived stress, and trait mindfulness levels, perhaps leading to a population being tested that would be less likely to benefit from the mindfulness intervention. Other studies have investigated clinical populations (e.g., Baer et al., 2012; Romceovich, Reed, Flowers, Kemper, & Mahan, 2018) or randomised designs (Shearer, Hunt, Chowdhury, & Nicol, 2016) and did not specifically examine the impacts personality could have on the stress reduction strategies.

### **Stress test**

The hypothesis that the stress test would elicit both psychological and physiological stress responses from both the control and experimental group was partially supported. Both the control and experimental groups did not perceive the TSST to be more stressful than the events of their daily lives for the last 30-days as measured through the pre-post PSS. However, the TSST influenced negative affect, which may suggest that the TSST impacted more on participants mood than on their perception of stress.

The current study found no significant differences between groups during all measures of the study indicating that the mindfulness group may not have gained direct stress-reduction benefits from the brief mindfulness session that could be used during the stress task. In general, a significantly higher heart rate was exhibited during the TSST compared to all other measure points, indicating there was an increase in stress levels, since increased heart rate is linked with the stress response (e.g., Oswald et al., 2006; Nall, 2018). However, this increase in heart rate did not translate to a significant increase in cortisol reactions. One explanation for this was the length of time the mindfulness intervention was conducted. Previous studies have shown success with 8-week mindfulness interventions (e.g., Baer et al., 2012; Farb, Segal, & Anderson, 2012), it is possible the short breathing exercise was not enough to meaningfully impact on the stress outcomes.

### **Limitations and future directions**

The current study had several limitations, including sample size, cortisol testing time, and limitations with heart rate monitors. The sample size was small and only offered 10 participants in each the control and experimental group, this does not allow for a robust analysis. Future research could replicate this study with a larger sample. The cortisol readings were also conducted at different times of the day. The hour wait time after arrival before baseline testing was designed to help counteract these effects, however, consistent testing times all participants would have been ideal. Finally, despite every effort to get equipment to work properly, there were technical issues with the heart rate monitors, with some participants unable to achieve accurate and proper heart rate measures during the testing time, which caused missing heart rate data.

Despite the limitations, this study still offers insight into the relationship between personality traits, mindfulness, and physiological stress responses concerning a laboratory stress-task. While the mindfulness intervention did not offer significant differences in stress

responses, either physical or psychological, mindfulness group participants showed smaller responses compared to their control counterparts. Future research could expand on this study by comparing personality groups, for example, those high versus those low in specific personality traits (e.g., high neuroticism versus low neuroticism), which could help develop a taxonomy of tailored mindfulness interventions. Future research could also investigate when a brief mindfulness intervention would be most beneficial for participants, either prior to, or following, a stress task. This could help the tailored mindfulness interventions be utilised in the most effective manner and offer less adverse outcomes to unavoidable stressful situations.

## **Conclusions**

The current study was unable to replicate the stress reduction benefits of a mindfulness intervention found in other studies (e.g., Chiesa & Serretti, 2009). Nevertheless, this study showed that the TSST was successful at increasing participants heart rate during the intervention with no group differences found between the control and the experimental group, indicating that the mindfulness intervention did not impact on stress responses, either psychological or physiological, in personality matched groups.

## References

- About Elmagd, M. (2016). Benefits, need and importance of daily exercise. *International Journal of Physical Education, Sports and Health*, 3(5), 22-27.
- Baer, R.A., Carmody, J., & Husinger, M. (2012). Weekly change in mindfulness and perceived stress in a mindfulness-based stress reduction program. *Journal of Clinical Psychology*, 68(7), 755-765. doi: 10.1002/jclp.21865
- Bibbey, A., Carroll, D., Roseboom, T.J., Phillips, A.C., de Rooij, S.R. (2012). Personality and physiological reactions to acute psychological stress. *International Journal of Psychophysiology*, 90, 28-36. doi: 10.1016/j.ijpsycho.2012.10.018
- Brouwer, A., van Schaik, M.G., Korteling, J.E., van Erp, J.B.F., & Toet, A. (2015). Neuroticism, extraversion, conscientiousness and stress: Physiological correlates. *IEEE Transactions on Affective Computing*, 6(2), 109-117.
- Carlson, L.E., Speca, M., Faris, P., & Patel, K.D (2007). One year pre-post intervention follow-up of psychological, immune, endocrine and blood pressure outcomes of mindfulness-based stress reduction (MBSR) in breast and prostate cancer outpatients. *Brain Behaviour and Immunity*, 21(8) 1038-1049. doi: 10.1016/j.bbi.2007.04.002
- Carver, C.S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, 61, 679-704. doi: 10.1146/annurev.psych.093008.100352
- Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. *The Journal of Alternative and Complementary Medicine*, 15(5), 593-600. doi: 10.1089/acm.2008.0495.
- Coffey, K.A., Hartman, M., & Fredrickson, B.L. (2010). Deconstructing mindfulness and constructing mental health: Understanding mindfulness and its mechanisms of action. *Mindfulness*, 1, 235-253. doi: 10.1007/s12671-010-0033-2

- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24(4), 385-396.
- Costa, P.T., & McCrae, R.R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment*, 4(1), 5-13.
- Dahlgren, A., Kecklund, G., & Åkerstedt, T. (2005). Different levels of work-related stress and the effects on sleep, fatigue and cortisol. *Scandinavian Journal of Work, Environment & Health*, 31(4) 277-285.
- Dickerson, S.S., & Kemeny, M.E. (2004). Acute stressor and cortisol responses: A theoretical integration and synthesis of laboratory research. *Psychological Bulletin*, 130(3), 355-391. doi: 10.1037/0033-2909.130.3.355
- Everly, G.S., & Lating, J.M. (2013). *A clinical guide to the treatment of the human stress response (3<sup>rd</sup> ed)*. New York: Springer.
- Farb, N. A., Segal, Z. V., & Anderson, A. K. (2013). Mindfulness meditation training alters cortical representations of interoceptive attention. *Social Cognitive and Affective Neuroscience*, 8(1), 15-26. doi: 10.1093/scan/nss066
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G\*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41, 1149-1160.
- Feng, Z., Liu, L., Zhang, C., Zheng, T., Wang, J., Lin, M., ... Hu, W. (2012). Chronic restraint stress attenuates function and promotes tumorigenesis. *Proceedings of the National Academy of Science*, 109(18), 7013-7018. doi: 10.1073/pnas.1203930109
- Gaab, J., Rohleder, N., Nater, U.M., & Ehlert, U. (2005). Psychological determinants of the cortisol stress response: The role of anticipatory cognitive appraisal. *Psychoneuroendocrinology*, 30, 599-610. doi: 10.1016/j.psyneuen.2005.02.001

- Giluk, T.L. (2009). Mindfulness, big five personality, and affect: A meta-analysis. *Personality and Individual Differences*, 47,805-811. doi: 10.1016/j.paid.2009.06.026
- Hannibal, K.E., & Bishop, M.D. (2014). Chronic stress, cortisol dysfunction, and pain: A psychoneuroendocrine rationale for stress management in pain rehabilitation. *Journal of the American Physical Therapy Association*, 94(12), 1816-1825.
- Hellhammer, D.H., Wüst, S., & Kudielka, B.M. (2008). Salivary cortisol as a biomarker in stress research. *Psychoneuroendocrinology*, 34, 163-171. doi: 10.1016/j.psyneuen.2008.10.026
- Kemeny, M.E. (2003). The psychobiology of stress. *Current Directions in Psychological Science*, 12(4), 124-129. doi: 10.1111/1467-8721.01246
- Kirschbaum, C., Pirke, K.M., & Hellhammer, D.H. (1993). The ‘Trier Social Stress Test’ – A tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology*, 28, 76-81.
- Koydemir-Ozden, S., & Demir, A., (2009). The relationship between perceived parental attitudes and shyness among Turkish youth: Fear of negative evaluation and self-esteem as mediators. *Current Psychology*, 28, 169-180. doi: 10.1007/s12144-009-9054-1
- Kuster, P.A., & Merkle, C.J. (2009). Caregiver stress, immune function, and health: Implications for research with parents of medically fragile children. *Issues in Comprehensive Pediatric Nursing*, 4, 257-276. doi: 10.1080/01460860490884165
- Laceulle, O.M., Nederhof, E., van Aken, M. A.G., & Ormel, J. (2014). Adolescent personality: Associations with basal, awakening, and stress-induced cortisol responses. *Journal of Personality*, 83(3), 262-273. doi: 10.1111/jopy.12101



- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer Publishing Company.
- Le Fevre, M., Matheny, J., & Kolt, G. S. (2003). Eustress, distress, and interpretation in occupational stress. *Journal of Managerial Psychology*, 18(7), 726-744. doi: 10.1108/02683940310502412
- Leary, M.R. (1983). A brief version of the Fear of Negative Evaluation Scale. *Personality and Social Psychology Bulletin*, 9(3), 371-375. doi: 10.1177/0146167283093007
- Lin, H.P., Lin, H.Y., Lin, W.L., & Huang, A.C. (2011). Effects of stress, depression, and their interaction on heart rate, skin conductance, finger temperature, and respiratory rate: Sympathetic-parasympathetic hypothesis of stress and depression. *Journal of Clinical Psychology*, 67(10), 1080-1091. doi: 10.102/jclp.20833
- Lupien, S.J., Maheu, F., Tu, M., Fiocco, A., & Schramek, T.E. (2007). The effects of stress and stress hormones on human cognition: Implications for the field of brain and cognition. *Brain and Cognition*, 65(3), 209-237. doi: 10.1016/j.bandc.2007.02.007
- Marcus, M.T., Fine, M.P., Moeller, G.F., Khan, M.M., Pitts, K., Swank, P.R., & Liehr, P. (2003). Changes in stress levels following mindfulness-based stress reduction in a therapeutic community. *Addictive Disorders and their Treatment*, 2(3), 63-68.
- Matousek, R.H., Dobkin, P.L., & Pruessner, J. (2010). Cortisol as a marker for improvement in mindfulness-based stress reduction. *Complementary Therapies in Clinical Practice*, 16(1), 13-19. doi: 10.103/j.ctcp.2009.06.004
- McEwen, B.S. (2008). Central effects of stress hormones in health and disease: Understanding the protective and damaging effects of stress and stress mediators. *European Journal of Pharmacology*, 583(2), 174-185. doi: 10.1016/j-ejphar.2007.11.071

- McEwn, B.S. (2000). The neurobiology of stress: From serendipity to clinical relevance. *Brain Research*, 886 (1-2), 172-189. doi: 10.1016/S0006-8993(00)02950-4
- Morton, M.L., Helminen, E.C., & Felver, J.C. (2020). A systematic review of mindfulness interventions on psychophysiological responses to acute stress. *Mindfulness*, 11, 2039-2054. doi: 10.1007/s12671-020-01386-7
- Nall, R., (2018). What's the difference between epinephrine and norepinephrine? Retrieved from: <https://www.healthline.com/health/epinephrine-vs-norepinephrine>
- Oliver, G., Wardle, J., & Gibson, E. L. (2000). Stress and food choice: A laboratory study. *Psychosomatic Medicine*, 62(6), 853-865.
- Oswald, L.M., Zandi, P., Nestald, G., Potash, J.B., Kalaydjian, A.E., & Wand, G.S. (2006). Relationship between cortisol responses to stress and personality. *Neuropsychopharmacology*, 31, 1583-1591. doi: 0893-133X/06
- Pallant, J. (2007). *SPSS survival manual: A step-by-step guide to data analysis using SPSS for windows (version 15) 3<sup>rd</sup> edition*. St Leonards, Australia: Allen & Unwin.
- Penley, J. A., & Tomaka, J. (2002). Associations among the big five, emotional responses, and coping with acute stress. *Personality and Individual Differences*, 32, 1215-1228. doi:10.1016/S0191-8869(01)00087-3
- Romceovich, L.E., Reed, S., Flowers, S.R., Kemper, K.J., & Mahan, J.D. (2018). Mind-body skills training for resident wellness: A pilot study of a brief mindfulness intervention. *Journal of Medical Education and Curricular Development*, 5, 1-10. doi: 10.1177/2382120518773061
- Robert-McCombe, J.J., Tacon, A., Randolph, P., & Caldera, Y. (2004). A pilot study to examine the effects of a mindfulness-based stress reduction and relaxation program

- on levels of stress hormones, physical functioning, and submaximal exercise responses. *Journal of Alternative & Contemporary Medicine*, 10(5), 819-827.
- Sarafino, E.P. & Smith, T.W. (2011). Health psychology: Biopsychosocial interactions (7th ed.). New York: John Wiley & Sons Inc.
- Schlotz, W., Hammerfald, K., Ehlert, U., & Gaab, J. (2011). Individual differences in the cortisol response to stress in young healthy men: Testing the roles of perceived stress reactivity and threat appraisal using multiphase latent growth curve modeling. *Biological psychology*, 87(2), 257-264. doi: 10.1016/j.biopsycho.2011.03.005
- Selye, H. (1950). Stress and the general adaptation syndrome. *British Medical Journal*, 1 (4667), 1383-1392.
- Shearer, A., Hunt, M., Chowdhury, M., & Nicol, L. (2016). Effects of a brief mindfulness meditation intervention of student stress and heart rate variability. *International Journal of Stress Management*, 23(2), 232-254. doi: 10.1037/a0039814
- Taelman, J., Vandeput, S., Spaepen, A., & Van Huffel, S. (2009). Influence of mental stress on heart rate and heart rate variability. In *4th European conference of the international federation for medical and biological engineering* (pp. 1366-1369). Springer, Berlin, Heidelberg.
- van Eck, M., Berkhof, H., Nicolson, N., & Sulon, J. (1996). The effects of perceived stress, traits, mood states, and stressful daily events on salivary cortisol. *Psychosom Med*, 58(5), 447-458. doi: 10.1097/00006842-19960900-00007
- Walsh, J.J., Balint, M.G., Smolira SJ, D.R., Fredricksen, L.K., & Madsen, S. (2009). Predicting individual differences in mindfulness: The role of trait anxiety, attachment

anxiety and attentional control. *Personality and Individual Differences*, 46(2), 94-99.

doi: 10.1016/j.paid.2008.09.008

Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-1070.

## **Chapter 6**

### **General discussion**

The current dissertation comprised of three studies that investigated the relationships between personality and stress, and the variables, if any, that impacted on the personality-stress relationship. Specifically, positive, and negative affect, and trait and state mindfulness, were examined to determine if they attributed to any variability in the relationship between personality and perceived stress. In Study 1, 290 participants (ranging from 18 to 64 years of age; 71% female) completed an online questionnaire package consisting of: the Perceived Stress Scale (PSS), the Big Five Inventory (BFI), and the Positive and Negative Affect Schedule (PANAS). A correlation analysis was conducted to help determine which personality traits would correlate with perceived stress. All five personality traits shared a correlation with perceived stress, with neuroticism being the only to have a positive correlation with perceived stress. To further this, a hierarchical regression was conducted to determine if personality traits would still correlate with perceived stress after controlling for positive and negative affect. I discovered that when all five personality traits were analysed concurrently and, when controlling for positive and negative affect, neuroticism was the only trait to explain a significant unique proportion of the variance in perceived stress. Affect was not found to moderate the relationship between neuroticism and perceived stress but did partially mediated the relationship between neuroticism and perceived stress.

While affect impacted the relationship between neuroticism and perceived stress in Study 1, Study 2, examined the impact of trait mindfulness on the relationship between personality and stress. In total, 266 participants (ranging from 18 to 64 years of age; 70% female) completed an online questionnaire package consisting of the PSS, BFI, and the Carolina Empirically Derived Mindfulness Intervention (CEDMI). A correlation analysis confirmed the results found in Study 1, with all five personality traits correlating with

perceived stress. Agreeableness and openness were the only personality traits to have a correlation with mindfulness – attention, and all five personality traits correlated with mindfulness acceptance. A hierarchical regression examined which personality traits were significantly associated with perceived stress when controlling for trait mindfulness and found that agreeableness and neuroticism explained significant unique proportions of the variance in perceived stress. Study 2 also extended the findings of Study 1 in relation to increasing knowledge of moderating and mediating factors in the relationship between personality traits and stress. Trait mindfulness attention significantly moderated the relationship between agreeableness and perceived stress. Trait mindfulness acceptance partially mediated the relationship between neuroticism and perceived stress, and agreeableness and perceived stress.

Study 3 was designed to examine the impacts of a brief, state-based, mindfulness intervention on physiological and psychological responses to a stress related task for participants matched on personality traits. Participants for Study 3 were recruited through Studies 1 and 2 and the results from those studies were used to match participants based on personality results of the first two studies. In Study 3, 20 participants were divided into either a control or mindfulness group. The mindfulness group was given a brief 10-minute mindful breathing exercise to complete prior to a stress task, the control group had no intervention. The results of Study 3 showed that a stress related task impacted on negative affect but did not significantly impact perceived stress. The mindfulness intervention did not impact perceived stress, cortisol, or heart rate, as no difference was found between the control or experimental group.

This chapter aims to view how all three studies are interrelated and the implications the findings have on stress, personality, and possible stress reduction techniques. This chapter will review the general findings of the dissertation in relation to personality and stress, and

personality, stress and mindfulness, and the implications the results could have for stress reduction techniques. Issues with the current dissertation and suggestions for future research will also be discussed.

## **General findings**

### **Personality and stress**

The associations between personality and stress reported in the literature have often been conflicting (e.g., Ebstrup et al., 2011; Penley & Tomaka, 2002). While neuroticism is consistently positively correlated with perceived stress, the remaining four of the Big Five personality traits have shown conflicting results. Studies 1 and 2 indicated that the influence of other variables, such as affect and mindfulness, could help to explain why these differences in results have occurred, with both affect and mindfulness impacting the significance of the relationship between personality and perceived stress. Other variables have been shown to mediate the relationship between personality and stress. For example, Williams and Wingate (2012) found that social support and emotion-focused coping mediated the relationship between personality and perceived stress, however, to-date no research, to our knowledge, has investigated the moderating and mediating effects of affect or mindfulness on this relationship. By exploring these possible moderating and mediating effects some of the gaps in the literature on the relationship between personality and stress can be addressed.

Differences in personality traits were found during Studies 1 and 2 in relation to perceived stress, while Study 3 further showed that there were links between the perception of stress and physiological stress responses, on participants that were matched based partially on personality scores. During Studies 1 and 2 it was evident that neuroticism still shared a strong link to perceived stress, even when controlling for variables such as positive and

negative affect and mindfulness. This further supports the notion that individuals high in neuroticism could be more likely to perceive events as stressful despite other confounding variables, such as affect. During Study 3 participants were matched based on personality traits since direct links were found between personality and stress in Studies 1 and 2. It is possible that the lack of significant differences between groups in Study 3 was a result of personality matching. Researchers that have found successful reduction in stress due to mindfulness interventions may not have accounted for the personalities of participants (e.g., Baer, Carmody, & Hunsinger, 2012) or examined a clinical population (Sarenmalm et al., 2013). As personality is enduring, by definition, the examination of modifiable variables that can impact the relationship between personality and stress is worth investigating, especially when trying to develop stress reduction techniques. This is important when examining the long-term health implications that can develop if either perceived or actual stress is present for extended periods of time. Study 1 and Study 2 both showed the links between personality and stress, but during Study 3 personality matched groups did not differ in their experience of a stress related task, even when one group undertook a brief mindfulness intervention.

### **Personality, mindfulness, and stress**

The way in which personality and mindfulness work to reduce or increase the likelihood of the stress process is still not fully understood. Chiesa, Serretti, and Jakobsen (2013) explained that mindfulness has been viewed as either a top-down process or a bottom-up process, in relation to emotion regulation, suggesting that mindfulness strategies can be used without conscious appraisal, but can also be deliberately practiced when needed. Perhaps the same is true for the way mindfulness interacts within the stress response process. In Study 2, I found that trait mindfulness impacts on the relationship between personality and stress, possibly by impacting on the actual appraisal of the events that could potentially be viewed as stressors, a key component to primary appraisal (Lazarus & Folkman, 1980), as



trait mindfulness is considered underlying levels of mindfulness that exist without the need for deliberate action from an individual, this could be representative of top-down processes. Study 3 extended that finding indicating that a brief state-based mindfulness intervention can also impact on stress responses in relation to a stress related exercise, with the mindfulness group showing lower heart rate levels during the mindfulness intervention. This could suggest that mindfulness acts as a coping mechanism during the stress process (bottom-up process) consistent with other mindfulness intervention findings (Arch & Craske, 2006; Farb et al., 2012; Gard et al., 2011) The dissertation as a whole, further supports the notion that mindfulness can be viewed as both a state and a trait, rather than simply falling into one category (Kiken, Garland, Bluth, Palsson, & Gaylord, 2015), with trait differences evident during Study 2 and Study 3 showing that differences in heart rate were present during the mindfulness intervention.

### **Implications for stress reduction techniques**

The effectiveness of long-term mindfulness-based stress reduction training have been well documented (e.g., Sarenmalm et al., 2013), and the links between state-mindfulness and perceived stress are also well established (e.g., Chiesa & Serretti, 2009). However, these stress reduction techniques are developed and trained techniques that require rigorous practice, usually lasting 8-weeks (Carlson & Garland, 2005). These programs are useful, but only for those that can commit to the time and potential financial costs associated with engaging in the program. The drop-out rate for these programs also has been problematic, with the latest training manual for mindfulness-based stress reduction (MBSR) suggesting that if three classes are missed, then participants should be encouraged to de-register and start the program again (Santorelli, Kabat-Zinn, Blacker, Meleo-Meyer, & Koerbel, 2017). Müller-Engelmann, Wunsch, Volk and Steil (2017) found that 35% of participants dropped out of their MBSR training program prior to completion; despite knowing that MBSR training helps

to reduce the perception of stress, individuals are not adhering to the full program course. Study 3 of this dissertation showed that a shortened mindfulness intervention on personality matched groups do not replicate the same success as the longer 8-week MBSR studies (Baer et al., 2012; Farb et al., 2012). Apparently, longer intervention approaches to stress reduction training could be a more beneficial way to examine stress reduction, however a larger sample design using the approach included in the current dissertation could help better determine the success of shorter interventions.

Stress reduction techniques could be better targeted based on individual personality traits. Study 1 and Study 2 both showed that neuroticism and agreeableness were the only personality traits linked with perceived stress when all traits were viewed concurrently. During Study 1, results from the moderation and mediation analyses showed that purely focusing on reducing negative affect or increasing positive affect might not be enough to reduce stress for those high in neuroticism. In Study 3, it was expected that the stress task would increase perceived stress post-task, however, the stress task only increased negative affect with perception of stress showing little difference. This may have been, at least partially, due to the feelings of relief that many participants expressed at the end of the stress task, such that the positive emotion associated with this relief could have confounded post-intervention measurement. It is possible that stress reduction techniques that focus of short interventions, such as the one used in Study 3, would only benefit those who were more likely to utilise these types of techniques in the past. As part of the experimental design, participants who had previous experience in mindfulness-based practices were excluded from participating, which could possibly have altered the results of the study.

### **Issues with the current research**

The studies included in this dissertation were designed to measure the factors that can influence the relationship between personality and stress. The dissertation then expanded this

further by reviewing a brief mindfulness intervention to determine if it would be effective in reducing, not only psychological, but also physiological stress responses. Despite my best intentions when the research design was developed, there are a number of limitations to each of the individual studies, as noted throughout the dissertation.

Studies 1 and 2 both involved cross sections, self-report designs. Inherently there are many limitations to this study design, including honesty of the participants, response bias, ability of the participants to interpret the questions, and sampling bias. Despite these limitations Studies 1 and 2 provided an understanding into the interrelationships between stress, affect and personality, and stress, mindfulness and personality. Without this clarifying information it would have been difficult to build baseline information for Study 3.

Study 3 primarily focused on an experimental design. While best efforts were made to control for as many variables as possible, there were still limitations to the design. For example, the gap between completing the preparation task for the TSST and then completing the mindfulness exercise could have caused participants to be more distressed as the notes they made were not fresh in their memories. Such distress could also have impeded their ability to focus on the mindfulness exercise. Technical difficulties with the heart rate monitors also meant that heart rate data was not all collected for all participants for the duration of the experiment. This meant that there was missing data in the analysis. As this was a pilot study these are areas that could be improved in future studies.

There was, however, at least one common methodological flaw throughout all three studies. Specifically, the population used for testing (throughout all three studies, mostly educated, Australians) makes it difficult to generalize the results to a wider demographic population. When recommending stress reduction techniques, this can only be generalized to individuals from a similar demographic population to the one that was tested.

## **Future research**

Future research could examine the links between stress, affect, mindfulness and personality traits. This could be done through replicating Study 3 to further expand on the pilot data collected. Including a wider population group and attempting to control for the methodological issues noted throughout the dissertation could help to offer more insight into the effectiveness of brief mindfulness interventions in the reduction of stress. The study design could be extended to measure stressors in everyday situations, rather than a laboratory-based stress exercise. This could offer a more “real world” generalizability to the results that are obtained.

Future research could also consider investigating stress reduction techniques that increase positive affect and trait mindfulness, while decreasing negative affect. This could be examined through personality matched groups, based on the dominant personality trait of individuals, to determine which stress reduction techniques would be most beneficial for each personality trait, rather than a one size-fits all approach. Targeted interventions could be more beneficial as individuals may be more likely to engage in the stress reduction technique if they feel it is customized to suit their needs.

Finally, while the effectiveness of MBSR is well documented (e.g., Arch & Craske, 2006; Baer et al., 2012; Dickenson et al., 2012), few studies have conducted follow-up analyses to determine if the results are long-lasting and robust over time, especially when investigating a non-clinical sample. Future research could examine the effectiveness of brief mindfulness interventions over longitudinally using a personality matched group. This could then be compared to the long-term benefits of MBSR techniques. As the current dissertation found no differences between the control and experimental groups, further investigation is needed to determine if personality matched participants would benefit in the same way from

long term MBSR techniques and training. This could help to determine if there would be long-term benefits for people with specific personality traits over an extended period of time.

## **Final conclusions**

The relationship between personality and stress has been the focus of research for decades, yet there is much that is still not known or certain about this relationship. The current dissertation found that positive and negative affect and trait mindfulness can impact the relationship between personality and stress. This dissertation extended the research to indicate that a personality matched, state-based mindfulness intervention seemed to have no impact on perceived psychological or physiological stress responses during exposure to a stress related task. All three studies provided support that other variables can impact the relationship between personality and stress, but a short personality-matched mindfulness intervention did not impact on stress responses. Studies 1 and 2 provided support that specific personality traits are impacted differently by affect and trait mindfulness, while Study 3 found that a brief mindfulness intervention did not alter the physiological or psychological stress experience of participants matched based on their personality traits. Further research is required to expand and extend the findings of the current dissertation. I hope that this dissertation has led researchers who read it to instigate future directions that can be investigated based on the findings of the included studies.

## References (Overall Dissertation)

- About Elmagd, M. (2016). Benefits, need and importance of daily exercise. *International Journal of Physical Education, Sports and Health*, 3(5), 22-27.
- Andreou, E., Alexopoulos, E.C., Lionis, C., Varvogli, L., Gnardellis, C., Chrousos, G.P., & Darviri, C. (2011). Perceived Stress Scale: Reliability and validity study in Greece. *International Journal of Environmental Research and Public Health*, 8, 3287-3298. doi: 10.3390/ijerph8083287
- American Institute of Stress (2011). *What is Stress?* Retrieved from <https://www.stress.org/what-is-stress>
- American Psychological Association (2018). *Stress in America: Generation Z*. Washington, DC: American Psychological Association.
- Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy*, 44(12), 1849-1858. doi: 10.1016/j.brat.2005.12.007
- Armitage, C.J., Conner, M., & Norman, P. (1999). Differential effects of mood on information processing: Evidence from theories of reasoned action and planned behaviour. *European Journal of Social Psychology*, 29, 419-433.
- Asmundson, G. J., Paluszek, M. M., Landry, C. A., Rachor, G. S., McKay, D., & Taylor, S. (2020). Do pre-existing anxiety-related and mood disorders differentially impact COVID-19 stress responses and coping? *Journal of Anxiety Disorders*, 74, 1-6. doi: 10.1016/j.janxdis.2020.102271
- Australian Psychology Society (2015). *Stress and wellbeing: How Australians are coping with life. The findings of the Australian Psychological Society Stress and Wellbeing in Australia survey 2015*. Melbourne, Australia: Australian Psychological Society.

- Baer, R.A., Carmody, J., & Husinger, M. (2012). Weekly change in mindfulness and perceived stress in a mindfulness-based stress reduction program. *Journal of Clinical Psychology, 68*(7), 755-765. doi: 10.1002/jclp.21865
- Bamber, M.D., & Schneider, J. K. (2016). Mindfulness based meditation to decrease stress and anxiety in college students: A narrative synthesis of the research. *Educational Research Review, 18*, 1-32. doi: 10.1016/j.edurev.2015.12.004
- Bao, X., Xue, S., & Kong, F. (2015). Dispositional mindfulness and perceived stress: The role of emotional intelligence. *Personality and Individual Difference, 78*, 48-52. doi: 10.1016/j.paid.2015.01.0070191-8869
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173.
- Bender, R.E., Alloy, L.B., Sylvia, L.G., Urošević, S., & Abramson, L.Y. (2010). Generation of life events in bipolar spectrum disorders a re-examination and extension of the stress generation theory. *Journal of Clinical Psychology, 66* (9) 907-926. doi: 10.1002/jclp.20705
- Betts, J.G., DeSaix, P., Johnson, E., Johnson, J.E., Korol, O., Kruse, D.H...Young, K.A. (2017). *Anatomy and Physiology*. Houston TX: OpenStax
- Bibbey, A., Carroll, D., Roseboom, T.J., Phillips, A.C., de Rooij, S.R. (2012). Personality and physiological reactions to acute psychological stress. *International Journal of Psychophysiology, 90*, 28-36. doi: 10.1016/j.ijpsycho.2012.10.018
- Bishop, S.R., Lau, M., Shapiro, S., Carlson, L., Anderson, N.D., Carmody, J., ... Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*(3), 230-241. doi: 10.1093/clipsy/bph077

- Blaxton, J.M. & Bergeman, C.S. (2017). A process-oriented perspective examining the relationships among daily coping, stress, and affect. *Personality and Individual Differences, 104*, 357-361.
- Bowen, S., Witkiewitz, K., Billworth, T.M., Chawla, N., Simpson, T.L., Ostafin, B.D... Blume, A.W. (2006). Mindfulness meditation and substance use in an incarcerated population. *Psychology of Addictive Behaviours, 20*(3), 343-347. doi: 10.1037/0893-164X.20.3.343
- Brouwer, A., van Schail, M., van Erp, J., & Korteling, H. (2013, September). Neuroticism, extraversion and stress: Physiological correlates. In *2013 Humaine Associations Conference on Affective Computing and Intelligent Interactions*, 429-434. doi: 10.1109/ACII.2013.77
- Brouwer, A., van Schaik, M.G., Korteling, J.E., van Erp, J.B.F., & Toet, A. (2015). Neuroticism, extraversion, conscientiousness and stress: Physiological correlates. *IEEE Transactions on Affective Computing, 6*(2), 109-117.
- Brown, K.W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*(4), 822-848. doi: 10.1037/0022-3514.84.4.822
- Buecker, S., Maes, M., Denissen, J.J.A., & Luhmann, M. (2020). Loneliness and the big five personality traits: A meta-analysis. *European Journal of Personality, 34*(1), 8-28. doi: 10.1002/per.2229
- Cannon, W.B. (1915). *Bodily changes in pain, hunger, fear, and rage*. New York: Appleton-Century-Crofts.



- Carlson, L.E., & Garland, S.N (2005). Impact of mindfulness-based stress reduction (MBSR) on sleep, mood, stress and fatigue symptoms in cancer outpatients. *International Journal of Behavioral Medicine*, 12(4), 278-285.
- Carlson, L.E., Speca, M., Faris, P., & Patel, K.D (2007). One year pre-post intervention follow-up of psychological, immune, endocrine and blood pressure outcomes of mindfulness-based stress reduction (MBSR) in breast and prostate cancer outpatients. *Brain Behaviour and Immunity*, 21(8) 1038-1049. doi: 10.1016/j.bbi.2007.04.002
- Carver, C.S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, 61, 679-704. doi: 10.1146/annurev.psych.093008.100352
- Cervone, D., & Pervin, L.A. (2008). *Personality theory and research*. Hoboken, NJ: John Wiley & Sons
- Chen, Y., Peng, Y., Ma, X., & Dong, X. (2017). Conscientiousness moderates the relationship between perceived stress and depressive symptoms among U.S. Chinese older adults. *The Journals of Gerontology Series A*, 72, 108-112. doi: 10.1093/Gerona/glw172
- Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. *The Journal of Alternative and Complementary Medicine*, 15(5), 593-600. doi: 10.1089/acm.2008.0495.
- Chiesa, A., Serretti, A., Jakobsen, J.C. (2013). Mindfulness: Top-down or bottom-up emotion regulation strategy? *Clinical Psychology Review*, 33, 82-96. doi: 10.1016/j.cpr.2012.10.006

- Civitci, A. (2015). The moderating role of positive and negative affect on the relationship between perceived social support and stress in college students. *Education Sciences, Theory & Practice*, 15(5), 565-573.
- Cloninger, S.C. (2008). *Theories of personality: Understanding persons*. Upper Saddle River, NJ: Pearsons Education
- Coffey, K.A., Hartman, M., & Fredrickson, B.L. (2010). Deconstructing mindfulness and constructing mental health: Understanding mindfulness and its mechanisms of action. *Mindfulness*, 1, 235-253. doi: 10.1007/s12671-010-0033-2
- Cohen, J.W. (1988). *Statistical power analysis for the behavioral sciences* (2<sup>nd</sup> ed). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24(4), 385-396.
- Connor-Smith, J.K., & Flachsbart, C. (2007). Relations between personality and coping: A meta-analysis. *Journal of Personality and Social Psychology*, 93(6), 1080-1107.
- Cooper, C.L., & Quick, J.C. (2017), *The handbook of stress and health: A guide to research and practice*. London: Wiley Blackwell
- Costa, P., Terracciano, A., & McCrae, R.R. (2001). Gender differences in personality traits across cultures: Robust and surprising findings. *Journal of Personality and Social Psychology*, 81(2), 322-331.
- Costa, P.T., & McCrae, R.R. (1980). Influences of extraversion and neuroticism on subjective well-being: Happy and unhappy people. *Journal of Social and Social Psychology*, 38(4), 668-678.

- Costa, P.T., & McCrae, R.R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment*, 4(1), 5-13.
- Dahlgren, A., Kecklund, G., & Åkerstedt, T. (2005). Different levels of work-related stress and the effects on sleep, fatigue and cortisol. *Scandinavian Journal of Work, Environment & Health*, 31(4) 277-285.
- David, J.P., Green, P.J., Martin, R. & Suls, J. (1997). Differential roles of neuroticism, extraversion, and even desirability for mood in daily life: An integrative model of top-down and bottom-up influences. *Journal of Personality and Social Psychology*, 73(1), 149-159.
- De Jong, G.M., van Sonderen, E., & Emmelkamp, P.M.G. (1999). A comprehensive model of stress: The roles of experienced stress and neuroticism in explaining the stress-distress relationship. *Psychotherapy and Psychosomatics*, 68(6), 290-298.
- DeNeve, K.M., & Cooper, H. (1998). The happy personality: A meta-analysis of 137 personality traits and subjective well-being. *Psychological Bulletin*, 124(2), 197-229.
- de Vibe, M., Solhaug, I., Tyssen, R., Friberg, O., Rosenvinge, J.H., Sørli, T., Halland, E., & Bjørndal, A. (2013). Does personality moderate the effects of mindfulness training for medical and psychology students? *Mindfulness*, 1, 1-9. doi: 10.1007/s1267-013-0258y
- Dickerson, S.S., & Kemeny, M.E. (2004). Acute stressor and cortisol responses: A theoretical integration and synthesis of laboratory research. *Psychological Bulletin*, 130(3), 355-391. doi: 10.1037/0033-2909.130.3.355
- Dresden, D. (December, 2017). What is the hippocampus? *Medical News Today*. Retrieved from <https://www.medicalnewstoday.com/articles/313295>
- Ebstrup, J.F., Eplov, L.F., Pisinger, C., & Jørgensen, T. (2011). Association between the five factor personality traits and perceived stress: Is the effect mediated by general self-efficacy? *Anxiety, Stress & Coping*, 24(4), 407-419.

- Ellis, S., Brown, R.F., Thorsteinsson, E.B., & Perrott, C. (2014). Trait mindfulness, affective symptoms and quality of life in people with non-hodgkin's lymphoma. *Journal of Cancer Therapy*, 5, 1114-1126. doi: 10.4236/jct.2014.512115
- Emmons, R.A., & Diener, E. (1985). Personality correlates of subjective well-being. *Personality and Social Psychology Bulletin*, 11(1), 89-97.
- Engler, B (2014). *Personality theories*. Delmont, CA: Wadsworth Cengage Learning.
- Everly, G.S., & Lating, J.M. (2013). *A clinical guide to the treatment of the human stress response (3<sup>rd</sup> ed)*. New York: Springer.
- Farb, N. A., Segal, Z. V., & Anderson, A. K. (2013). Mindfulness meditation training alters cortical representations of interoceptive attention. *Social Cognitive and Affective Neuroscience*, 8(1), 15-26. doi: 10.1093/scan/nss066
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G\* Power 3.1: Tests for correlation and regression analyses. *Behavior research methods*, 41(4), 1149-1160
- Feltman, R., Robinson, M.D., & Ode, S. (2009). Mindfulness as a moderator of neuroticism-outcome relations: A self-regulation perspective. *Journal of Research in Personality*, 43, 953-961. doi: 10.1016/j.jrp.2009.08.009
- Feng, Z., Liu, L., Zhang, C., Zheng, T., Wang, J., Lin, M., ... Hu, W. (2012). Chronic restraint stress attenuates function and promotes tumorigenesis. *Proceedings of the National Academy of Science*, 109(18), 7013-7018. doi: 10.1073/pnas.1203930109
- Folkman, S., & Lazarus, R.S. (1980). An analysis of coping in a Middle-aged community sample. *Journal of Health and Social Behavior*, 21(3), 219-239.
- Friedman, H.S. (2019). Neuroticism and health as individuals age. *Personality disorders: Theory, Research, and Treatment*, 10 (1), 25-32. doi: 10.1037/per0000274

- Gaab, J., Rohleder, N., Nater, U.M., & Ehlert, U. (2005). Psychological determinants of the cortisol stress response: The role of anticipatory cognitive appraisal. *Psychoneuroendocrinology*, 30, 599-610. doi: 10.1016/j.psyneuen.2005.02.001
- Gard, T., Hölzel, B. K., Sack, A. T., Hempel, H., Lazar, S. W., Vaitl, D., & Ott, U. (2012). Pain attenuation through mindfulness is associated with decreased cognitive control and increased sensory processing in the brain. *Cerebral Cortex*, 22(11), 2692-2702. doi: 10.1093/cercor/bhr352
- George, J.M., Zhou, J. (2001). When openness to experience and conscientiousness are related to creative behavior: An interactional approach. *Journal of Applied Psychology*, 86, 513-524.
- Geukes, K., Nestler, S., Huttermann, R., Kufner, A.C.P., & Back, M.D. (2017). Trait personality and state variability: Predicting individual differences in within- and cross-context fluctuations in affect, self-evaluations, and behaviour in everyday life. *Journal of Research in Personality*, 69, 124-138. doi: 10.1016/j.jrp.2016.06.003
- Giluk, T.L. (2009). Mindfulness, big five personality, and affect: A meta-analysis. *Personality and Individual Differences*, 47, 805-811. doi: 10.1016/j.paid.2009.06.026
- Gispén-de Wied, C.C. (2000). Stress in schizophrenia: An integrative view. *European Journal of Pharmacology*, 405, 375-384. doi: 10.1016/S0014-2999(00)00567-7
- Grant, S., & Logan-Fox, J. (2006). Occupational stress, coping and strain: The combined/interactive effect of the Big Five traits. *Personality and Individual Differences*, 41, 719-732.
- Gross, J.J., Sutton, S.K., & Ketelaar, T. (1998). Relations between affect and personality: Support for the affect-level affectivity-reactivity views. *Personality and Social Psychology Bulletin*, 24(3), 279-288.

- Gruner, T.M . (2006). Acute and chronic stress. *Journal of Complementary Medicine*, 5(6), 12-25.
- Guski, R. (2001). Environmental stress and health. *Elsevier*, 7, 4667-4671.
- Hanley, A.W. (2016) The mindfulness personality: Associations between dispositional mindfulness and the five factor model of personality. *Personality and Individual Differences*, 91, 154-158. doi: 10.1016/j.paid.2015.11.054
- Hannibal, K.E., & Bishop, M.D. (2014). Chronic stress, cortisol dysfunction, and pain: A psychoneuroendocrine rationale for stress management in pain rehabilitation. *Journal of the American Physical Therapy Association*, 94(12), 1816-1825.
- Hayes, A.F. (2009) Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*, 76(4), 408-420. doi: 10.1080/03637750903310360
- Hayes, A.F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York: The Guilford Press.
- Hellhammer, D.H., Wüst, S., & Kudielka, B.M. (2008). Salivary cortisol as a biomarker in stress research. *Psychoneuroendocrinology*, 34, 163-171. doi: 10.1016/j.psyneuen.2008.10.026
- Hicks, A., Siwik, C., Phillips, K., Zimmaro, L.A., Salmon, P., Burke, N., ... Sephton, S.E. (2020). Dispositional mindfulness is associated with lower basal sympathetic arousal and less psychological stress. *International Journal of Stress Management*, 27(1), 88-92. doi: 10.1037/str0000124
- Hofmann, S.G., Sawyer, A.T., Witt, A.A., & Oh, D. (2010). The effect of Mindfulness-Based Therapy on Anxiety and Depression: A meta-Analytic Review. *Journal of Consulting and Clinical Psychology*, 78 (2), 169-183. doi: 10.1037/a0018555

- Izard, C.E., Libero, D.Z., Putnam, P., & Haynes, O.M. (1993). Stability of emotion experiences and their relations to traits of personality. *Journal of Personality and Social Personality*, 64(5), 847-860.
- Jackson, S.M., & Schneider, T.R. (2014) Extraversion and stress. In A.D. Haddock & A.P. Rutkowski (Eds), *Psychology of extraversion* (pp121-131). New York: Nova Science Publishers.
- John Hopkins Medicine. (n.d.) Adrenal Glands. *John Hopkins Medicine*. Retrieved from <https://www.hopkinsmedicine.org/health/conditions-and-diseases/adrenal-glands#:~:text=Adrenal%20glands%2C%20also%20known%20as,stress%20and%20other%20essential%20functions>.
- John, O.P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. Pervin & O.P. John (Eds.), *Handbook of Personality: Theory and Research* (pp. 102-138). New York: Guilford Press.
- Kabat-Zinn, J., Massion, A. O., Kristeller, J., Peterson, L. G., Fletcher, K. E., Ebert, L., Lenderking, W. R., & Santorelli, S. F. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *American Journal of Psychiatry*, 149(7), 936-943. <https://doi.org/10.1176/ajp.149.7.936>
- Karagkouni, A., Alevizos, M., & Theoharides, T.C. (2013). Effect of stress on brain inflammation and multiple sclerosis. *Autoimmunity Reviews*, 12, 947-953. doi: 10.1016/j.autrev.2013.02.006
- Kemeny, M.E. (2003). The psychobiology of stress. *Current Directions in Psychological Science*, 12(4), 124-129. doi: 10.1111/1467-8721.01246
- Kiken, L.G., Garland, E.L., Bluth, K., Palsson, O.S., Gaylord, S.A. (2015). From a state to a trait: Trajectories of state mindfulness in meditation during intervention predict

- changes in trait mindfulness. *Personality and Individual Differences*, 81, 41-46. doi: 10.1016/j.paid.2014.12.044
- Kirschbaum, C., Pirke, K.M., & Hellhammer, D.H. (1993). The 'Trier Social Stress Test' – A tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology*, 28, 76-81.
- Kluepfel, L., Ward, T., Yehuda, R., Dimoulas, E., Smith, A., & Daly, K. (2013). The evaluation of mindfulness-based stress reduction for veterans with mental health conditions. *Journal of Holistic Nursing*, 31(4), 248-255. doi: 10.1177/0898010113495975
- Koydemir-Ozden, S., & Demir, A., (2009). The relationship between perceived parental attitudes and shyness among Turkish youth: Fear of negative evaluation and self-esteem as mediators. *Current Psychology*, 28, 169-180. doi: 10.1007/s12144-009-9054-1
- Kuster, P.A., & Merkle, C.J. (2009). Caregiver stress, immune function, and health: Implications for research with parents of medically fragile children. *Issues in Comprehensive Pediatric Nursing*, 4, 257-276. doi: 10.1080/01460860490884165
- Laceulle, O.M., Nederhof, E., van Aken, M. A.G., & Ormel, J. (2014). Adolescent personality: Associations with basal, awakening, and stress-induced cortisol responses. *Journal of Personality*, 83(3), 262-273. doi: 10.1111/jopy.12101
- Lafferty, M. E., & Dorrell, K. (2006). Coping strategies and the influence of perceived parental support in junior national age swimmers. *Journal of Sports Science*, 2 (3), 253-259. doi: 10.1080/17461390500188702



- Latzman, R.D., & Masuda, A. (2013). Examining mindfulness and psychological inflexibility within the framework of big five personality. *Personality and Individual Differences*, 55(2), 129-134. doi: <http://dx.doi.org/10.1016/j.paid.2013.02.019>
- Lavoie, J. A.A., & Douglas, K.S. (2012). The Perceived Stress Scale: Evaluating configural, metric and scalar invariance across mental health status and gender. *Journal of Psychopathology Behavioral Assessment*, 34, 48-57. doi: 10.1007/s10862-011-9266-1
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer Publishing Company.
- Le Fevre, M., Matheny, J., & Kolt, G. S. (2003). Eustress, distress, and interpretation in occupational stress. *Journal of Managerial Psychology*, 18(7), 726-744. doi: 10.1108/02683940310502412
- Leary, M.R. (1983). A brief version of the Fear of Negative Evaluation Scale. *Personality and Social Psychology Bulletin*, 9(3), 371-375. doi: 10.1177/0146167283093007
- Leger, K.A., Charles, S.T., Turiano, N.A., & Almeida, D.A. (2016). Personality and stress-related affect. *Journal of Personality and Social Psychology*, 111(6), 917-928. doi: 10.1037/pspp0000083
- Lench, H.C., Flores, S.A., & Bench, S.W. (2011). Discrete emotions predict changes in cognition, judgment, experience, behaviour, and physiology: A meta-analysis of experimental emotional elicitations. *Psychological Bulletin*, 137(5), 834-855.
- LePine, J.A., LePine, M.A., & Jackson, C.L. (2004). Challenge and hindrance stress: Relationships with exhaustion, motivation to learn, and learning performance. *Journal of Applied Psychology*, 89(5), 883-891.
- Li, Y., Starr, L.R., Hershenberg, (2017). Responses to positive affect in daily life: Positive rumination and dampening moderate the association between events and depressive

- symptoms. *Journal of Psychopathology and Behavioral Assessment*, 39, 412-425. doi: 10.1007/s10862-017-9593-y
- Lin, H.P., Lin, H.Y., Lin, W.L., & Huang, A.C. (2011). Effects of stress, depression, and their interaction on heart rate, skin conductance, finger temperature, and respiratory rate: Sympathetic-parasympathetic hypothesis of stress and depression. *Journal of Clinical Psychology*, 67(10), 1080-1091. doi: 10.102/jclp.20833
- Linton, S.J. (2010). Does work stress predict insomnia? A prospective study. *British Journal of Health Psychology*, 9 (2), 127-136. doi: 10.1348/135910704773891005
- Lucas, R.E., & Fujita, F. (2000). Factors influencing the relation between extraversion and pleasant affect. *Journal of Personality and Social Psychology*, 79(6), 1039-1056.
- Lupien, S.J., Maheu, F., Tu, M., Fiocco, A., & Schramek, T.E. (2007). The effects of stress and stress hormones on human cognition: Implications for the field of brain and cognition. *Brain and Cognition*, 65(3), 209-237. doi: 10.1016/j.bandc.2007.02.007
- Marcus, M.T., Fine, M.P., Moeller, G.F., Khan, M.M., Pitts, K., Swank, P.R., & Liehr, P. (2003). Changes in stress levels following mindfulness-based stress reduction in a therapeutic community. *Addictive Disorders and their Treatment*, 2(3), 63-68.
- Matousek, R.H., Dobkin, P.L., & Pruessner, J. (2010). Cortisol as a marker for improvement in mindfulness-based stress reduction. *Complementary Therapies in Clinical Practice*, 16(1), 13-19. doi: 10.103/j.ctcp.2009.06.004
- Matud, M.P. (2004). Gender differences in stress and coping styles. *Personality and Individual Difference*, 37, 1401-1415. doi:10.1016/j.paid.2004.01.010
- Matz, S., Chan, Y. W. F., & Kosinski, M. (2016). Models of personality. In M. Tkalčič, B. De Carolis, M. de Gemmis, A. Odić, & A. Košir (Eds.), *Human-computer interaction series. Emotions and personality in personalized services: Models, evaluation and*

- applications* (p. 35–54). Switzerland, Springer International Publishing. [https://doi.org/10.1007/978-3-319-31413-6\\_3](https://doi.org/10.1007/978-3-319-31413-6_3)
- McEwen, B.S. (2008). Central effects of stress hormones in health and disease: Understanding the protective and damaging effects of stress and stress mediators. *European Journal of Pharmacology*, 583(2-3), 174-185. doi: 10.1016/j.ejphar.2007.11.071
- McEwen, B.S. (2000). The neurobiology of stress: From serendipity to clinical relevance. *Brain Research*, 886(1-2), 172-189. doi: 10.1016/S0006-8993(00)02950-4
- McNally, I.M. (2002). Contrasting concepts of competitive state-anxiety in sport: Multidimensional anxiety and catastrophe theories. *Athletic Insight*, 4(2), 10-22.
- Medvedev, O.N., Krägeloh, C.U., Narayanan, A., Siegert, R.J. (2017). Measuring mindfulness: Applying generalizability theory to distinguish between state and trait. *Mindfulness*, 8(4), 1036-1046. doi: 10.1007/s12671-017-0679-0
- Meyer, G.J., & Shack, J.R. (1989). Structural convergence of mood and personality: Evidence of old and new directions. *Journal of Personality and Social Psychology*, 57(4), 691-706.
- Miller, C.E., Brady, M., & Dean S.L. (2020). In conscientiousness a proxy for depression? A study of big five conscientiousness predictive power above depression. *Journal of Mental Health and Social Behaviour*, 2 (1), 112-115.
- Moksnes, U.K., Moljord, I.E.O., Espnes, G.A., & Byrne, D.G. (2010). The association between stress and emotional states in adolescents: The role of gender and self-esteem. *Personality and Individual Differences*, 49, 430-435.
- Morton, M.L., Helminen, E.C., & Felver, J.C. (2020). A systematic review of mindfulness interventions on psychophysiological responses to acute stress. *Mindfulness*, 11, 2039-2054. doi: 10.1007/s12671-020-01386-7

- Mroczek, D.K., & Almeida, D.M. (2004). The effect of daily stress, personality and age on negative affect. *Journal of Personality*, 72(2), 355-378.
- Müller-Engelmann, M., Wunsch, S., Volk, M., & Steil, R. (2017). Mindfulness-based stress reduction (MBSR) as a standalone intervention for posttraumatic stress disorder after mixed traumatic events: A mixed-methods feasibility study. *Frontiers in psychology*, 8 (1407), 1-11. doi: 10.3389/fpsyg.2017.01407.
- Nall, R., (2018). What's the difference between epinephrine and norepinephrine? Retrieved from: <https://www.healthline.com/health/epinephrine-vs-norepinephrine>
- New Idea. (2017, February). 5 ways to stay mindful. Retrieved from: <https://www.newidea.com.au/article/beauty-health/5-ways-to-stay-mindful>
- Novak, M., Björck, L., Giang, K.W., Heden-Ståhl, C., Wilhelmsen, L., & Rosengren, A. (2012). Research: Epidemiology perceived stress and incidence of type 2 diabetes. A 35-year follow-up study of middle-aged Swedish men. *Diabetic Medicine*, 30 (1), 8-16. doi: 10.1111/dme.12037
- Nyklíček, I., Mommersteeg, P.M.C., Van Beugen, S., Ramakers, C., & Van Boxtel, G.T. (2013). Mindfulness-based stress reduction and physiological activity during acute stress: A randomized controlled trial. *Health Psychology*, 32(10), 1110-1113. doi: 10.1037/a0032200
- Oliver, G., Wardle, J., & Gibson, E. L. (2000). Stress and food choice: A laboratory study. *Psychosomatic Medicine*, 62(6), 853-865.
- O'Loughlin, R.E & Zuckerman, M. (2008). Mindfulness as a moderator of the relationship between dehydroepiandrosterone and reported physical symptoms. *Personality and Individual Differences*, 44(5), 1193-1202. doi: 10.1016/j.paid.2007.11.013

- Öhlin, B., Nilsson, P. M., Nilsson, J. Å., & Berglund, G. (2004). Chronic psychosocial stress predicts long-term cardiovascular morbidity and mortality in middle-aged men. *European Heart Journal*, 25(10), 867-873. doi: 10.1016/j.ehj.2004.03.003
- Oswald, L.M., Zandi, P., Nestald, G., Potash, J.B., Kalaydjian, A.E., & Wand, G.S. (2006). Relationship between cortisol responses to stress and personality. *Neuropsychopharmacology*, 31, 1583-1591. doi: 0893-133X/06
- Ouellet-Morin, I., Odger, C.L., Danese, A., Bowes, L., Shakoor, S., Papadopoulos, A.S... Arseneault, L. (2011). Blunted cortisol responses to stress signal social and behavioral problems among maltreated/bullied 12-year-old children. *Biological Psychiatry*, 70(11), 1016-1023. doi: 10.1016/j.biopsych.2011.06.017
- Pallant, J. (2007). *SPSS survival manual: A step-by-step guide to data analysis using SPSS for windows (version 15) 3<sup>rd</sup> edition*. St Leonards, Australia: Allen & Unwin.
- Penley, J. A., & Tomaka, J. (2002). Associations among the big five, emotional responses, and coping with acute stress. *Personality and Individual Differences*, 32,1215-1228. doi:10.1016/S0191-8869(01)00087-3
- Preacher, K.J., & Hayes, A.F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879–891.
- Rau, H.K., & William, P.G. (2016). Dispositional mindfulness: A critical review of construct validation research. *Personality and Individual Difference*, 93, 32-43. doi: 10.1016/j.paid.2015.09.035
- Reb, J., Narayanan, J., & Chaturvedi, S. (2014). Leading Mindfully: Two studies on the influence of supervisor trait mindfulness on employee well-being and performance. *Mindfulness*, 5, 36-45. doi: 10.1007/s12671-012-0144-z

- Robert-McCombe, J.J., Tacon, A., Randolph, P., & Caldera, Y. (2004). A pilot study to examine the effects of a mindfulness-based stress reduction and relaxation program on levels of stress hormones, physical functioning, and submaximal exercise responses. *Journal of Alternative & Contemporary Medicine*, 10(5), 819-827.
- Robins, R.W., Tracy, J.L., Trzesniwski, K., Potter, J., & Gosling, S.D. (2001). Personality correlates of self-esteem. *Journal of Research in Personality*, 35, 463-482. doi: 10.1006/jrpe.2001.2324
- Romcevich, L.E., Reed, S., Flowers, S.R., Kemper, K.J., & Mahan, J.D. (2018). Mind-body skills training for resident wellness: A pilot study of a brief mindfulness intervention. *Journal of Medical Education and Curricular Development*, 5, 1-10. doi: 10.1177/2382120518773061
- Rusting, C.L. (1998). Personality, mood, and cognitive processing of emotional information: Three conceptual frameworks. *Psychological Bulletin*, 124(2), 165-196.
- Rusting, C.L. (1999). Interactive effects of personality and mood on emotion-congruent memory and judgment. *Journal of Personality and Social and Psychology*, 77(5), 1073-1086.
- Saklofske, D.H., Austin, E.J., Mastoras, S.M., Beaton, L., & Osborne, S.E. (2012). Relationships of personality, affect, emotional intelligence and coping with student stress and academic success: Different patterns of association for stress and success. *Learning and Individual Differences*, 22, 251-257.
- Santorelli, S. F., Kabat-Zinn, J., Blacker, M., Meleo-Meyer, F., & Koerbel, L. (2017). Mindfulness-based stress reduction (MBSR) authorized curriculum guide. *Center for*

*Mindfulness in Medicine, Health Care, and Society (CFM). University of Massachusetts Medical School.*

Sarafino, E.P. & Smith, T.W. (2011). *Health psychology: Biopsychosocial interactions* (7th ed.). New York: John Wiley & Sons Inc.

Sarenmalm, E.K., Mårtensson, L., Holmberg, S.B., Andersson, B.A., Odén, A., & Bergh, I. (2013). Mindfulness based stress reduction study design of a longitudinal randomized controlled complementary intervention in women with breast cancer. *BioMed Central Complementary and Alternative Medicine*, 13, 248-257. doi: 1472-6882/13/248

Schellekens, H., Finger, B.C., Dinan, T.G., & Cryan, J.F. (2012). Ghrelin signalling and obesity: At the interface of stress, mood and food reward. *Pharmacology & Therapeutics*, 135, 316-326. doi: 10.1016/j.pharmthera.2012.06.004

Schlotz, W., Hammerfald, K., Ehlert, U., & Gaab, J. (2011). Individual differences in the cortisol response to stress in young healthy men: Testing the roles of perceived stress reactivity and threat appraisal using multiphase latent growth curve modeling. *Biological Psychology*, 87(2), 257-264. doi: 10.1016/j.biopsycho.2011.03.005

Schneider, T.R., Rench, T.A., Lyons, J.B., & Riffle, R.R. (2011). The influence of neuroticism, extraversion and openness on stress responses. *Stress and Health*, 28(2), 102-110.

Schroevers, M.J., & Brandsma, R. (2010). Is learning mindfulness associated with improved affect after mindfulness-based cognitive therapy? *The British Psychological Society*, 101, 95-107. doi:10.1348/000712609X424195

Schutte, N.S., Malouff J.M., Segrera, E., Wolf, A., & Rodgers, L. (2003). States reflecting the Big Five dimensions. *Personality and Individual Differences*, 34, 591-603.

- Segerstorm, S.C., & O'Connor, D.B. (2012). Stress, health and illness. Four challenges for the future. *Psychology and Health*, 27(2), 128-140. doi: 10.1080/08870446.2012.659516
- Selye, H. (1950). Stress and the general adaptation syndrome. *British Medical Journal*, 1 (4667), 1383-1392.
- Selye, H. (1977). A code for coping with stress. *AORN Journal*, 25(1), 35-42. doi: 10.1016/S0001-2092(07)68496-8.
- Selye, H. (1980). A personal message from Hans Selye. *Journal of Extension*, 18 (3), 6-11.
- Shavitt, S., Cho, Y.I., Johnson, T.P., Jiang, D., Holbrook, A., & Stavrakantonaki, M. (2016). Culture moderates the relation between perceived stress, social support, and mental and physical health. *Journal of Cross-Cultural Psychology*, 47(7), 956-980. doi: 10.1177/0022022116656132
- Shearer, A., Hunt, M., Chowdhury, M., & Nicol, L. (2016). Effects of a brief mindfulness meditation intervention of student stress and heart rate variability. *International Journal of Stress Management*, 23(2), 232-254. doi: 10.1037/a0039814
- Shewchuk, R. M., Elliott, T. R., MacNair-Semands, R. R., & Harkins, S. (1999). Trait influences on stress appraisal and coping: An evaluation of alternative frameworks. *Journal of Applied Social Psychology*, 29(4), 685-704. doi: 10.1111/j.1559-1816.1999.tb02019.x
- Shukla, A., & Bala Panwar, P. (2015). Stress and personality traits relationship: A study of accounting professionals in Rajasthan. *Indian Journal of Accounting*, XLVII(1), 121-132.



- Snippe, E., Dziak, J.J., Lanza, S.T., Nyklíček, I., & Wichers, M. (2017). The shape of change in perceived stress, negative affect, and stress sensitivity during mindfulness-based stress reduction. *Mindfulness*, 8, 728-736. doi: 10.1007/s1267-016-0650-5
- Soto, C.J., & John, O.P. (2009). Ten facet scales of the Big Five inventory: Convergence with NEO PI-R facets, self-peer agreement, and discriminant validity. *Journal of Research in Personality*, 43, 84-90. doi: 10.1016/j.jrp.2008.10.002
- Steptoe, A., & Kivimäki, M. (2013). Stress and cardiovascular disease: An update on current knowledge. *Annual Reviews of Public Health*, 34, 337-354. doi: 10.1146/annurev-publhealth-031912-114452
- Suh, E., Diener, E., & Fujita, F. (1996). Events and subjective well-being: Only recent events matter. *Journal of Personality and Social Psychology*, 70(5), 1091-1102.
- Szabo, S., Tache, Y., & Somogyi, A. (2012). The legacy of Hans Selye and the original stress research: A retrospective 75 years after his landmark brief “letter” to the editor of nature. *Stress*, 15(5), 472-478. doi: 10.3109/10253890.2012.710919
- Taelman, J., Vandeput, S., Spaepen, A., & Van Huffel, S. (2009). Influence of mental stress on heart rate and heart rate variability. In *4th European conference of the international federation for medical and biological engineering* (pp. 1366-1369). Springer, Berlin, Heidelberg.
- Tang, Y.Y., & Posner, M.I. (2013). Tools of the Trade: Theory and method in mindfulness neuroscience. *Social Cognitive and Affective Neuroscience*, 8(1), 118-120. doi: 10.1093/scan/nss112
- Taylor, S., Landry, C.A., Paluszek, M.M., Fergus, T.A., McKay, D., & Asmundson, G. J.G. (2020). COVID stress syndrome: Concept, structure, and correlates. *Depression and Anxiety*, 37, 706-714. doi: 10.1002/da.23071

- Techniker Krankenkasse (2016). Entspann dich, Deutschland: TK-Stressstudie 2016 [Relax yourself, Germany: TK stress study 2016]. Germany: Department of Health Management, Techniker Krankenkasse.
- Teigen, K.H. (1994). Yerkes-Dodson: A law for all seasons. *Theory & Psychology*, 4(4), 525-547. doi: 10.1177/0959354394044004
- Thompson, B.L., & Waltz, J. (2007). Everyday mindfulness and mindfulness meditation: Overlapping constructs or not? *Personality and Individual Differences*, 43(7), 1875-1885. doi: 10.1016/j.paid.2007.06.017
- Toscano, N. (2014, October 21). Job stress compo claims surge to \$273 million. *The Age*. Retrieved from <https://www.theage.com.au/national/victoria/job-stress-compo-claims-surge-to-273-million-20141021-119h90.html>
- Vago, D.R., & Silbersweig, D.A. (2012). Self-awareness, self-regulation, and self-transcendence (S-ART): A framework for understanding the neurobiological mechanisms of mindfulness. *Frontiers in Human Neuroscience*, 6, 296 – 326. doi: 10.3389/fnhum.2012.00296
- Van Dam, N. T., van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., ... & Fox, K. C. (2018). Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspectives on Psychological Science*, 13(1), 36-61. <https://doi:10.1093/clipsy.bph077>
- Van de Mortel, T. F. (2008). Faking it: Social desirability response bias in self-report research. *The Australian Journal of Advanced Nursing*, 25(4), 40.

- van Eck, M., Berkhof, H., Nicolson, N., & Sulon, J. (1996). The effects of perceived stress, traits, mood states, and stressful daily events on salivary cortisol. *Psychosom Med*, 58(5), 447-458. doi: 10.1097/00006842-19960900-00007
- Van Praag, H.M. (2004). Can stress cause depression? *Neuro-Psychopharmacology & Biological Psychiatry*, 28, 897-907. doi: 10.1016/j.pnpbp.2004.05.031
- Veldhuis, J.D., Sharma, A., & Roelfsema, F. (2013). Age-dependent and gender-dependent regulation of hypothalamic-adrenocorticotrophic-adrenal axis. *Endocrinol Metab Clinic North America*, 42(2), 201-225. doi: 10.1016/j.ecl.2013.02.002
- Vollrath, M. (2001). Personality and stress. *Scandinavian Journal of Psychology*, 42, 335-347. doi: 10.1111/1467-9450.00245
- Vollrath, M., & Torgersen, S. (2000). Personality types and coping. *Personality and Individual Differences*, 29, 367-378. doi: 10.1016/S0191-8869(99)00199-3
- Walsh, J.J., Balint, M.G., Smolira SJ, D.R., Fredricksen, L.K., & Madsen, S. (2009). Predicting individual differences in mindfulness: The role of trait anxiety, attachment anxiety and attentional control. *Personality and Individual Differences*, 46(2), 94-99. doi: 10.1016/j.paid.2008.09.008
- Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-1070.
- Watson, D., Clark, L.A., McIntyre, C.W., & Hamaker, S. (1992). Affect, personality, and social activity. *Journal of Personality and Social Psychology*, 63(6), 1011-1025.
- Williams, P.G., Rau, H.K., Cribbet, M.R., & Gunn, H.E. (2009). Openness to experience and stress regulation. *Journal of Research in Psychology*, 43, 777-784. doi:10.1016/j.jrp.2009.06.003

- Williams, L., & Wingate, A. (2012). Type D personality, physical symptoms and subjective stress: The mediating effects of coping and social support. *Psychology and Health*, 27(9), 1075-1085. doi:10.1080/08870446.2012.667098.
- Wilt, J.A., Bleidorn, W., Revelle, W. (2017). Velocity explains the links between personality states and affect. *Journal of Research in Personality*, 69, 86-95. doi: 10.1016/j.jrp.2016.06.008
- World Health Organisation (2013). *Cause-specific mortality, 2008: WHO region by country*. Retrieved from <http://apps.who.int/gho/data/node.main.887?lang=en>
- Yeager, D.S., Lee, H.Y., & Jamieson, J.P. (2016). How to improve adolescent stress responses: Insights from integrating implicit theories of personality and biopsychosocial models. *Psychological Science*, 27(8), 1078-1091. doi: 10.1177/0956797616649604
- Yerkes, R., & Dodson, J.D. (1908). The relation of strength of stimulus to rapidity of habit-formation. *Journal of Comparative Neurology and Psychology*, 18, 459-482.
- Zimmaro, L.A., Salmon, P., Naidu, H., Rowe, J., Phillips, K., Rebholz, W.N... Sephton, S.E. (2016). Associations of dispositional mindfulness with stress, cortisol, and well-being among university undergraduate students. *Mindfulness*, 7(4), 1-12. doi: 10.1007/s/12671-016-0526-8
- Zgierska, A., Rabago, D., Chawla, N., Kushner, K., Koehler, R., & Marlatt, A. (2009). Mindfulness meditation for substance use disorders: A systematic review. *Substance Abuse*, 30(4), 266-294. doi: 10.1080/08897070903250019

## **Appendix A**

### **Study 1 and Study 2 questionnaire package**

#### **Plain Language Information Statement**

##### **SCHOOL OF HEALTH SCIENCES**

**PROJECT TITLE:** Investigating Associations between Stress, Mindfulness and Personality  
**PRINCIPAL RESEARCHER:** Dr. Liz Temple  
**STUDENT RESEARCHERS:** Leanne Sommers

If you are over 18 years of age, you are invited to participate in a study investigating the associations between stress, mindfulness and personality. This study is being conducted through the University of Ballarat by Leanne Sommers (Masters student) under the supervision of Dr. Liz Temple of the School of Health Sciences, University of Ballarat.

The aim of this study is to investigate the relationships between stress, mindfulness and personality to determine why some people experience higher levels of stress than other people when their daily lives are similar. This information may help to identify people who are at risk of experiencing high levels of stress, which is known to have adverse effects on both mental and physical health.

Participation in this study involves the completion of an anonymous online questionnaire, which will take approximately 20 to 30 minutes. The questionnaire includes demographics items (e.g., age, gender, relationship status, employment) and questions about your personality and levels of stress and mindfulness. You will also be asked to report how you are feeling today, as well how you generally feel in some social situations. Participation is voluntary and you can withdraw from the study at any time. Submission of the questionnaire will be taken as consent for participation.

Please note that once you have submitted your questionnaire, we are unable to retrieve these data for you should you wish to cease your participation at that stage. If you are a student of the University of Ballarat, participation or non participation will have no effect on your assessment. In addition, no member of UB staff will be aware of whether you have participated or not, as all responses are anonymous. All data acquired from the questionnaire is completely confidential and all efforts to ensure the protection of the data from being revealed will be taken. Results from the study may be reported in academic publications and presented at conferences, and all data will be deleted after a minimum period of 5 years.

It is unlikely that this research will cause feelings of distress. However, should you feel affected at all by the questions presented in the study, please contact your doctor, psychologist, counsellor or local health service. Alternatively, 24 hour counselling assistance is provided by Lifeline (phone: 13 11 14; <http://www.lifeline.org.au/>).

If you have any questions, or would like further information regarding this study (Investigating Associations between Stress, Mindfulness and Personality), please contact the Principal Researcher, Dr Liz Temple of the School of Health Sciences; PH: (03) 5327 9744; EMAIL: [e.temple@ballarat.edu.au](mailto:e.temple@ballarat.edu.au)

Should you (i.e. the participant) have any concerns about the ethical conduct of this research project, please contact the University of Ballarat Ethics Officer, Research & Graduates Studies Office, University of Ballarat, PO Box 663, Mt Helen VIC 3353. Telephone: (03) 5327 9765, Email: [ub.ethics@ballarat.edu.au](mailto:ub.ethics@ballarat.edu.au)

**\*1. I have read the information provided above and any concerns I had regarding this study have been resolved to my satisfaction.**

I understand that:

- all information I provide will be confidential and I cannot be identified from survey results
- aggregated results will be used for the purpose of research and may be reported in scientific and academic journals
- I am free to withdraw my consent at any time during the study, in which event my participation in the research study will immediately cease and any information obtained from me will not be used. However, once the questionnaire has been submitted, it is not possible to identify the data, and therefore it will not be possible to withdraw consent to participate after that point in time.
- it is recommended that I should seek professional support if I become distressed

In preservation of anonymity, I understand that no name or signature is required of me to give consent. By activating the 'next' button below I am agreeing to participate in this study.

☐ I agree with the above statement

☐ Exit

## Demographic Questions

Please answer the following demographic questions

### **2. What is your gender?**

### **3. What is your age?**

### **4. What is your relationship status?**

- ☐ Single
- ☐ Non-cohabiting relationship (e.g., dating)
- ☐ Cohabiting relationship (e.g., married, de-facto)
- ☐ Other (please specify)

### **5 What is your parental status?**

- ☐ I do not have any children
- ☐ I have children BUT they do not live with me
- ☐ I have children AND they live with me part-time
- ☐ I have children AND they live with me full-time
- ☐ Other (please specify)

### **6 If you have children, how old are they?**

### **7 What is the highest level of education you have completed?**

- ☐ Less than high school
- ☐ High School
- ☐ Trade certificate or diploma
- ☐ University degree
- ☐ Postgraduate degree
- ☐ Other (please specify)

**8 What is your employment status?**

- |  |   |
|--|---|
| <input type="checkbox"/> Student                         | <input type="checkbox"/> Unemployed, seeking work     |
| <input type="checkbox"/> Studying AND in paid employment | <input type="checkbox"/> Unemployed, NOT seeking work |
| <input type="checkbox"/> Employed full-time              | <input type="checkbox"/> Retired                      |
| <input type="checkbox"/> Employed part-time / casual     |   |
| <input type="checkbox"/> Other (please specify)          |   |

**9 What is your country/region of residence? (i.e., where do you currently live)**

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> Australia              | <input type="checkbox"/> Central America | <input type="checkbox"/> Africa          |
| <input type="checkbox"/> New Zealand            | <input type="checkbox"/> Eastern Europe  | <input type="checkbox"/> Pacific Islands |
| <input type="checkbox"/> North America          | <input type="checkbox"/> South America   |  |
| <input type="checkbox"/> Western Europe         | <input type="checkbox"/> Asia            |  |
| <input type="checkbox"/> Other (please specify) |  |  |



Your Lifestyle

**10 What time do you typically**

Get up in the morning?

Go to bed at night?

**11 How well do you typically sleep?**

☐ Very poorly      ☐ Poorly      ☐ OK      ☐ Well      ☐ Very Well

**12 How often do you feel tired during the day for no good reason**

☐ Very often      ☐ Often      ☐ sometimes      ☐ Rarely      ☐ Very Rarely

**13 How often have you participated in the following activities?**

	Never	A few times	Regularly in the past	Regularly now
Yoga	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meditation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mindfulness-techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tai-Chi	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Relaxation techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other stress reduction techniques (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**\*14 Have you completed any Mindfulness training?**

☐ Yes

☐ No

**15 If yes, please describe the training e.g., what did you do, where and for how long?**

## PSS

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way.

### **\*16. In the last month, how often have you...**

	Never	Almost Never	Sometimes	Fairly Often	Very Often
Been upset because of something that happened unexpectedly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt that you were unable to control the important things in your life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt nervous and "stressed"?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt confident about your ability to handle your personal problems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt that things were going your way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Found that you could not cope with all the things that you had to do?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Been able to control irritations in your life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt that you were on top of things?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Been angered because of the things that were outside of your control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt difficulties were piling up so high that you could not overcome them?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had too many things to do?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Found yourself in situations of conflict?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt you were in a hurry?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had too many worries?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt you were doing things because you had to not because you wanted to?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt criticized or judged?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt under pressure from deadlines?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**BF**

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please indicate the extent to which you agree or disagree with each statement.

**\*17 I see myself as someone who...**

	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
Is talkative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tends to find fault with others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does a thorough job	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is depressed, blue	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is original, comes up with new ideas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is reserved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is helpful and unselfish with others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can be somewhat careless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is relaxed, handles stress well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is curious about many different things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is full of energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Starts quarrels with others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is a reliable worker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can be tense	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In ingenious, a deep thinker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generates a lot of enthusiasm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has a forgiving nature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tends to be disorganized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Worries a lot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has an active imagination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tend to be quiet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is generally trusting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tending to be lazy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is emotionally stable, not easily upset	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is inventive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has an assertive personality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can be cold and aloof	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Perseveres until the task is finished	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can be moody	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Values artistic, aesthetic experiences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is sometimes shy, inhibited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is considerate and kind to almost everyone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does things efficiently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remains calm in tense situations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Prefers work that is routine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Is outgoing, sociable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is sometimes rude to others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Makes plans and follows through with them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gets nervous easily	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Likes to reflect, play with ideas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has few artistic interests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Likes to cooperate with others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is easily distracted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is sophisticated in art, music or literature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## CEDMI

**\*18 Please read each of the following statements carefully and indicate how true each is for you.**

	Never or very rarely true	Rarely true	Sometimes true	Often true	Very often or always true
When I'm walking, I deliberately notice the sensations of my body moving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I criticize myself for having irrational or inappropriate emotions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When I take a shower or bath, I stay alert to the sensations of the water on my body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I tell myself I shouldn't be feeling the way I'm feeling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I notice how foods and drinks affect my thoughts, bodily sensations, and emotions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I believe some of my thoughts are abnormal or bad and I shouldn't think that way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I pay attention to sensations, such as the wind in my hair or sun on my face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I make judgements about whether my thoughts are good or bad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I tell myself that I shouldn't be thinking the way I'm thinking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I notice the smells and aromas of things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think some of my emotions are bad or inappropriate and I shouldn't feel them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I pay attention to how my emotions affect my thoughts and behaviour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I disapprove of myself when I have ideas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The following statements relate to how you may feel when you get upset. Please read each statement carefully and indicate how often you feel this way

**\*19 When I'm upset...**

	Almost Never (0- 10%)	Sometimes (11-35%)	About half the time (35- 65%)	Most of the time (66- 90%)	Almost always (91-100%)
I become angry with myself for feeling that way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I become embarrassed for feeling that way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel ashamed for feeling that way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel like I am weak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel guilty for feeling that way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I become irritated with myself for feeling that way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## PANAS

The scale consists of a number of words that describe different feelings and emotions.

**\*20 Please indicate to what extent you feel this way RIGHT NOW, that is, at the present moment**

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Interested	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Distressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Excited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upset	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strong	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guilty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hostile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enthusiastic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irritable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ashamed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nervous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Determined	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Attentive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jittery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Active	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Afraid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## **Stress**

**21 In comparison to most people you know, how stressed are you?**

- ☐ much less stressed
- ☐ a little less stressed
- ☐ about the same
- ☐ a little more stressed
- ☐ a lot more stressed

**22 How stressed do you feel you are in general?**

- ☐ not at all stressed
- ☐ a little stressed
- ☐ fairly stressed
- ☐ very stressed
- ☐ extremely stressed

**23 Why do you think you are this stressed?**

**24 in the last year, have you tried to reduce your stress levels?**

- ☐ yes (question 25)
- ☐ no (question 26)

**25 what did you do to reduce your stress levels? Was it successful?**

**26 Are there any particular reasons why you haven't tried to reduce your stress levels?**

**BFNES**

**\*27 Please read each of the following statements carefully and indicate how characteristic each is of you according to the scale**

	Not at all characteristic of me	Slightly characteristic of me	Moderately characteristic of me	Very characteristic of me	Extremely characteristic of me
I worry about what other people think of me even when I know it doesn't make any difference	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am unconcerned even if I know people are forming an unfavourable impression of me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am frequently afraid of other people noticing my shortcomings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I rarely worry about what kind of impression I am making	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am afraid that others will not approve of me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am afraid that people will find fault with me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other people's opinions of me do not bother me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When I am talking to someone, I worry about what they may be thinking of me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am usually worried about what kind of impression I make	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I know someone is judging me, it has little effect on me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sometimes I think I am too concerned with what other people think of me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I often worry that I will say or do the wrong things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



## **Future Research?**

We will be conducting a related study. For this study participants will need to come to the Mt Helen campus of the University of Ballarat to participate.

You don't have to decide now, but if you think that you may be interested and able to participant, please indicate below.

### **28 Are you interested in being involved in future research?**

☐ Yes

☐ No

If yes, Thank you for your interest.

Please enter your email address in the space below and we will contact you in a few months to give you more information about the study and what participants will be asked to do.

### **28. Email address:**

Please note: by entering your email address above you will be effectively removing the anonymity of your data. However, the researchers will take the following steps to ensure the confidentiality of your data. First, an identification (ID) code will be assigned to you. Second, two files will be created. One of these will contain just your ID code and your email address, while the other will contain your ID code and the data from this questionnaire (minus your email address). These files will be stored separately and password protected. We will use the de-identified data file for analyses and identification of participants who meet inclusion criteria for our second study. A list of ID codes will be compiled for participants meeting our inclusion criteria, and this list will be used to locate the relevant email addresses in the separate file to enable the invitations to participate in the second study. The file containing ID codes and email addresses will be deleted after recruitment has been completed.

## Thank you

Thank you for participating in this study.

If any of the questions have caused you any distress, please contact your doctor, psychologist, counsellor or local health service. Alternatively, 24 hour counselling assistance is provided by Lifeline (phone: 13 11 14; <http://www.lifeline.org.au/>).

### Information about this study

This study is investigating the associations between the Big 5 personality traits (extraversion, neuroticism, agreeableness, openness to experiences and conscientiousness), perceived stress, and mindfulness. The information from this study will increase our understanding about people who are at risk of experiencing high levels of stress, which may assist relevant education and health professionals to identify people who could benefit from the provision of stress-reduction techniques.

We feel that this research is important because stress is known to have an adverse impact on both mental and physical health. So, decreasing the levels of stress you experience is likely to increase wellbeing. Mindfulness techniques have been found to be very effective in decreasing stress levels for a wide variety of people. If you would like to learn more about mindfulness and/or try it out, you can find some useful information and resources on the following sites:

- <http://www.bemindful.co.uk/>
- <http://www.mindful.org/resources>
- <http://makingaustraliahappy.abc.net.au/mindfulness.php>
- <http://www.mindfulness.org.au/index.html>
- <http://www.openground.com.au/>

If you have any questions, or would like further information regarding this study (Investigating Associations between Stress, Mindfulness and Personality), please contact the Principal Researcher, Dr Liz Temple of the School of Health Sciences, University of Ballarat; PH: (03) 5327 9744; EMAIL: [e.temple@ballarat.edu.au](mailto:e.temple@ballarat.edu.au)

## Appendix B

### Ethics approval for Study 1 and Study 2

Principal Researcher:	Elizabeth Temple
Other/Student Researcher/s:	Leanne Sommers
School/Section:	SHS
Project Number:	A12-152
Project Title:	Investigating associations between stress, mindfulness and personality.
For the period:	04/10/2013 to 30/06/2014

*Please quote the Project No. in all correspondence regarding this application.*

#### **REPORTS TO HREC:**

A final report for this project must be submitted to the Ethics Officer on:  
**30 July 2014**

These report forms can be found at:

<http://www.federation.edu.au/research-and-innovation/research-support/ethics>

Fiona Koop

**Ethics Officer**  
**6 March 2014**

**Please see attached 'Conditions of Approval'.**

### **CONDITIONS OF APPROVAL**

1. The project must be conducted in accordance with the approved application, including any conditions and amendments that have been approved. You must comply with all of the conditions imposed by the HREC, and any subsequent conditions that the HREC may require.
2. You must report immediately anything which might affect ethical acceptance of your project, including:
  - Adverse effects on participants;
  - Significant unforeseen events;
  - Other matters that might affect continued ethical acceptability of the project.
3. Where approval has been given subject to the submission of copies of documents such as letters of support or approvals from third parties, these must be provided to the Ethics Office before the research may commence at each relevant location.
4. Proposed changes or amendments to the research must be applied for, using a 'Request for Amendments' form, and approved by the HREC before these may be implemented.
5. If an extension is required beyond the approved end date of the project, a 'Request for Extension' should be submitted, allowing sufficient time for its consideration by the committee. Extensions cannot be granted retrospectively.
6. If changes are to be made to the project's personnel, a 'Changes to Personnel' form should be submitted for approval.
7. An 'Annual Report' must be provided by the due date specified each year for the project to have continuing approval.
8. A 'Final Report' must be provided at the conclusion of the project.
9. If, for any reason, the project does not proceed or is discontinued, you must advise the committee in writing, using a 'Final Report' form.
10. You must advise the HREC immediately, in writing, if any complaint is made about the conduct of the project.
11. You must notify the Ethics Office of any changes in contact details including address, phone number and email address.
12. The HREC may conduct random audits and / or require additional reports concerning the research project.

**Failure to comply with the *National Statement on Ethical Conduct in Human Research* (2007) and with the conditions of approval will result in suspension or withdrawal of approval.**

## **Appendix C**

### **Pre-intervention questionnaire – Study 3**

#### **Demographic Questions**

Please answer the following demographic questions

**1 ID Number**

**2 What is your age**

**3 What is your gender**

**4 Are you currently pregnant? (pregnancy can impact on your cortisol levels we will be measuring today – this information will remain confidential)**

☐ Yes

☐ No

**5 Are you currently taking any medication (e.g., the birth control pill, blood pressure or cholesterol medications, etc.)? (some medications impact on your cortisol levels we will be measuring today – this information will remain confidential)**

☐ Yes

☐ No

**6 If yes, what medication are you taking**

**7 Do you currently smoke tobacco regularly? (i.e., at least one cigarette a day)**

☐ Yes

☐ No

**8 what time do you typically**

Get up in the morning?

Go to bed at night?

**9 how well do you typically sleep**

☐ very poorly      ☐ poorly      ☐ OK      ☐ well      ☐ very well

**10 how often do you feel tired during the day for no good reason?**

☐ very often      ☐ often      ☐ sometimes      ☐ rarely      ☐ very rarely

**11 how well did you sleep LAST NIGHT?**

☐ very poorly      ☐ poorly      ☐ OK      ☐ well      ☐ very well

**12 how tired do you feel RIGHT NOW?**

☐ very alert      ☐ a little alert      ☐ not tired, but not alert      ☐ a little tired      ☐ very tired

**13 How stressed do you feel you are in general?**

☐ not at all stressed      ☐ a little stressed  
☐ fairly stressed      ☐ very stressed      ☐ extremely stressed

**14 why do you think you are stressed?**

**15 in comparison to most people you know, how stressed are you?**

☐ much less stressed      ☐ a little less stressed      ☐ about the same      ☐ a little more stressed  
☐ a lot more stressed

**16 How often have you participated in the following activities in the past 6 months?**

	Never	A few times	Regularly in the past	Regularly now
Yoga	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meditation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mindfulness-techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tai-Chi	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Relaxation techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other stress reduction techniques (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## PSS

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way.

### \*17. In the last month, how often have you...

	Never	Almost Never	Sometimes	Fairly Often	Very Often
Been upset because of something that happened unexpectedly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt that you were unable to control the important things in your life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt nervous and "stressed"?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt confident about your ability to handle your personal problems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt that things were going your way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Found that you could not cope with all the things that you had to do?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Been able to control irritations in your life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt that you were on top of things?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Been angered because of the things that were outside of your control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt difficulties were piling up so high that you could not overcome them?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had too many things to do?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Found yourself in situations of conflict?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt you were in a hurry?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had too many worries?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt you were doing things because you had to not because you wanted to?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt criticized or judged?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt under pressure from deadlines?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## CEDMI

**\*18 Please read each of the following statements carefully and indicate how true each is for you.**

	Never or very rarely true	Rarely true	Sometimes true	Often true	Very often or always true
When I'm walking, I deliberately notice the sensations of my body moving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I criticize myself for having irrational or inappropriate emotions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When I take a shower or bath, I stay alert to the sensations of the water on my body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I tell myself I shouldn't be feeling the way I'm feeling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I notice how foods and drinks affect my thoughts, bodily sensations, and emotions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I believe some of my thoughts are abnormal or bad and I shouldn't think that way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I pay attention to sensations, such as the wind in my hair or sun on my face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I make judgements about whether my thoughts are good or bad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I tell myself that I shouldn't be thinking the way I'm thinking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I notice the smells and aromas of things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think some of my emotions are bad or inappropriate and I shouldn't feel them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I pay attention to how my emotions affect my thoughts and behaviour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I disapprove of myself when I have ideas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The following statements relate to how you may feel when you get upset. Please read each statement carefully and indicate how often you feel this way

**\*19 When I'm upset...**

	Almost Never (0- 10%)	Sometimes (11-35%)	About half the time (35- 65%)	Most of the time (66- 90%)	Almost always (91-100%)
I become angry with myself for feeling that way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I become embarrassed for feeling that way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel ashamed for feeling that way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel like I am weak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel guilty for feeling that way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I become irritated with myself for feeling that way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



## PANAS

The scale consists of a number of words that describe different feelings and emotions.

**\*20 Please indicate to what extent you feel this way RIGHT NOW, that is, at the present moment**

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Interested	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Distressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Excited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upset	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strong	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guilty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hostile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enthusiastic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irritable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ashamed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nervous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Determined	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Attentive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jittery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Active	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Afraid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Thank you for completing the questionnaire. Please let the researcher know that you have finished.**

## Appendix D

### NEO PI-R questions – Study 3

# NEO PI-R™

## Revised NEO Personality Inventory (NEO PI-R)

### Item Booklet—Form S

Paul T. Costa, Jr., PhD, and Robert R. McCrae, PhD

#### Instructions for use with the Hand-Scoring Answer Sheet

For use with the Machine-Scoring Answer Sheet, turn to page 2.

Please read all these instructions carefully before beginning. Mark all your answers on the answer sheet and write only where indicated. **DO NOT** write in this test booklet.

On the accompanying answer sheet, please write your name in the space provided. Indicate your sex by placing a check in the appropriate box under "Sex." Enter the date and your identification number, if you have been given one, in the spaces provided. Check "Yourself" in the space labeled "Person being rated" since you are describing yourself. Write in your age and check the box next to "S" in the space labeled "NEO Form."

This questionnaire contains 240 statements. Please read each item carefully and circle the one answer that best corresponds to your agreement or disagreement.

Circle "SD" if the statement is definitely false or if you **strongly disagree**. ☒SD ☐D ☐N ☐A ☐SA

Circle "D" if the statement is mostly false or if you **disagree**. ☐SD ☒D ☐N ☐A ☐SA

Circle "N" if the statement is about equally true or false, if you cannot decide, or if you are **neutral** on the statement. ☐SD ☐D ☒N ☐A ☐SA

Circle "A" if the statement is mostly true or if you **agree**. ☐SD ☐D ☐N ☒A ☐SA

Circle "SA" if the statement is definitely true or if you **strongly agree**. ☐SD ☐D ☐N ☐A ☒SA

There are no right or wrong answers, and you need not be an "expert" to complete this questionnaire. Describe yourself honestly and state your opinions as accurately as possible.

Answer every item. Note that the answers are numbered down the columns on the answer sheet. Please make sure that your answer is marked in the correctly numbered space. If you make a mistake or change your mind, **DO NOT ERASE!** Make an "X" through the incorrect response and then draw a circle around the correct response. After you have answered the 240 items, answer the three questions labeled A, B, and C on the answer sheet. Turn to page 3 in this booklet and begin with item 1.

**PAR Psychological Assessment Resources, Inc.** • 16204 N. Florida Avenue • Lutz, FL 33549 • 1.800.331.8378 • [www.parinc.com](http://www.parinc.com)

Copyright © 1978, 1985, 1989, 1991, 1992 by Psychological Assessment Resources, Inc. All rights reserved. May not be reproduced in whole or in part in any form or by any means without written permission of Psychological Assessment Resources, Inc. This form is printed in blue ink on white paper. Any other version is unauthorized.

9 8 7 6 5 4 3 2

Reorder #RO-2028






Printed in the U.S.A.

### Instructions for use with the Machine-Scoring Answer Sheet






Please read all these instructions carefully before beginning. Use a No. 2 pencil to complete your responses on the accompanying answer sheet. Please mark all your answers on the answer sheet. **DO NOT** write in this test booklet.



On the answer sheet, fill in the circle next to "Self" in the box labeled "Person Rated" since you are describing yourself. Enter your name and/or identification number, if you have been given one, in the spaces provided and then fill in the corresponding circles below each box. In the box labeled "Test Form" fill in the circle next to the letter "S." In the spaces provided, fill in your sex, age, and today's date. Turn the answer sheet over.





This questionnaire contains 240 statements. Please read each item carefully and fill in the one answer that best corresponds to your agreement or disagreement.

Fill in "SD" if the statement is definitely false or if you **strongly disagree**.     

Fill in "D" if the statement is mostly false or if you **disagree**.     

Fill in "N" if the statement is about equally true or false, if you cannot decide, or if you are **neutral** on the statement.     

Fill in "A" if the statement is mostly true or if you **agree**.     

Fill in "SA" if the statement is definitely true or if you **strongly agree**.     

There are no right or wrong answers, and you need not be an "expert" to complete this questionnaire. Describe yourself honestly and state your opinions as accurately as possible.

Answer every item and be sure to fill in the circles completely. Note that the answers are numbered down the columns on the answer sheet. Please make sure that your answer is marked in the correctly numbered space. If you make a mistake or change your mind, erase your first answer completely. Then fill in the circle that corresponds to your correct answer. After you have answered the 240 items, please answer the three questions labeled A, B, and C on the answer sheet. Turn to page 3 in this booklet and begin with item 1.

1. I am not a worrier.
2. I really like most people I meet.
3. I have a very active imagination.
4. I tend to be cynical and skeptical of others' intentions.
5. I'm known for my prudence and common sense.
6. I often get angry at the way people treat me.
7. I shy away from crowds of people.
8. Aesthetic and artistic concerns aren't very important to me.
9. I'm not crafty or sly.
10. I would rather keep my options open than plan everything in advance.
11. I rarely feel lonely or blue.
12. I am dominant, forceful, and assertive.
13. Without strong emotions, life would be uninteresting to me.
14. Some people think I'm selfish and egotistical.
15. I try to perform all the tasks assigned to me conscientiously.
16. In dealing with other people, I always dread making a social blunder.
17. I have a leisurely style in work and play.
18. I'm pretty set in my ways.
19. I would rather cooperate with others than compete with them.
20. I am easy-going and lackadaisical.
21. I rarely overindulge in anything.
22. I often crave excitement.
23. I often enjoy playing with theories or abstract ideas.
24. I don't mind bragging about my talents and accomplishments.
25. I'm pretty good about pacing myself so as to get things done on time.
26. I often feel helpless and want someone else to solve my problems.
27. I have never literally jumped for joy.
28. I believe letting students hear controversial speakers can only confuse and mislead them.
29. Political leaders need to be more aware of the human side of their policies.
30. Over the years I've done some pretty stupid things.
31. I am easily frightened.
32. I don't get much pleasure from chatting with people.
33. I try to keep all my thoughts directed along realistic lines and avoid flights of fancy.
34. I believe that most people are basically well-intentioned.
35. I don't take civic duties like voting very seriously.
36. I'm an even-tempered person.
37. I like to have a lot of people around me.
38. I am sometimes completely absorbed in music I am listening to.
39. If necessary, I am willing to manipulate people to get what I want.
40. I keep my belongings neat and clean.
41. Sometimes I feel completely worthless.
42. I sometimes fail to assert myself as much as I should.
43. I rarely experience strong emotions.
44. I try to be courteous to everyone I meet.
45. Sometimes I'm not as dependable or reliable as I should be.



46. I seldom feel self-conscious when I'm around people.
47. When I do things, I do them vigorously.
48. I think it's interesting to learn and develop new hobbies.
49. I can be sarcastic and cutting when I need to be.
50. I have a clear set of goals and work toward them in an orderly fashion.
51. I have trouble resisting my cravings.
52. I wouldn't enjoy vacationing in Las Vegas.
53. I find philosophical arguments boring.
54. I'd rather not talk about myself and my achievements.
55. I waste a lot of time before settling down to work.
56. I feel I am capable of coping with most of my problems.
57. I have sometimes experienced intense joy or ecstasy.
58. I believe that laws and social policies should change to reflect the needs of a changing world.
59. I'm hard-headed and tough-minded in my attitudes.
60. I think things through before coming to a decision.
61. I rarely feel fearful or anxious.
62. I'm known as a warm and friendly person.
63. I have an active fantasy life.
64. I believe that most people will take advantage of you if you let them.
65. I keep myself informed and usually make intelligent decisions.
66. I am known as hot-blooded and quick-tempered.
67. I usually prefer to do things alone.
68. Watching ballet or modern dance bores me.
69. I couldn't deceive anyone even if I wanted to.
70. I am not a very methodical person.
71. I am seldom sad or depressed.
72. I have often been a leader of groups I have belonged to.
73. How I feel about things is important to me.
74. Some people think of me as cold and calculating.
75. I pay my debts promptly and in full.
76. At times I have been so ashamed I just wanted to hide.
77. My work is likely to be slow but steady.
78. Once I find the right way to do something, I stick to it.
79. I hesitate to express my anger even when it's justified.
80. When I start a self-improvement program, I usually let it slide after a few days.
81. I have little difficulty resisting temptation.
82. I have sometimes done things just for "kicks" or "thrills."
83. I enjoy solving problems or puzzles.
84. I'm better than most people, and I know it.
85. I am a productive person who always gets the job done.
86. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.
87. I am not a cheerful optimist.
88. I believe we should look to our religious authorities for decisions on moral issues.
89. We can never do too much for the poor and elderly.
90. Occasionally I act first and think later.

91. I often feel tense and jittery.
92. Many people think of me as somewhat cold and distant.
93. I don't like to waste my time daydreaming.
94. I think most of the people I deal with are honest and trustworthy.
95. I often come into situations without being fully prepared.
96. I am not considered a touchy or temperamental person.
97. I really feel the need for other people if I am by myself for long.
98. I am intrigued by the patterns I find in art and nature.
99. Being perfectly honest is a bad way to do business.
100. I like to keep everything in its place so I know just where it is.
101. I have sometimes experienced a deep sense of guilt or sinfulness.
102. In meetings, I usually let others do the talking.
103. I seldom pay much attention to my feelings of the moment.
104. I generally try to be thoughtful and considerate.
105. Sometimes I cheat when I play solitaire.
106. It doesn't embarrass me too much if people ridicule and tease me.
107. I often feel as if I'm bursting with energy.
108. I often try new and foreign foods.
109. If I don't like people, I let them know it.
110. I work hard to accomplish my goals.
111. When I am having my favorite foods, I tend to eat too much.
112. I tend to avoid movies that are shocking or scary.
113. I sometimes lose interest when people talk about very abstract, theoretical matters.
114. I try to be humble.
115. I have trouble making myself do what I should.
116. I keep a cool head in emergencies.
117. Sometimes I bubble with happiness.
118. I believe that the different ideas of right and wrong that people in other societies have may be valid for them.
119. I have no sympathy for panhandlers.
120. I always consider the consequences before I take action.
121. I'm seldom apprehensive about the future.
122. I really enjoy talking to people.
123. I enjoy concentrating on a fantasy or daydream and exploring all its possibilities, letting it grow and develop.
124. I'm suspicious when someone does something nice for me.
125. I pride myself on my sound judgment.
126. I often get disgusted with people I have to deal with.
127. I prefer jobs that let me work alone without being bothered by other people.
128. Poetry has little or no effect on me.
129. I would hate to be thought of as a hypocrite.
130. I never seem to be able to get organized.
131. I tend to blame myself when anything goes wrong.
132. Other people often look to me to make decisions.
133. I experience a wide range of emotions or feelings.
134. I'm not known for my generosity.
135. When I make a commitment, I can always be counted on to follow through.

136. I often feel inferior to others.
137. I'm not as quick and lively as other people.
138. I prefer to spend my time in familiar surroundings.
139. When I've been insulted, I just try to forgive and forget.
140. I don't feel like I'm driven to get ahead.
141. I seldom give in to my impulses.
142. I like to be where the action is.
143. I enjoy working on "mind-twister"-type puzzles.
144. I have a very high opinion of myself.
145. Once I start a project, I almost always finish it.
146. It's often hard for me to make up my mind.
147. I don't consider myself especially "light-hearted."
148. I believe that loyalty to one's ideals and principles is more important than "open-mindedness."
149. Human need should always take priority over economic considerations.
150. I often do things on the spur of the moment.
151. I often worry about things that might go wrong.
152. I find it easy to smile and be outgoing with strangers.
153. If I feel my mind starting to drift off into daydreams, I usually get busy and start concentrating on some work or activity instead.
154. My first reaction is to trust people.
155. I don't seem to be completely successful at anything.
156. It takes a lot to get me mad.
157. I'd rather vacation at a popular beach than an isolated cabin in the woods.
158. Certain kinds of music have an endless fascination for me.
159. Sometimes I trick people into doing what I want.
160. I tend to be somewhat fastidious or exacting.
161. I have a low opinion of myself.
162. I would rather go my own way than be a leader of others.
163. I seldom notice the moods or feelings that different environments produce.
164. Most people I know like me.
165. I adhere strictly to my ethical principles.
166. I feel comfortable in the presence of my bosses or other authorities.
167. I usually seem to be in a hurry.
168. Sometimes I make changes around the house just to try something different.
169. If someone starts a fight, I'm ready to fight back.
170. I strive to achieve all I can.
171. I sometimes eat myself sick.
172. I love the excitement of roller coasters.
173. I have little interest in speculating on the nature of the universe or the human condition.
174. I feel that I am no better than others, no matter what their condition.
175. When a project gets too difficult, I'm inclined to start a new one.
176. I can handle myself pretty well in a crisis.
177. I am a cheerful, high-spirited person.
178. I consider myself broad-minded and tolerant of other people's lifestyles.
179. I believe all human beings are worthy of respect.
180. I rarely make hasty decisions.



181. I have fewer fears than most people.
182. I have strong emotional attachments to my friends.
183. As a child I rarely enjoyed games of make believe.
184. I tend to assume the best about people.
185. I'm a very competent person.
186. At times I have felt bitter and resentful.
187. Social gatherings are usually boring to me.
188. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.
189. At times I bully or flatter people into doing what I want them to.
190. I'm not compulsive about cleaning.
191. Sometimes things look pretty bleak and hopeless to me.
192. In conversations, I tend to do most of the talking.
193. I find it easy to empathize—to feel myself what others are feeling.
194. I think of myself as a charitable person.
195. I try to do jobs carefully, so they won't have to be done again.
196. If I have said or done the wrong thing to someone, I can hardly bear to face them again.
197. My life is fast-paced.
198. On a vacation, I prefer going back to a tried and true spot.
199. I'm hard-headed and stubborn.
200. I strive for excellence in everything I do.
201. Sometimes I do things on impulse that I later regret.
202. I'm attracted to bright colors and flashy styles.
203. I have a lot of intellectual curiosity.
204. I would rather praise others than be praised myself.
205. There are so many little jobs that need to be done that I sometimes just ignore them all.
206. When everything seems to be going wrong, I can still make good decisions.
207. I rarely use words like "fantastic!" or "sensational!" to describe my experiences.
208. I think that if people don't know what they believe in by the time they're 25, there's something wrong with them.
209. I have sympathy for others less fortunate than me.
210. I plan ahead carefully when I go on a trip.
211. Frightening thoughts sometimes come into my head.
212. I take a personal interest in the people I work with.
213. I would have difficulty just letting my mind wander without control or guidance.
214. I have a good deal of faith in human nature.
215. I am efficient and effective at my work.
216. Even minor annoyances can be frustrating to me.
217. I enjoy parties with lots of people.
218. I enjoy reading poetry that emphasizes feelings and images more than story lines.
219. I pride myself on my shrewdness in handling people.
220. I spend a lot of time looking for things I've misplaced.
221. Too often, when things go wrong, I get discouraged and feel like giving up.
222. I don't find it easy to take charge of a situation.
223. Odd things—like certain scents or the names of distant places—can evoke strong moods in me.
224. I go out of my way to help others if I can.
225. I'd really have to be sick before I'd miss a day of work.

- 226. When people I know do foolish things, I get embarrassed for them.
- 227. I am a very active person.
- 228. I follow the same route when I go someplace.
- 229. I often get into arguments with my family and co-workers.
- 230. I'm something of a "workaholic."
- 231. I am always able to keep my feelings under control.
- 232. I like being part of the crowd at sporting events.
- 233. I have a wide range of intellectual interests.
- 234. I'm a superior person.
- 235. I have a lot of self-discipline.
- 236. I'm pretty stable emotionally.
- 237. I laugh easily.
- 238. I believe that the "new morality" of permissiveness is no morality at all.
- 239. I would rather be known as "merciful" than as "just."
- 240. I think twice before I answer a question.

## Appendix E

### Post-intervention questionnaire – Study 3

#### Post-Task questionnaire

##### \*1. Id Number

##### \*2. Please indicate to what extent you feel this way **RIGHT NOW**, that is, at the present moment

	Very slightly or Not at All	A little	Moderately	Quite a Bit	Extremely
Interested	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Distressed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Excited	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strong	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guilty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scared	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hostile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enthusiastic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proud	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Irritable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Alert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ashamed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervous	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determined	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attentive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jittery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Active	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Post-Task questionnaire

### \*3. During the task and preparation time, how often .....

	Never	Almost Never	Sometimes	Fairly Often	Very Often
were you upset because of something that happened unexpectedly?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you feel that you were unable to control the things that were happening?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you feel nervous and "stressed"?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you feel confident about your ability to handle your problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you feel that things were going your way?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you find that you could not cope with all the things that you had to do?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
were you able able to control irritations?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you feel that you were on top of things?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
were you angered because of things that were outside of your control?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you feel difficulties were piling up so high that you could not overcome them?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you have too many things to do?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you find yourself in a situation of conflict?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you feel you were in a hurry?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you have too many worries?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you feel you were doing things because you had to not because you wanted to?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you feel criticized or judged?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
did you feel under pressure from the preparation or task deadlines?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Post-Task questionnaire

**4. Please describe how you feel you performed in the task and explain why you feel this way (e.g., do you feel that you did well or not so well? Did you find it challenging or relatively easy? Which aspects were the easiest/most challenging for you? Why?)**

▲ □

▼ □

## Post-Task questionnaire

### **Thank you**

Thank you for completing this questionnaire.

Please notify the researcher that you have finished.

## **Appendix F**

### **Script for explaining the TSST – Study 3**

These two trained interviewers are here to assess how outgoing and comfortable you are in situations in which you must project yourself as an expert. This is a type of personality test for a trait called extraversion. You will be given a hypothetical situation in which you will be applying for your ideal job. In this hypothetical situation, you are applying for your ideal job. You have dreamed about working in this job for as many years as you can remember. You have just seen an advertisement for this perfect job and decided to apply. After submitting your application, you have been invited for an interview. The job pays a very large salary. You are competing against a lot of other candidates, and the final selection will be made based on your ability to convince the interviewers of how your experiences, abilities, and education make you a better candidate than the others. You will try to convince this panel of interviewers that you are the best candidate for the position. You will have 10 minutes to prepare a detailed speech. After the preparation time has elapsed, you will return and deliver your speech to these interviewers. Your speech should explain why you should get the job.

Remember, you should try to perform better than all of the other participants. These examiners are specially trained to monitor and rate your speech for its believability and convincingness, and they will compare your performance to that of the others who perform this task. Also, you will be videotaped during the task so that the examiners can go over the videotape carefully and rate the contents of your speech as well as your nonverbal behaviour. Now let us go back to your room so that you can prepare for your job interview

## Appendix G

### Script for confederates – Study 3

Confederate 1

#### **ONLY CONFEDERATE 1 IS TO TALK. CONFEDERATE 2 TAKES NOTES**

The participant will be introduced to the confederates before beginning the experiment maintain eye contact but do not speak

*Upon participant returning to the room after making notes for the interview*

Set the timer for 5 minutes – inform the participant to begin

“The timer has been set for 5 minutes please begin”

Try to maintain eye contact with the participant at all times.

**If the subject pauses for 20 seconds, prompt the participant by saying**

“you still have more time please continue”

**If they participant asks the you a question comment with**

“Say whatever comes to your mind” or “be as creative as you like”

**When the time is up please say**

“Please stop, your time is up”

**Inform the participant of the arithmetic task using the following script:**

“We have completed that task, now we would like to ask you to take part in another task. We would like you to count backwards from 1022 subtracting 13 each time. For example 1022 than 1009. You should do the subtraction as fast and as accurately as possible”

**If the subjects make an error, the subject needs to restart at 1022. Instruct the participant**

“That’s incorrect. Please start again from the beginning”

**At the end of the 5 minutes, instruct the participant**

“Please stop, your time is up. You may leave the room”

**If the subject asks questions as to their performance on the task respond with**

“I am not allowed to tell you that. Someone will give you that information later.”



## **Confederate 2**

### **ONLY CONFEDERATE 1 IS TO TALK. CONFEDERATE 2 TAKES NOTES**

The participant will be introduced to the confederates before beginning the experiment maintain eye contact but do not speak

*Upon participant returning to the room after making notes for the interview*

Make notes in relations to the participants behaviour. Maintain eye contact with participant when you are not making notes.

- Does the participant seem nervous
- Does the participant continually use words such as “um”
- How often is the participant prompted to keep going

\*\*\* Remember you are not meant to talk at all throughout the experiment, even if the participant asks you a question \*\*\*\*\*

### **Arithmetic task**

Make notes on how many mistakes the participant makes and at which number they are making the mistake.

Take notes about how nervous the participant seems and if they use words such as “um”

## Appendix H

### Arithmetic task – Study 3

1022	710	398	86
1009	697	385	73
996	684	372	60
983	671	359	47
970	658	346	34
957	645	333	21
944	632	320	8
931	619	307	
918	606	294	
905	593	281	
892	580	268	
879	567	255	
866	554	242	
853	541	229	
840	528	216	
827	515	203	
814	502	190	
801	489	177	
788	476	164	
775	463	151	
762	450	138	
749	437	125	
736	424	112	
723	411	99	

## Appendix I

### Plain language statement – Study 3

<b>PROJECT TITLE:</b>	<b>Investigating Associations between Stress, Mindfulness and Personality: Study 2</b>
<b>PRINCIPAL RESEARCHER:</b>	<b>Dr. Liz Temple</b>
<b>STUDENT RESEARCHERS:</b>	<b>Dr Nina Fotinatos and Leanne Sommers</b>

You are invited to continue your involvement in the research project Investigating Associations between Stress, Mindfulness and Personality. This study is also being conducted through the University of Ballarat by Leanne Sommers (Masters student) under the supervision of Dr. Liz Temple and Dr Nina Fotinatos of the School of Health Sciences, University of Ballarat.

The aim of this study is to build on from the first study (the online questionnaire you completed recently) and further investigate the relationships between stress, mindfulness and personality to determine why some people experience higher levels of stress than other people when their daily lives are similar. This information may help to identify people who are at risk of experiencing high levels of stress, which is known to have adverse effects on both mental and physical health.

Participation in this study will involve approximately 1.5 to 2 hours of your time and will include the completion of questionnaires and a number of tasks. You will need to come to the Mount Helen campus of the University of Ballarat to participate. It is anticipated that the study will be run during the week of the 3<sup>rd</sup>-7<sup>th</sup> of June, 2013, with a day and time arranged to suit your availability. In recompense for your time, you will receive a \$20 Woolworths gift card and be placed in a draw for an additional \$50 gift card.

The study process has three parts. If you chose to participate, you will first complete a questionnaire package, which will take approximately 40 to 60 minutes. This includes questions about your personality and levels of stress and mindfulness. You will then participate in a number of individual tasks, which may lead you to experience some stress. After this, you will complete two of the questionnaires for a second time, and then receive your gift card after having the opportunity to discuss the study and ask any questions you may have after participating in it.

An additional aspect of this study is the collection of physiological data because we are interested in investigating both psychological and physiological responses to stress in relation to personality and trait mindfulness. Therefore, we will be asking participants to attach a heart rate monitor on arrival at the testing location, which will then be worn throughout the study procedure. Participants will also be asked to provide salivary cortisol samples at various times during the study. To get these samples, participants will be given a container with a small swab inside, they will need to chew on the swab for 60-90 seconds (until saturated) and then put it back into the container, which will then be labelled with your participant identification number. The samples will be stored securely at the University of Ballarat before being delivered to a pathology laboratory in

Melbourne, where your cortisol levels will be analysed. After completion of the test in g, the samples will be destroyed, and the data will be sent back to the researchers for statistical analysis.

Participation is voluntary and you can withdraw from the study at any time. As participants will be attending a physical location for this study, participation will not be anonymous. However, on arrival on the day of the study, participants will be provided with an identification number that will be used for all data you provide and all data that is collected in relation to you. As such, after the day of testing there will be no identifying information linking you to your data. This means that if you chose to withdraw your data more than 24 hours after participation, we will be unable to retrieve these data for you. If you are a student of the University of Ballarat, participation or non-participation will have no effect on your assessment. All data acquired from the questionnaire is completely confidential and all efforts to ensure the protection of the data from being revealed will be taken. Results from the study may be reported in academic publications and presented at conferences, and all data will be deleted after a minimum period of 5 years.

Should you feel affected at all by the questions presented in the study or the tasks you are asked to perform, please contact your doctor, psychologist, counsellor or local health service. Alternatively, 24 hour counselling assistance is provided by Lifeline (phone: 13 11 14; <http://www.lifeline.org.au/>).

If you have any questions, or would like further information regarding this study (Investigating Associations between Stress, Mindfulness and Personality), please contact the Principal Researcher, Dr Liz Temple of the School of Health Sciences; PH: (03) 5327 9744; EMAIL: [e.temple@ballarat.edu.au](mailto:e.temple@ballarat.edu.au)

Should you (i.e. the participant) have any concerns about the ethical conduct of this research project, please contact the University of Ballarat Ethics Officer, Research & Graduates Studies Office, University of Ballarat, PO Box 663, Mt Helen VIC 3353. Telephone: (03) 5327 9765, Email: [ub.ethics@ballarat.edu.au](mailto:ub.ethics@ballarat.edu.au)

## Appendix J

### Ethics approval – Study 3

Principal Researcher:	Liz Temple
Other/Student Researcher/s:	Nina Fotinatos Leanne Sommers
School/Section:	SHS
Project Number:	A13-032
Project Title:	Investigating the association between stress, mindfulness and personality: Study 2
For the period:	TBC to 30/06/2013

*Please quote the Project No. in all correspondence regarding this application.*

### **REPORTS TO HREC:**

A final report for this project must be submitted to the Ethics Officer on:  
**30/07/2013**

These report forms can be found at:

<http://www.ballarat.edu.au/research/research-services/forms/ethics-forms>

Ms Elanor Mahon

**Ethics Officer**  
**10 May 2021**

**Please see attached 'Conditions of Approval'.**

### **CONDITIONS OF APPROVAL**

1. The project must be conducted in accordance with the approved application, including any conditions and amendments that have been approved. You must comply with all of the conditions imposed by the HREC, and any subsequent conditions that the HREC may require.
2. You must report immediately anything which might affect ethical acceptance of your project, including:
  - Adverse effects on participants;
  - Significant unforeseen events;
  - Other matters that might affect continued ethical acceptability of the project.
3. Where approval has been given subject to the submission of copies of documents such as letters of support or approvals from third parties, these must be provided to the Ethics Office before the research may commence at each relevant location.
4. Proposed changes or amendments to the research must be applied for, using a 'Request for Amendments' form, and approved by the HREC before these may be implemented.
5. If an extension is required beyond the approved end date of the project, a 'Request for Extension' should be submitted, allowing sufficient time for its consideration by the committee. Extensions cannot be granted retrospectively.
6. If changes are to be made to the project's personnel, a 'Changes to Personnel' form should be submitted for approval.
7. An 'Annual Report' must be provided by the due date specified each year for the project to have continuing approval.
8. A 'Final Report' must be provided at the conclusion of the project.
9. If, for any reason, the project does not proceed or is discontinued, you must advise the committee in writing, using a 'Final Report' form.
10. You must advise the HREC immediately, in writing, if any complaint is made about the conduct of the project.
11. You must notify the Ethics Office of any changes in contact details including address, phone number and email address.
12. The HREC may conduct random audits and / or require additional reports concerning the research project.

**Failure to comply with the *National Statement on Ethical Conduct in Human Research* (2007) and with the conditions of approval will result in suspension or withdrawal of approval.**

## Appendix K

### Final ethics report – Study 1 and Study 2

Please indicate the type of report	Annual Report (Omit 3b & 5b) Final Report
Project No:	A12-152
Project Name:	Stress and Coping – does personality make a difference?
Principal Researcher:	Dr Elizabeth Temple (on original ethics application and at Fed Uni at the time of ethics application) Associate Professor Christopher Mesagno (current principal supervisor and Fed Uni staff member)
Other Researchers:	Leanne Duggan
Date of Original Approval:	04/10/2013
School / Section:	SHS
Phone:	
Email:	

Please note: For HDR candidates, this Ethics annual report is a separate requirement, in addition to your HDR Candidature annual report, which is submitted mid-year to [research.degrees@federation.edu.au](mailto:research.degrees@federation.edu.au).

1) Please indicate the current status of the project:				
1a) Yet to start				
1b) Continuing				
1c) Data collection completed				
1d) Abandoned / Withdrawn:				
1e) If the approval was subject to certain conditions, have these conditions been met? (If not, please give details in the comments box below )			Yes	No
<b>Comments:</b>				
1f) Data Analysis	Not yet commenced	Proceeding	Complete	None
1g) Have ethical problems been encountered in any of the following areas: Study Design			Yes	No

Recruitment of Subjects	Yes	No
Finance	Yes	No
Facilities, Equipment	Yes	No
(If yes, please give details in the comments box below)		
Comments:		

<b>2a) Have amendments been made to the originally approved project?</b>	
No	Yes
<b>2b) If yes, was HREC approval granted for these changes?</b>	
Yes	Provide detail: Yes Application for Amendment to an Existing Project Yes Change of Personnel Yes Extension Request
No	If you have made changes, but not had HREC approval, provide detail as to why this has not yet occurred:
<b>2c) Do you need to submit any amendments now?</b>	
No	Yes Application for Amendment to an Existing Project Yes Change of Personnel Yes Extension Request * NB: If 'Yes', <a href="#">download &amp; submit the appropriate request</a> to the HREC for approval: Please note: Extensions will not be granted retrospectively. Apply well prior to the project end date, to ensure continuity of HRE approval.

<b>3a) Please indicate where you are storing the data collected during the course of this project:</b> (Australian code for the Responsible conduct of Research Ch 2.2.2, 2.5 – 2.7)
Re-identified data has been stored on a computer; this was protected by password to log into the computer but also to open the data files.
<b>3b) Final Reports:</b> Advise when & how stored data will be destroyed (Australian code for the Responsible conduct of Research Ch 2.1.1)
After 5 years of completion of thesis, data will be deleted from the computer.

<b>4) Have there been any events that might have had an adverse effect on the research participants OR unforeseen events that might affect continued ethical acceptability of the project?</b>



<b>No</b>	Yes * NB: If 'yes', please provide details in the comments box below:
<b>Comments:</b>	

<b>5a) Please provide a short summary of results of the project so far (no attachments please):</b>
<p>Hierarchical regression showed that 56% of the variance in perceived stress was explained by personality and affect, with neuroticism being the only personality trait to significantly correlate with perceived stress when all five traits and affect were viewed concurrently. No mediation effects were evident, positive affect moderated the relationship between neuroticism and perceived stress.</p> <p>A second hierarchical regression showed that 58% of the variance in perceived stress was explained by personality and trait mindfulness. Neuroticism and agreeableness were the only personality traits to correlate with perceived stress when all personality traits and trait mindfulness were examined together. The sub-scale trait mindfulness attention significantly moderated the relationship between agreeableness and perceived stress, while a partial mediation was found between neuroticism and the sub-scale trait mindfulness acceptance.</p>
<b>5b) Final Reports:</b> Provide details about how the aims of the project, as stated in the application for approval, were achieved (or not achieved). (Australian code for the Responsible conduct of Research 4.4.1)
The study aimed to investigate the relationship between all five personality traits in the Big Five approach and the relationship between these personality traits and perceived stress. This was achieved through correlation, two hierarchical regressions, and exploratory moderation and mediation analyses.

<b>6) Publications:</b> Provide details of research dissemination outcomes for the previous year resulting from this project: eg: Community seminars; Conference attendance; Government reports and/or research publications
N/A

<b>7) The HREC welcomes any feedback on:</b> <ul style="list-style-type: none"> <li>• Difficulties experienced with carrying out the research project; or</li> <li>• Appropriate suggestions which might lead to improvements in ethical clearance and monitoring of research.</li> </ul>

<b>8) Signatures</b>
----------------------

Principal Researcher:		Date:	24/01/2021
	Print name: Associate Professor Christopher Mesagno		
Other/Student Researchers:		Date:	23/01/2021
	Print name: Leanne Duggan		
	..... Print name:	Date:	

Submit to the *Ethics Office, Mt Helen campus*, by the due date:  
[research.ethics@federation.edu.au](mailto:research.ethics@federation.edu.au)

## Appendix L

### Final ethics report – Study 3

Please indicate the type of report	<b>Annual Report (Omit 3b &amp; 5b)</b> <b>Final Report</b>
Project No:	<b>A13-032</b>
Project Name:	<b>Investigating the associations between stress, mindfulness, and personality: Study 2</b>
Principal Researcher:	<b>Dr Elizabeth Temple (on original ethics application and at Fed Uni at the time of ethics application)</b> <b>Associate Professor Christopher Mesagno (current principal supervisor and Fed Uni staff member)</b>
Other Researchers:	<b>Leanne Duggan</b>
Date of Original Approval:	<b>05/10/2013</b>
School / Section:	<b>SHS</b>
Phone:	
Email:	

Please note: **For HDR candidates, this Ethics annual report is a separate requirement, in addition to your HDR Candidature annual report, which is submitted mid-year to [research.degrees@federation.edu.au](mailto:research.degrees@federation.edu.au).**

1) Please indicate the current status of the project:				
1a) Yet to start 1b) Continuing <b>1c) Data collection completed</b> 1d) Abandoned / Withdrawn:				
1e) If the approval was subject to certain conditions, have these conditions been met? (If not, please give details in the comments box below )			Yes	No
<b>Comments:</b>				
1f) Data Analysis	Not yet commenced	Proceeding	<b>Complete</b>	None
1g) Have ethical problems been encountered in any of the following areas: Study Design			Yes	<b>No</b>

Recruitment of Subjects	Yes	No
Finance	Yes	No
Facilities, Equipment	Yes	No
(If yes, please give details in the comments box below)		
Comments:		

<b>2a) Have amendments been made to the originally approved project?</b>	
No	Yes
2b) If yes, was HREC approval granted for these changes?	
Yes	Provide detail: <b>Yes</b> Application for Amendment to an Existing Project <b>Yes</b> Change of Personnel <b>Yes</b> Extension Request
No	If you have made changes, but not had HREC approval, provide detail as to why this has not yet occurred:
2c) Do you need to submit any amendments now?	
No	<b>Yes</b> Application for Amendment to an Existing Project <b>Yes</b> Change of Personnel <b>Yes</b> Extension Request * NB: If 'Yes', <a href="#">download &amp; submit the appropriate request</a> to the HREC for approval: Please note: Extensions will not be granted retrospectively. Apply well prior to the project end date, to ensure continuity of HRE approval.

3a) Please indicate where you are storing the data collected during the course of this project: (Australian code for the Responsible conduct of Research Ch 2.2.2, 2.5 – 2.7)
Data was kept in a locked filing cabinet and on a password protected computer
3b) <b>Final Reports:</b> Advise when & how stored data will be destroyed (Australian code for the Responsible conduct of Research Ch 2.1.1)
<b>Any paper files will be shredded and data files from the computer will be deleted after 5 years of completion of thesis.</b>

4) Have there been any events that might have had an adverse effect on the research participants OR unforeseen events that might affect continued ethical acceptability of the project?
---

<b>No</b>	<b>Yes</b> * NB: If 'yes', please provide details in the comments box below:
<b>Comments:</b>	

5a) Please provide a short summary of results of the project so far (no attachments please):
<b>Comparison of the groups indicated that no significant differences in perceived stress were evident pre to post- intervention. Changes in heart rate were noted for all participants during the intervention, though no difference was evident between groups. The results indicate a mindfulness breathing exercise makes little difference to physiological stress responses during a stress task.</b>
5b) <b>Final Reports:</b> Provide details about how the aims of the project, as stated in the application for approval, were achieved (or not achieved). (Australian code for the Responsible conduct of Research 4.4.1)
<b>This project aimed to investigate the impacts of a brief mindfulness exercise on both physiological and psychological stress responses on personality matched participants. This was achieved through examining differences between the two groups (mindfulness and control).</b>

6) Publications: Provide details of research dissemination outcomes for the previous year resulting from this project: eg: Community seminars; Conference attendance; Government reports and/or research publications
N/A

7) The HREC welcomes any feedback on: <ul style="list-style-type: none"> <li>Difficulties experienced with carrying out the research project; or</li> <li>Appropriate suggestions which might lead to improvements in ethical clearance and monitoring of research.</li> </ul>

8) Signatures			
Principal Researcher:	.....	Date:	<b>24/01/2021</b>

	<b>Print name: Associate Professor Christopher Mesagno</b>		
Other/Student Researchers:	<b>Print name: Leanne Duggan</b>	Date:	<b>23/01/2021</b>
	..... <b>Print name:</b>	Date:	

Submit to the Ethics Office, Mt Helen campus, by the due date:  
[research.ethics@federation.edu.au](mailto:research.ethics@federation.edu.au)