



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

Research Commons

<http://researchcommons.waikato.ac.nz/>

Research Commons at the University of Waikato

Copyright Statement:

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand).

The thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- Any use you make of these documents or images must be for research or private study purposes only, and you may not make them available to any other person.
- Authors control the copyright of their thesis. You will recognise the author's right to be identified as the author of the thesis, and due acknowledgement will be made to the author where appropriate.
- You will obtain the author's permission before publishing any material from the thesis.

**The Effects of Mindfulness-Based Stress Reduction
Interventions on Employee Stress and Well-Being:**

A Meta-Analytic Study

A thesis

submitted in partial fulfilment

of the requirements for the degree

of

Master of Applied Psychology (Organisational)

at

The University of Waikato

by

SIMONE THIERSTEIN



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

2019

Abstract

Organisations have started to acknowledge that employee stress and well-being have a central role in organisational performance and can also impact individuals' overall health. Poor employee well-being and stress have been linked to psychological, physiological, and behavioural issues such as loss of productivity, work accidents (Fries, 2009), cardiovascular disease, hypertension (Tennant, 2001), and increased staff turnover (Murphy, & Sauter, 2003). Furthermore, distress can decrease life- satisfaction and have a major influence on our daily lives (Berger, 1994). Employee well-being programmes became popular in the 1970s, such as the programme developed by Jon Kabat- Zinn which is known as the 'mindfulness-based stress reduction' intervention. In this meta-analytic study, the effect of MBSR interventions categorised in three groups (tMBSR, mMBSR, and cMBSR) on employee stress and well-being is examined.

Statistical data of stress levels was taken from the following measures: GHQ, DASS, MBI, and PSS. Statistical data of well- being levels was taken from measures such as the SPWB, the SWLS, the SF- 36 and the SF- 12v2, and the PSQI.

The meta-analysis on MBSR and its effect on stress reduction resulted in a medium summary effect size ($g = -0.489$). A smaller summary effect size ($g = -0.242$) was found when carrying out a meta-analysis only comprising of studies which included a control group. The meta-analysis on the effect of MBSR on enhancing well-being outcomes resulted in a moderate effect size ($g = 0.512$).

The findings in this study are in line with previous research outcomes supporting the claim that MBSR assists in stress reduction and increases well-being in employees. There are various limitations to this study such as few controlled studies and a majority of samples working in the health care sector. Future research could focus on cMBSR interventions in the workplace and explore why they may have a larger effect size than traditional MBSR.

Dedication

To Janice Mary Tipene, you will live forever in our hearts.

Time is

Too slow for those who Wait,

Too swift for those who Fear,

Too long for those who Grieve,

Too short for those who Rejoice,

But for those who Love,

Time is not.

Henry Van Dyke

Acknowledgements

It would not have been possible to write and complete this thesis without the support I have received from several individuals in my life. First of all, I want to thank my amazingly supportive and encouraging supervisor Dr Anna Sutton. I am immensely grateful for your support over the past year, your open- door policy, your calm and positive attitude, and your positive feedback have been keeping me motivated to keep pushing forward. Thank you for guiding me on this journey.

To Jillene, thank you for helping me with the thesis formatting as well as teaching me how to use database search functions effectively. I would also like to thank my friends who have taken time to proofread this piece of work and provided me with their feedback. Further, big thanks to my peer students with whom I have spent many hours studying in the postgraduate psychology lab. Your feedback, positive mindsets and kind words of encouragement and reassurance of my abilities to write this thesis have helped to keep me sane during stressful times. A massive thank you to my flatmates that have endured my highs and lows during the past year and have been checking on me to make sure I am alright. My gratitude also goes out to my colleagues at work, your understanding and supportive manner have been of great value during the past year.

Most of all, without the support of my family, my partner, and my friends from close as well as afar, this thesis would have been a lonely journey. I would like you to know that your phone calls, plentiful text messages, parcels full of Swiss goodness, mountain bike adventures, yoga sessions, reflective conversations, shared laughs, hugs, and your endless love and encouragement mean the world to me and have brought light in times of struggles and frustration. Thank you for being my light in the dark. You all bring so much joy, gratitude, and appreciation into my life and help me be a better person, thank you.

Table of Contents

Abstract	ii
Dedication	iii
Acknowledgements	iv
List of Tables.....	ix
List of Figures	x
Chapter 1: Introduction	1
Stress	2
Definitions of Stress	2
Stress in the Workplace.....	5
Coping with Stress	6
Stress Intervention in the Workplace	7
Conclusion	7
Well-Being	8
Definitions of Well-Being.....	8
Employee Well-being.....	9
Well-being Programmes in Organisations	10
NZ Context.....	11
Conclusion	12
Mindfulness.....	13
Definition of Mindfulness	13
Impact of Mindfulness and Human Functioning	16
Mindfulness in the Workplace	17
Mindfulness-Based Interventions	18
Mindfulness-Based Stress Reduction Intervention	20
Outline of MBSR	22

Traditional MBSR (tMBSR), modified MBSR (mMBSR) and compressed MBSR (cMBSR)	23
MBSR Benefits to Organisations	24
Conclusion	25
Chapter 2: Methodology	26
The Objective of a Meta-Analysis	26
Critique of Meta-Analytic Methods	27
Keyword Selection	28
Databases.....	29
Criteria for Considering Studies in this Review	31
Initial Review of Exclusion Criteria	31
Initial Review of Inclusion Criteria.....	31
Final Review of Exclusion Criteria.....	32
Final Review of Inclusion Criteria.....	32
Data Set.....	33
Quantitative Measures.....	33
Measures of Stress.....	33
Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983)	33
Maslach Burnout Scale (MBI) (Maslach & Jackson, 1981)	34
Depression Anxiety Stress Scales (DASS) (Lovibond & Lovibond, 1995) .	35
General Health Questionnaire (GHQ) (Goldberg, 1978).....	35
Measures of Well-Being	35
Subjective Psychological Well-Being Scale (SPWB) (Ryff, 1989).....	35
Satisfaction with Life Scale (SWLS) (Diener, Emmons, Larsen, & Griffin, 1985)	36
Short Form Health Survey (SF-36 and SF-12v2) (Ware, Snow, & Kosinski, 1993)	36

Pittsburgh Sleep Quality Index (PSQI) (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989).....	37
Reverse Scoring	37
Data Analysis and Extraction.....	37
Fixed Effect vs. Random Effect	38
Assessment of Heterogeneity	39
Assessment of Reporting and Publication Bias	39
Chapter 3: Results	40
Sample Description	40
Effect Size	46
Cohen's <i>d</i> and Hedges' <i>g</i>	46
Confidence Intervals	47
Forest Plots.....	47
Outcomes of MBSR Interventions on Employee Stress	47
Outcomes of MBSR Interventions on Employee Well-being.....	55
Heterogeneity	57
I-Square (I^2).....	57
Tau-Square (T^2) and Tau (T).....	58
Heterogeneity Within Studies Measuring Stress Outcomes	58
Heterogeneity Within Studies Measuring Well-Being Outcomes	59
Publication Bias	59
Funnel Plots.....	59
The Rosenthal Fail-Safe (Classic Fail-Safe N)	61
Orwin's Fail-Safe N	62
Chapter 4: Discussion	64
Chapter Overview	64
Summary of Aim and Constructs	64

Summary of Results	64
Limitations	67
Implications for the Workplace.....	71
NZ Context.....	72
Future Research Suggestions	73
Overall Conclusion.....	74
References	75

List of Tables

Table 1: <i>Description of included studies</i>	42
---	----

List of Figures

<i>Figure 1:</i> Flowchart of a traditional MBSR programme	23
<i>Figure 2:</i> Review process flow diagram.....	29
<i>Figure 3:</i> Forest plot of MBSR interventions on stress outcomes.....	48
<i>Figure 4:</i> Forest plot of MBSR interventions, excluding control group samples, on stress outcomes	50
<i>Figure 5:</i> Forest plot of MBSR interventions, only including studies with a control-group, on stress outcomes.....	51
<i>Figure 6:</i> Forest plot of mMBSR interventions on stress outcomes.....	52
<i>Figure 7:</i> Forest plot of tMBSR interventions on stress outcomes.....	53
<i>Figure 8:</i> Forest plot of cMBSR interventions on stress outcomes.....	54
<i>Figure 9:</i> Forest plot of MBSR interventions on well-being outcomes.....	56
<i>Figure 10:</i> Funnel plot of studies including a measure of stress	60
<i>Figure 11:</i> Funnel plot of studies including a measure of well-being	61

Chapter 1: Introduction

In this thesis, the effects of mindfulness-based stress reduction interventions on employee stress and well-being was researched in the form of a systematic review and meta-analysis. This topic was chosen because there are high personal and organisational costs related to workplace stress (Adams, 1980) and poor employee well-being (Wright, Cropanzano, Bonett, & Diamond, 2009).

Workplace stress is associated with psychological, physiological, and behavioural issues in employees. Depression, anxiety, and irritability have been linked to chronic stress in employees (Tennant, 2001; Murphy & Sauter, 2003). Hypertension and coronary heart diseases are some of the physiological issues that have been related to stress in the workplace (Tennant, 2001; Murphy & Sauter, 2003). Work performance, work accidents, and substance abuse can also result from occupational stress (Murphy, 1995; Fries, 2009). Employee well-being has also been linked to organisational performance, absenteeism, turnover, obesity, and cardiovascular health (Danna & Griffin, 1999; Wright, Cropanzano, Bonett, & Diamond, 2009).

Most of us spend the majority of our time at work, therefore it should be of interest to the field of organisational psychology to determine if employee well-being interventions, more specifically, mindfulness-based stress reduction interventions, can reduce stress levels in employees and also increase their well-being. A mindfulness-based intervention was chosen as previous research on mindfulness-based programmes in the workplace found an association between those interventions and improved resiliency, and task performance (Glomb, Duffy, Bono, & Yang, 2012). Further, previous research has found that mindfulness can lead to a decrease in burnout (Flook, Goldberg, Pinger, Bonus, & Davidson, 2013), a perceived decrease in stress (Roeser Schonert-Reichl, Jha, Cullen, Wallace, Wilensky, ...& Harrison, 2013; Trowbridge, Lawson, Andrews, Pecora, & Boyd, 2017; Dos Santos, Kozasa, Carmagnani, Tanaka, Lacerda, & Nogueira-Martins, 2016), work-family conflict (Allen & Kibutz, 2012), and negative moods (Roche & Haar 2014), as well as greater sleep quality (Hülshager, Lang, Depenbrock, Fehrmann, Zijlstra, & Alberts, 2014).

This chapter provides an overview of the concepts of stress, well-being, mindfulness, and employee well-being interventions such as the mindfulness-based stress reduction programme. We aim to explore how each of these concepts impacts employees as well as organisations.

Stress

Definitions of Stress

Linger (2016) states that stress is a widely used term to describe feelings of nervousness, uneasiness (discomfort), and anxiety, which are caused by various situations and settings. According to Hans Selye (1976), any animate object is constantly experiencing stress because it is the natural physiological response to any demand made upon the body, no matter if the stressor is real or imagined (Linger, 2016). As opposed to common beliefs, stress is not simply nervous tension or the result of damage but can be linked to our internal drives and thus, cannot be avoided (Selye, 1976).

Stress is the body's way of responding to a challenge and preparing to meet a demanding situation with strength, focus, fortitude, and increased alertness (Shilpashree & Sathish Kumar, 2011). The feeling of distress is a complex process that occurs when an individual considers their resources and abilities as insufficient in order to respond in a way they perceive is expected. Stress results from the perceived discrepancy between personal capabilities and necessary behaviour or response, rather than from the stressor itself (Berger, 1994). We all, therefore, experience stress at one point in time throughout our lives. Selye (1976) states that the best way to avoid harmful stress is to choose an environment that concurs with one's intrinsic preferences to decrease frustration and readaption, which are, according to him, major sources of distress. Berger (1994) states that stress can have a major influence on the quality of our daily lives. She claims that distress - meaning too much negative stress - is a common disease in industrialised nations. Distress can cause health issues and diminish life satisfaction in individuals. Despite this, a certain degree of stress is needed to achieve excitement and stimulation to get things done. To maintain an optimal level of stress, individuals need to be able to control the amount of stress they are

putting themselves under, as well as their response to it (Berger, 1994). Each individual has a different level of stress preference (Benson & Proctor, 1984). Where stress refers to a state, a stressor is the stimulus causing it (Shilpashree & Sathish Kumar, 2011).

Stress, and how well people cope with it, mediates physical and psychological well-being (Benson & Proctor, 1984) and, therefore, has a big impact on how people perform in their jobs and/ or at home. If an individual is consumed by stress, it is likely he or she shuts down emotionally, psychologically, and physically (Linger, 2016; Gauthier, Meyer, Grefe, & Gold, 2015). According to Shilpashree and Sathish Kumar (2011), acute stressors, such as receiving negative feedback for a task, affect an individual in the short term, whereas chronic stressors such as toxic leadership will affect an individual over a longer term. Stress covers a multitude of phenomena, ranging from mild irritation to severe dysfunction causing health issues (Shilpashree & Sathish Kumar, 2011). If one is unable to react to stressors in a way that is positive and effective, a loss of homeostasis, which is the loss of the body's internal balance, might be triggered and generate a general sense of 'dis-ease' (Linger, 2016).

Karasek developed the job demand-control-support model in the 1980s, which is a well-known model in the field of organisational psychology. This model functions with three main dimensions: job demands, job decision autonomy, and job social support. The idea behind the demand-control-support model is that it can predict mental strain resulting from the interaction of job demands and job decision-making autonomy. According to Karasek (1979), job strain is particularly caused by the combination of high job demands such as high workload and time pressure, and low job control, which is an individual's control over their tasks and the manner in which they are conducted during their workdays. According to this model, employees who have higher decision latitude on how to meet their job demands, are less likely to experience job strain (e.g. job-related anxiety, exhaustion, health-issues, or dissatisfaction). The model proposes that psychological stress does not result from one single aspect of the work environment but from the combined effects of the demands of a work situation and the range of freedom in decision-making given to the employee (Karasek, 1979).

The job-demand-resource model is another model of stress commonly used in organisational psychology. This model builds on Karasek's model of stress by investigating personal and organisational resources that may have a buffering effect on stress. In this model, factors associated with job stress are classified into two general categories, job demands, and job resources (Bakker, Van Veldhoven, & Xanthopoulou, 2010). Job demands are referring to physical, psychological, social, or organisational aspects of a job that take continuous physical or psychological effort or skills and can be related to numerous psychological and physiological costs such as high work pressure, or emotionally challenging interactions with clients. Although job demands are not necessarily negative, they might turn into job stressors when meeting those demands require high effort from which the employee has not sufficiently recovered from (Bakker et al., 2010). Job resources refer to those aspects that are of physical, psychological, social, or organisational nature. Job security, pay, and career opportunities can be seen as organisational resources. Team climate and supervisor and co-worker support are interpersonal and social resources. Optimism and personal control are psychological resources and work facilities and equipment and tools are physiological resources. Job resources are purposeful in reaching work goals by reducing job demands and the psychological and physiological costs associated with them and can inspire personal growth, learning, and development (Bakker et al., 2010). They play a major motivational role for employees as they can increase the likelihood of completing a task successfully and reaching work goals. This model proposes that job resources may buffer the impact of job demands on job strain such as burnout.

Lazarus and Folkman (1984) developed the interaction-oriented model of stress, a transactional model which is commonly used in mindfulness-based research studies and interventions. Lazarus and Folkman's definition of stress is that stress is a multifaceted phenomenon having a dynamic and interactive relationship between an individual and the environment, where the way an individual responds to stress affects the individual's environment and vice versa. Responses to events that happen in a person's physical, social, or psychological environment define the presence of stress, level of stress and amplitude of the stress they perceive to be there. In other words, a person mediates between

environmental stimuli and their response to these stimuli, yet at the same time, the physical, emotional, and psychological characteristics of a person may also have a significant effect on their environment (Lazarus & Folkman, 1984). Overcoming life circumstances that are stressful might heighten one's sense of personal mastery or efficiency and increase resilience. This could help to decrease negative outcomes or future stress (Cacioppo & Hawkley, 2003). All of the discussed models of stress in this study are multifaceted, therefore, stress is viewed as a multifaceted concept.

Stress in the Workplace

As demands in the workplace are increasing, feelings of an inability to cope can arise (Walach, Nord, Zier, Dietz-Waschkowski, Kersig, & Schüpbach, 2007). Evidence has shown that workplace stress can be linked to negative individual and organisational outcomes. Work stress can lead to feelings of overwhelming strain that expands beyond the workplace and can lead to family conflict and withdrawal from family involvement (Caulfield, Chang, Dollard, & Eishaug, 2004).

Because negative stressors can result from our expectations not meeting perceived situations and events, ever-changing workplaces are creating an opportunity for stress to arise and are known to decrease health and well-being (Linger, 2016). Continuously stressful situations in the workplace are likely to exhaust body, mind, and spirit and illnesses such as hypertension, depression and alienation are found to have a causal relationship to workplace stress (Adams, 1980). Linger (2016), suggests that we need to understand how negative stress affects our ability to think and work at optimal levels and how to make changes to shift from negative perceptions and management of stressful situations to a more positive orientation.

Knowledge about chronic diseases induced through long-term stress in the workplace is increasing. Stress in the workplace can also lead to inappropriate coping methods during leisure time (Walach, et al., 2007). Individuals who are highly distressed may engage in unhealthy coping mechanisms such as alcohol abuse (Crum, Muntaner, Eaton, & Anthony, 1995), smoking (Epstein & Perkins, 1988) or they may develop an eating-disorder (Troop, Holbrey, & Treasure, 1998).

Workplace stress has been linked to a decrease in both emotional and physical well-being (Murphy & Sauter, 2003). Employees who experience chronic stress can become psychologically impacted and develop psychological issues such as anxiety, depression, and/ or irritability (Tennant, 2001; Murphy & Sauter, 2003). Physiological issues resulting from stress include an increased risk of hypertension and coronary heart disease (Tennant, 2001; Murphy & Sauter, 2003). Stress can also result in behavioural issues such as poor work performance, work accidents (Murphy & Sauter, 2003; Fries, 2009), insomnia (Chrousos, 2009), and/ or substance abuse (Murphy, 1995).

Due to the effects of stress-related illnesses, individuals may have to take time off from work. This may result in increased absenteeism which can impact organisations negatively. Further, work stress can be linked to increased employee turnover as well as work injuries (Murphy & Sauter, 2003). Murphy and Sauter (2003) reported that a third of the US population is estimated to report high levels of stress in their workplace. Consequently, stress-related issues create high healthcare costs.

Coping with Stress

Kabat-Zinn (1990) emphasizes the importance of tuning into one's breathing as a technique of stress reduction. Attention to one's breathing is a central component in a variety of stress management techniques. Berger (1994) also found that individuals with positive self-concepts tend to experience less stress. This might be because individuals who possess a more positive self-concept, would be less likely to rate their talents and capabilities as insufficient when coping with a stressful situation (Berger, 1994).

Somatic techniques such as jogging and yoga focus directly on the body and are more effective at treating somatic stress symptoms such as tense muscles, heightened heart rate and lack of energy. Cognitive approaches have been found to be most effective in changing mental processes that result in cognitive symptoms such as anxiety, worry, insomnia, and negative self-talk. According to Berger (1994), cognitive stress management methods focus on quietening the mind to reduce conclusions that one's competencies are not sufficient to carry out

what is needed. Stress can be reduced by either changing the stressor (external focus) or by changing one's perception of a stressful situation (internal focus) (Fries, 2009).

Stress Intervention in the Workplace

Workplace interventions targeting work-stress can be grouped into three categories (Richardson & Rothstein, 2008). Primary interventions are designed to help employees with stress reduction by educating them about stress reduction techniques. In these interventions, the aim is to alter the amount of stress employees' experience. This can be achieved by building support groups, for example. Secondary interventions include stress management techniques and are aimed at reducing stress symptoms before they become more serious health issues (Murphy & Sauter, 2003). Methods include muscle relaxation, deep breathing and meditation exercises (Richardson & Rothstein, 2008). Tertiary interventions include employee assistance programmes in which employees are given the option to connect with mental health professionals. According to Richardson and Rothstein (2008), relaxation techniques are the most often used stress reduction methods.

Richardson and Rothstein (2008) conducted a meta-analysis exploring the effectiveness of stress management interventions in a workplace setting. A significant moderate effect size across all studies was found ($d = 0.526$, 95% CI = 0.364, 0.687). They found that relaxation interventions were the most frequently used (69%) within the 36 included studies. They anticipate that this was due to the simplicity and low-cost of this type of intervention, as they are often self-taught through audio-recordings. Cognitive-behavioural interventions, on the other hand, are often taught by a professional and in group settings and, therefore, require more organisational resources. Where relaxation interventions aim to draw attention away from sources causing distress, cognitive-behavioural interventions advocate a more proactive and reactive response to stress.

Conclusion

Stress cannot be avoided as it is the body's natural response to any demand made upon it. If a person is experiencing too much stress, negative emotional,

physiological and behavioural responses can occur. Stress in the workplace can be detrimental not only for the employee, but also for an organisation as a loss in productivity, increased absenteeism and turnover rates, workplace accidents, and consequently, high healthcare costs can arise. To tackle those issues, organisations started implementing employee well-being programmes in the 1970s to decrease stress levels and increase well-being in their employees.

Well-Being

Definitions of Well-Being

The traditional definition of well-being is that a person is viewed as psychologically well when he or she does not suffer from anxiety, depression, or another psychological dysfunction (Ryff, 1989). According to Ryff (1989), however, there is more to well-being than just the absence of disease. In her view, the key dimensions of well-being are self-acceptance, positive relationships with others, autonomy, environmental mastery, purpose in life, and personal growth. The World Health Organisation (n.d) defines well-being as a state of mental health in which every individual recognises his or her own potential, can cope with the normal stresses of life, can work productively, and is able to make a contribution to his or her community. Dodge, Daly, Huyton, and Sanders (2012) claim that the definition of well-being is still largely unresolved. However, despite the differences in approaches, most researchers now believe that well-being is a multi-dimensional concept and is seen as ‘positive functioning’ (Dodge et al., 2012). In Seligman’s (2002) view, the dimension of life-satisfaction is an indicator of well-being, which can be supported by the fact that the term ‘quality of life’ and ‘well-being’ have been used interchangeably in various fields of study (Dodge et al., 2012). Seligman’s (2002) theory of well-being, similar to Ryff’s (1989), focuses on concepts such as positive emotion, engagement, relationships, meaning, and accomplishment (PERMA). Furthermore, Marks and Shah (2004) describe well-being as something more than simply ‘being happy’. According to them, well-being results from developing as an individual, being fulfilled and making a contribution to the community in addition to feeling satisfied and happy.

Curran, Knapp and Beecham (2004) define the concept of well-being as comprising of various components such as life/ non-work-related satisfaction enjoyed by the individual, including satisfaction or dissatisfaction with social life, family life, hobbies and so on, and general health. They see health as a sub-component of well-being and include a combination of mental/ psychological indicators as an effect, for example, anxiety or frustration, and physiological/ physical indicators such as high blood pressure or heart conditions, as general physical health as an effect. Further, Curran et al. (2004) go on and define well-being as a two person-related concept. They believe that well-being can refer to the actual physical health of workers, defined by physical symptoms and public health rates of physical illness and disease, or it can also be referred to as the mental, psychological, and emotional aspects of employees, marked by emotional states and public health rates of mental illness and disease (Curran et al., 2004). This definition of employee well-being is lacking a more holistic approach as it does not take social aspects into account. In this study, well-being is viewed as a multi-faceted construct.

In their article, Dodge et al. (2002, p.230), define well-being as "the balance point between an individual's resource pool and the challenges faced". They say that a stable state of well-being can be achieved when individuals have the psychological, social, and physiological resources they need to conquer a psychological, social, or physiological challenge. Therefore, if individuals are faced with more challenges than resources, the balance is off and well-being decreases. Moreover, Reber (1995) describes well-being as a state that can be affected by life events and can therefore fluctuate.

Employee Well-being

Employee well-being can be broadly defined as the overall quality of an employee's experience and functioning in the workplace. It is made up of psychological, physical, and behavioural aspects (Ryan & Deci, 2001).

Irrespective of how well-being has been defined, organisational researchers have been long aware of the major costs that can be attributed to low well-being in both individual and financial terms (Wright et al., 2009). Depression, self-esteem, hypertension, alcoholism, and illicit drug use

correlate with dysfunctional well-being (Quick, Wright, Adkins, Nelson, & Quick, 2013). Recent research suggests that employee well-being can be associated with benefits for employees as well as organisations. Increased employee well-being can be related to increased organisational performance, decreased absenteeism, decreased turnover, and increased job performance (Danna & Griffin, 1999; Wright et al., 2009), decreased workplace accidents, and better physical health outcomes such as improved cardiovascular health, decreased obesity and better overall physiological health (Wright et al., 2009). In their article, Curran, Knapp and Beecham (2004) state that individual experiences at work, no matter if they are of a physical, emotional, mental or social nature, have an impact on the employee while they are in the workplace, but those experiences also trickle over into other life domains. The health and well-being of employees should be of more concern to employers because of the impact it has on workers and, consequently, the negative impact poor employee well-being has on organisations. Boyd (1997) found that employees experiencing poor health and well-being in the workplace may be less productive, make lower quality decisions, and are more likely to be absent from work. Consequently, it has been found that they make a consistently decreasing contribution to the organisation (Price & Hooijberg, 1992). In their article, Grawitch, Gottschalk, and Munz (2006) describe healthy workplaces as organisations that maximise the integration of employee goals for well-being and their own organisational goals for productivity and profit.

Organisations have introduced employee well-being interventions at organisational and individual levels in an effort to improve the safety and working conditions of employees in the workplace, lessen workplace related stressors and/or to improve an employee's stress coping mechanism (Curran et al, 2004). Poor employee well-being bears high occupational costs such as health insurance costs, costs of lost productivity and absenteeism, and cost of compensable lawsuits (Curran et al., 2004).

Well-being Programmes in Organisations

The workplace has been acknowledged as a key contributor to employee health and well-being (Dickson-Swift, Fox, Marshall, Welch, & Willis, 2014).

Therefore, it seems logical that organisations need to look after their employees. One way to do so is with the implementation of Employee Wellness Programmes. Employee Wellness Programmes (EWP) also known as Workplace Wellness Programmes, have been around since the 1970s. Despite differences in intervention type, organisations share a common goal of creating a more productive workforce and reducing healthcare costs for workers, the government, and taxpayers (Otenyo & Smith, 2017). They may also desire to improve internal characteristics such as employee morale and teamwork, and incentive structure. In general, EWPs have been found to increase employee fitness and reduce risk factors for workers' ill health (Gebhardt & Crump, 1990).

Studies have found that EWPs give good returns of investment (ROI) in the form of employee productivity and performance due to less absenteeism and better health (Berry, Mirabito, & Baun, 2010; Dickson-Swift et al., 2014; Otenyo & Smith, 2017; Regional Public Health, 2012). It has also been found that employees participating in EWPs show higher employee satisfaction, morale, and retention compared to nonparticipants. This could be due to a strengthening of organisational culture, employee pride and trust, and increased work commitment through participation in an EWP (Berry et al., 2010; Otenyo & Smith, 2017). Furthermore, studies have found that for every dollar spent on one employee in an EWP, six dollars were saved through a decrease in medical claim costs in the U.S. (Schaefer, 2015; Berry et al., 2010). Moreover, Baicker, Cutler, and Song (2010) found that medical costs fell by \$3.27 per dollar spent on an EWP and absenteeism costs linked to EWP decreased by \$2.75 per dollar spend on EWP in the U.S.

NZ Context

In New Zealand, healthcare costs have increased immensely in the past few decades. In 1950, there was an average spending of \$550 per person on health care, in 2009, individuals spent more than four times as much (\$2,870). There are various reasons for those rising healthcare costs, one of them being our ageing population. The thought behind this is that as we are getting older, we are more likely to need medical attention. Another reason is technological development and change as machines and techniques used in medical settings can be very

expensive. We also earn more than what we did 50 years ago, meaning that we are more likely to be able to afford to go and see a specialist. Another point raised in this article was that employees might have to undergo medical tests before commencing employment. All of these are possible causes of increased healthcare spending (The Treasury, 2010). Business NZ (n.d) undertook a survey in 2017 called *Wellness in the Workplace*. They found that in 2016, New Zealand had lost 6.6 million working days, causing a loss of \$1.5 billion to organisations, due to employee absenteeism. They also found that stress levels have increased when comparing the survey with the ones undertaken in previous years (2013 and 2015). Based on these findings, a link between employee age, recruitment strategies, salary, stress levels, healthcare costs, and absenteeism can be made.

Conclusion

There are various definitions of what constitutes well-being. In the past, it has been understood as the absence of disease (Ryff, 1989). Presently, well-being is understood to have multiple facets and includes domains such as personal growth, mastery, purposefulness, fulfilment, life-satisfaction, autonomy, and positive relationships with others. Although researchers have not settled for one definition, they agree that well-being is a multi-dimensional concept and is seen as ‘positive functioning’ (Dodge et al., 2012). In this thesis, well-being is considered a multi-faceted concept including the above-mentioned domains. Further, organisations should understand that employees with a high level of well-being have a lower turnover rate, higher productivity, and fewer medical costs (Otenyo & Smith, 2017). Since the 1970s, organisations have started implementing employee well-being programmes because there have been previous research findings that linked improved employee well-being to health care savings, reduced absenteeism and turnover rates, increased team morale, heightened work satisfaction, and increased productivity and performance (Berry et al., 2010; Otenyo & Smith, 2017). In addition, well-being programmes can boost teamwork and organisational trust, commitment, and loyalty (Berry et al., 2010). Previous research suggests that mindfulness practice has a strong impact on a range of well-being outcomes (Eberth & Sedlemeier, 2012) and can, therefore, be seen as a fitting intervention to target employee well-being.

Mindfulness

Definition of Mindfulness

The construct of mindfulness meditation can be traced back to Buddhist traditions (Bishop, Lau, Shapiro, Carlson, Anderson, Carmody, & Devins, 2004; Bishop, 2002). A classical Buddhist view of mindfulness includes clear-minded attention to, and awareness of, what is perceived in the present moment (Quaglia, Brown, Lindsay, Creswell, & Goodman, 2005). Good, Lyddy, Glomb, Bono, Brown, Duffy, and Lazar (2016), describe mindfulness as an internal state that is difficult to observe or describe, and no set definition has been agreed upon. They have used a definition of mindfulness as receptive attention to awareness of present events and experiences. Good et al. (2016) claim that mindfulness influences three clusters of outcomes: Performance, relationships with others, and well-being. Mindfulness appears to have widely positive impacts on human functioning such as attention, cognition, emotions, behaviour, and physiology. Mindfulness is both effortful and effortless. It requires focus and attention and at the same time, it requires letting go of judgment (Bain, 1995).

Mindfulness is not the opposite of evaluation or judgement, but it is rather a state of attentiveness that characterises mindfulness because evaluations, judgment, and associated memories can be closely attended to by a mind that is aware of what is occurring from moment to moment (Good et al., 2016).

Brown and Ryan (2003) describe mindfulness as a quality of consciousness that is characterised by clarity of current experiences and functioning and is, therefore, the contrary of mindlessness, which is the state of automatic and habitual functioning that is deep-seated in many people. They suggest that by adding clarity to experiences, mindfulness can directly contribute to well-being and happiness as well as assist with emotion- and self-regulation. Brown and Ryan (2003), describe mindfulness as an attribute that varies between and within individuals.

Mindfulness refers to the self-regulation of attention to the conscious awareness of one's immediate experiences, whilst adopting an attitude of curiosity, openness, and acceptance (Bishop et al., 2004).

Kabat-Zinn (1994) suggests that mindfulness arises from the development of three components. Firstly, one should set clear intentions as to why one is practising, for example, for self-regulation, self-exploration, or self-liberation. Secondly, one has to practice an attention characterized by the observation of one's moment-to-moment experiences - without interpretation, elaboration, or analysis. Lastly, a quality of attending, characterized by an attitude of acceptance, kindness, compassion, openness, patience, non-striving, and curiosity needs to be attempted in order to reach a state of mindfulness (Kabat-Zinn, 1994). Shapiro Carlson, Astin, and Freedman (2006) posit that mindfulness cultivated this way facilitates a fundamental shift in perspective called re-perceiving, a term that is synonymous with decentering, diffusion, and distracting.

Until recently, mindfulness has been largely unconsidered outside the field of philosophy and religious studies. Mindfulness has been written off as being too mystical or Zen-like to justify systematic scientific investigation (Dane, 2011). Confusion around the term mindfulness might have played a role in this because mindfulness and meditation are often used interchangeably. However, mindfulness can be seen as a psychological state, which does not require meditation. As mindfulness is a state and not a quality that some individuals have, and others do not (Dane, 2011), mindfulness can, in fact, be learned.

Kabat-Zinn (2003a) operationally defines mindfulness as awareness that emerges by paying attention on purpose to the present moment in a non-judgemental manner, observing the unfolding of experience in moment-to-moment awareness. He also states that mindfulness is a state of particular attention and awareness that can be cultivated through meditation. In his opinion, there is nothing particularly Buddhist about mindfulness as we are all mindful to some degree or another. According to the researcher, achieving a mindfulness state is within our nature and most individuals have been or at least can be, mindful at times. A common feature found within the cultivation of mindfulness includes the ability to learn that habitual, reactive patterns stem from unhelpful habits of the mind. Further, it takes the realisation that fear, denial, and discrepancy-based thinking create and exacerbate distress and that skilful ways of relating to experience can be developed through awareness and practice, which offer the potential for moments of freedom from reactivity (Gethin, 1998). Dane

(2011) claims that mindfulness is not simply an instant state of living in the present moment with the promise of reduced anxiety, depression, and increased performance and life satisfaction. He proposes that mindfulness is rather similar to an art form which an individual needs to develop over time and which can be enhanced through regular and disciplined practice on a daily basis in both formal and informal settings. Mindfulness seems to reflect a sort of metacognitive ability in which the participant gains the capacity to observe his or her mental processes and, therefore, allows practitioners to acknowledge and accept a situation for what it is (Marks, 1999).

Bishop (2002) describes mindfulness as the process of stepping back and observing the flow of consciousness, which is believed to result in the recognition of each thought and feeling reflected as a mental event with no added inherent value or importance other than what the practitioner grants them. This creates a shift in perspective from automatically accepting the validity or relevance of each thought, to the suspension of commitment to any one thought or perspective (Bishop, 2002). Therefore, thoughts are treated as potentialities pending further evidence. Similarly, when practising mindfulness, affect states, the state of feeling an emotion, are not inherently pleasant or unpleasant, they are simply observed as mental events. Mindfulness as a tool can help to regulate emotional reactions such as the feeling of distress in a situation that is perceived as overwhelming. When one is mindful, the ability to step back and detach from instant emotional reactivity to a situation is practiced. This diminishes the feeling of one's inability to cope with an event and one can observe the event in a non-judgmental manner before taking action rather than reacting in an emotionally driven way.

In recent years, the concept of mindfulness has become more and more popular amidst various professional fields including organisational leaders, psychologists, coaches, employees and consultants. The increase in interest is likely to stem from various findings pointing to physical and psychological benefits when practising mindfulness (Hyland, Lee, & Mills, 2015). For years, mindfulness techniques have been used to help clinical populations to cope with illnesses, including depression, anxiety, and chronic pain (Baer, 2003). More recently, mindfulness interventions have found their way into the workplace where links to improved social relationships, resiliency, and task performance

have been found (Glomb, Duffy, Bono, & Yang, 2012). By recognising the potential of mindfulness interventions, more and more organisations have started implementing them (Hyland et al., 2015).

There are various styles of meditation. In mindfulness meditation, for example, one is focusing attention on the experience of thoughts, emotions, and bodily sensations, and simply observing them as they arise and fade away (Hölzel, Lazar, Gard, Schuman-Olivier, Vago, & Ott, 2011). Thus, mindfulness meditation includes various aspects of attention, for instance, the ability to focus and sustain one's attention, and have a reduced proneness to distraction (Moore & Malinowski, 2009).

Impact of Mindfulness and Human Functioning

Mindfulness techniques have been successful in the treatment of disorders and improvements of health (Hölzel et al, 2011). Mindfulness has also been shown to generate positive effects on psychological well-being of healthy individuals (Carmody & Bear, 2008) as well as improve cognitive functioning (Ortner, Kilner, & Zelazo, 2007). Emerging research shows that enhanced functioning may mediate diverse workplace outcomes (Mrazek, Franklin, Philips, Baird, & Schooler, 2013).

Mindfulness has been found to affect human functioning largely through attention, which in turn, alters other domains of basic functioning. Mindfulness has shown to improve three qualities of attention: stability (Mrazek et al., 2013), control (Ocasio, 2011), and efficiency (Van den Hurk, Giommi, Gielen, Speckens, & Barendregt, 2010). The mind is estimated to wander half its waking hours, but mindfulness can help stabilize attention of the mind. Even a small amount of mindfulness training has been associated with reduced mind wandering (Mrazek et al., 2013). Individuals who completed mindfulness training were shown to remain attentive for a longer period of time on both visual (MacLean et al. 2010) and audio tasks (Lutz, Slagter, Rawlings, Francis, Greischar, & Davidson, 2009). Experienced meditators also show reduced activation of the neural network indicative of mind wandering (Brewer, Worhunsky, Gray, Tang, Weber, & Kober, 2011) as well as brain activity patterns consistent with sustained attention (Pagnoni, 2012). Increased attentional stability might be due to increased noticing

when the mind wanders and then bringing it back to the present-moment focus, which is a core feature of mindfulness that shows control over one's attention (Hasenkamp, Wilson-Mendenhall, Duncan, & Barsalou, 2012). Studies have shown that meditators are less distractible in nature, even when distraction is of an emotional nature (Allen, Dietz, Blair, Van Beek, Rees, Vestergaard-Poulsen, Lutz, & Roepstorff, 2012).

Mindfulness supports attentional efficiency in the way of economical use of cognitive resources (Neubauer & Fink 2009). When mindfulness increases attentional control and decreases distraction to off-task activities or thoughts, attentional efficiency increases (Good et al., 2016). Furthermore, people that meditate regularly feel that it takes less effort to pay attention (Tang, Hölzel, & Posner, 2015).

Mindfulness in the Workplace

Weick and Roberts (1993) introduced mindfulness into the management literature with concepts that are different from the Buddhist understanding. Their understanding of mindfulness is cognitive flexibility and attention to novelty. For the majority of us, work plays a major role in our lives as we spend most of our waking hours at work. According to Trunnell and Braza (1995), we often spend more time and energy in our relationships with many of our co-workers than we do with our immediate families. Our identities as individuals have become increasingly related to what we do rather than who we are. This increased emphasis on time and energy spent at work is reflected physically, socially, and psychologically (Trunnell & Braza, 1995). Evidence suggests that mindfulness contributes to an increase in physical and mental health, interpersonal relationships, and behavioural regulation (Brown, Ryan, & Creswell, 2007).

Hülshager, Feinholdt, and Nübold (2015) report that theoretical and empirical research on mindfulness has found that mindfulness-based practices enhance self-regulation that guide psychological, behavioural, and physiological reactions. Through this self-regulation process, mindfulness interventions have the potential to aid in the process of successfully unwinding from demands of work and advocate recovery in terms of psychological detachment and sleep quality, which in turn can be linked to well-being (Hülshager et al., 2015). Some argue

that mindfulness provides superior self-regulation, which shapes workplace functioning (Glomb et al., 2011). Mindfulness has also been linked to decreased levels of reported burnout (Flook, Goldberg, Pinger, Bonus, & Davidson, 2013), perceived stress (Roeser Schonert-Reichl, Jha, Cullen, Wallace, Wilensky, ...& Harrison, 2013; Trowbridge, Lawson, Andrews, Pecora, & Boyd, 2017; Dos Santos, Kozasa, Carmagnani, Tanaka, Lacerda, & Nogueira-Martins, 2016), work-family conflict (Allen & Kibutz, 2012), and negative moods (Roche & Haar 2014) as well as greater sleep quality (Hülshager, Lang, Depenbrock, Fehrmann, Zijlstra, & Alberts, 2014).

Mindfulness interventions differ in the way they are carried out. They may be implemented face-to-face or online, and the population can be either clinical or non-clinical in nature (Janssen, Heerkens, Kuijer, Van der Heijden, & Engels, 2018). As pointed out by Hyland, Lee, and Mills (2015), the most prominent effect of mindfulness is a significant decrease in experienced stress levels, and one of the most popular mindfulness interventions is mindfulness-based stress reduction (MBSR) designed by Jon Kabat-Zinn in 1979 (Kabat-Zinn, 2003a). Until recently, most mindfulness interventions in the workplace were customised MBSR programmes (Hyland et al., 2015) as they adapted their format and content from the traditional MBSR. For example, some interventions have been modified into shorter classes lasting 60 to 90 minutes instead of the traditional 2.5 hours and daily home practice was reduced to 10 to 15 minutes a day instead of 45 minutes of daily practice. Courses vary in length from 1 day to 12 weeks (Hyland et al., 2015). Furthermore, mindfulness interventions can be conveyed in a variety of formats such as online, over the phone, or face-to-face, which can make the programme more readily accessible.

Mindfulness-Based Interventions

Mindfulness-based programmes (MBP) are part of the third wave of empirically tested psychotherapies (the first wave are behavioural therapies; the second wave are cognitive therapies). Third wave approaches have a decreased emphasis on controlling internal experiences and an increased emphasis on themes such as acceptance, metacognition, and how individuals relate to their experiences. A distinctive characteristic of MBP is that the systematic and sustained training in

formal and informal mindfulness meditation practices (for both teacher and participant) is central to both the therapeutic approach and underpinning the theoretical model, as they are both based on mindfulness. MBPs also have a pedagogic component. Second-generation mindfulness-based interventions, which are traditionally openly spiritual in nature, make the linkage to Buddhist teachings explicit within the pedagogy and are more traditional in the manner in which they construct and teach mindfulness (Van Gordon, Shonin, & Griffith, 2015). Today, MBPs draw some aspects from Buddhism but aim to clearly re-contextualise both the programme content and theoretical underpinnings within the mainstream society. It is aimed to base the programme in science and contemporary approaches to managing mental and physical health and supporting well-being. This is so they are suitable for delivery to mainstream public institutions across a variety of cultures and settings as well as diverse values and religious affiliations (Van Gordon et al., 2015). MBPs seek to support the ability for individuals to meet experiences with curiosity, composure, and compassion (Feldman & Kuyken, 2011).

MBPs were specifically designed to manage dysfunctions such as stress and depression. Their designs have been informed by theories, traditions, science, and the major disciplines of medicine, psychology, and education (Gethin, 1998). The key influences that have shaped MBPs are contemplative mindfulness practices, which are based on theories about the human mind-body taken from aspects of early Buddhist psychology. This articulates the ways in which individuals can come to recognize universal habitual patterns that create and maintain distress. MBPs draw on aspects of traditions while leaving behind their religious, esoteric, and mystical elements. Science has been a key element in the development of MBPs due to the fact that the development of MBPs is grounded in developments, in theory, cognitive neuroscience (Tang et al., 2015), translational research (Strauman & Merrill, 2004), and evidence-based practice across a range of disciplines. Another key component is medicine, as MBPs were originally developed within a medical framework and culture as a form of participatory medicine in which patients are challenged to discover and draw upon their own resources of learning, healing and transformation (Kabat-Zinn, 2003b).

Psychology is a further key component in the design of MBPs, specifically, the field of cognitive psychology, which has been investigating into the specific process through which MBP's reduce stress and foster individual growth (Segal, Williams, & Teasdale, 2013). The last key component is education. The pedagogical process in MBP is taken from educational principles that are experiential, interactive, participatory, student – centred, and relationship-centred (Santorelli, 2000).

MBPs typically include mindfulness training through three formal mindfulness practices: the body scan, mindful movement, and sitting meditation (Crane, Brewer, Feldman, Kabat-Zinn, Santorelli, Williams, & Kuyken. 2017). MBPs are often delivered in a group context but can be adapted to suit specific contexts or a target population.

Mindfulness practices can include a focus on attention (e.g. focusing on the breath), and/or a focus that allows for open monitoring of various sensory stimuli e.g. mindful movement or yoga (Good et al., 2016). Mindfulness meditation involves sitting quietly and is mainly characterized by observing one's experiences without judging or modifying them (Bishop et al., 2004). Often, these practices are combined into training programmes such as the well-validated mindfulness-based stress reduction programme (MBSR) (Kabat-Zinn, 2003a).

Mindfulness-Based Stress Reduction Intervention

Jon Kabat-Zinn created the mindfulness-based reduction programme in 1979 and went on to establish the Stress Reduction Clinic and the Center for Mindfulness in Medicine, Health Care, and Society at the University of Massachusetts Medical School. His idea behind MBSR was to integrate mindfulness within clinical mainstream medicine and psychology. MBSR was developed as an educational and training tool for people suffering from increasing demands linked to psychological and emotional stress, and to learn how to relate in new ways to life challenges (Kabat-Zinn, 1990). MBSR can be seen as a vessel for seamless integration of Eastern meditative dharma practice (Buddhist teachings) and perspectives within a Western framework of behavioural interventions. MBSR falls under the cognitive technique of stress management. Meditation reduces

autonomic functions such as reduced oxygen consumption, slower respiration, decreased heart rate, lower blood pressure, and responsiveness of the sympathetic nervous system (Feuerstein, Labbé, & Kuczmierczyk, 2013). A study by Walach et al. (2007), found most participants reported changes in the way they coped with stress after participating in an MBSR programme. Individuals reported that they felt that they were able to deal with stress in a more 'mindful' way and therefore would not experience immediate panic.

Two primary intentions stood behind the development of MBSR in 1979 (Kabat-Zinn, 2003b). Firstly, Kabat-Zinn aimed to provide a tool for individuals that are clinically ill. He wanted them to become trained in mindfulness meditation and learn how to immediately apply the technique in their lives to support stress- and pain-management and help to combat their illnesses. This intervention was not designed with the aim to turn individuals to Buddhism or to create 'expert' meditators. The intervention had to be free of cultural, religious, and ideological factors associated with the Buddhist teachings of mindfulness. Kabat-Zinn (2003a) was simply trying to offer new and possibly effective ways for facing, exploring and relieving suffering at the levels of both body and mind. Further, he hoped individuals would understand the potential power in the mind-body connection by doing so, through MBSR. MBSR was designed to teach individuals to take responsibility for their own well-being and participate more fully in their movement towards an increased level of health by developing and promoting a deeper sense of interconnectedness between body and mind (Kabat-Zinn, 2003b).

The second intention of the programme was to use MBSR as a model that can be adjusted to be used in different settings and contexts, for example, schools, workplaces, prisons, and others (Kabat-Zinn, 2003b). MBSR has also given rise to other mindfulness-based interventions such as mindfulness-based cognitive therapy (MBCT), which is combining MBSR with cognitive therapy and has been found to be effective for relapse prevention in chronic depression (Kabat-Zinn, 1990). MBSR is an eight-week programme of intensive mindfulness training (moment-to-moment awareness) and its integration into everyday life.

Outline of MBSR

Mindfulness-based stress reduction interventions traditionally run over an eight-week period (Figure 1). They include one full-day retreat and weekly 2.3-3.5-hour group meetings. CD's or Mp3 downloads are provided to guide daily mindfulness meditation and yoga practice. Moreover, a home manual and weekly hand-outs, which can be in the form of email or on an online platform, outlining each weeks' formal and informal practices are provided.

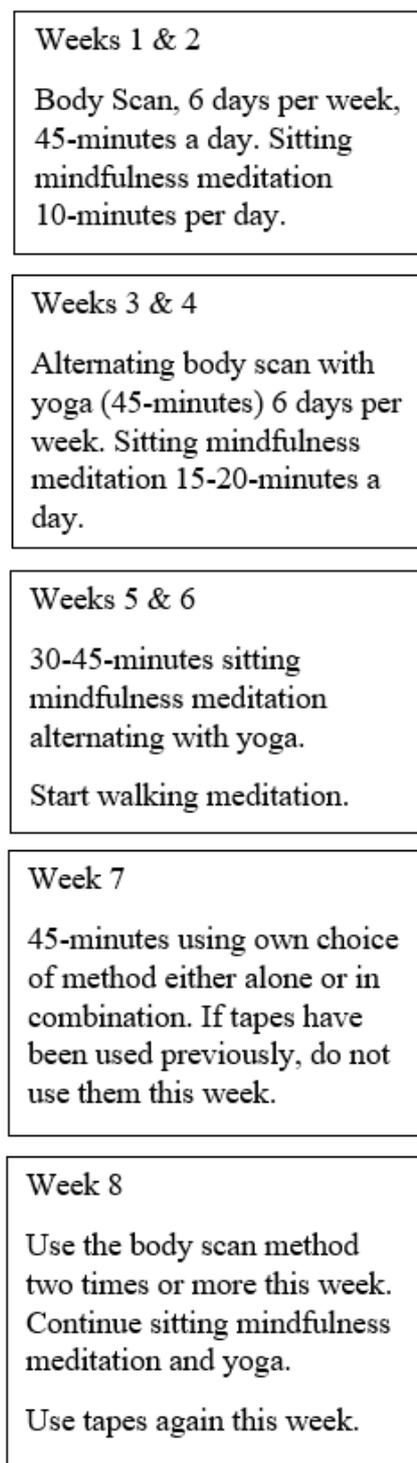


Figure 1. Flowchart of a traditional MBSR programme

Traditional MBSR (tMBSR), modified MBSR (mMBSR) and compressed MBSR (cMBSR)

Above, a traditional MBSR (tMBSR) intervention is outlined (Figure 1). Due to various modifications that have been made over the years to fit different audiences

and environments, MBSR has been grouped into three categories for the purpose of this meta-analytic study. Modified MBSR (mMBSR) refers to an intervention that is similar in length but might not have all the components of a tMBSR. These often included less daily practice (e.g. 30-minutes compared to 45-minutes), no workbook or CDs and face-to-face interactions are reduced in time (e.g. weekly 2-hr meetings). The face-to-face interaction has also been replaced with online teaching in some studies using mMBSR. Compressed MBSR (cMBSR) are also modified forms of tMBSR consisting of a shortened version of the traditional intervention. They included shorter time frames of intervention implementation (e.g. 2-weeks instead of 8-weeks), less daily practice (e.g. 15-minutes instead of 45-minutes) and less overall interaction with instructors or other group members than tMBSR or mMBSR. This meta-analysis considers and compares all three types of MBSR.

MBSR Benefits to Organisations

A low-cost on-site stress reduction programme that shifts deep-seated perspectives on stress by increasing a mindful approach to life can be beneficial for both employer and employee. MBSR is a culture free and adaptable intervention that has been based on well-established concepts and has been around for over three decades (Kabat-Zinn, 2003a).

Various meta-analyses on MBSR have found the effects of reduced stress in healthy and/or working adults (Virgili, 2015; Eberth & Sedelmeier, 2012; Khoury et al., 2013; Chiesa & Serretti, 2009). A meta-analysis by Eberth and Sedelmeier (2012), discovered that mindfulness-based programmes including a meditation component were found to have a stronger effect on well-being than those that did not include meditation. In their study, Khoury et al. (2013) found that mindfulness-based interventions were not only reducing psychological distress and anxiety, but also improving well-being. Moreover, Chiesa and Serretti (2009) discovered that MBSR was able to reduce ruminative thinking and trait anxiety, as well as increase empathy and self-compassion, in healthy individuals.

Conclusion

The concept of mindfulness has been around for a long time. Traditionally, it can be traced back to Buddhist traditions (Bishop et al., 2004) where it was understood as clear-minded attention and awareness of what is occurring at a given moment (Quaglia et al., 2005). Due to findings indicating physical and physiological benefits of mindfulness (Hyland et al., 2015), mindfulness has more recently been introduced to various settings such as medicine, psychology, education, and organisations (Baer, 2003; Glomb et al., 2012).

Employees, as well as organisations, can profit from participating in a mindfulness-based intervention as they are found to increase physical and mental health, interpersonal relationships and behaviour regulation (Brown et al., 2007). Furthermore, decreases in stress levels (Roeser et al., 2013; Trowbridge et al., 2017; Dos Santos et al., 2016), decreased work-family-conflict (Allen & Kibutz, 2012), decreased negative moods (Roche & Haar, 2014), and improved sleep quality (Hülshager et al., 2014) can result from mindfulness practice. Additionally, mindfulness has also been linked to improved attentional qualities (Mrazek et al., 2013; Ocasio, 2011; Van den Hurk et al., 2010). These qualities can help employees to flourish in their jobs, increase workplace productivity, decrease absenteeism, and improve overall health of individuals (Berry et al., 2010; Dickson-Swift et al., 2014; Otenyo & Smith, 2017).

Due to previous findings on mindfulness-based interventions in the workplace pointing beneficial outcomes for employees as well as organisations, a meta-analysis on mindfulness-based stress reduction, created by Jon Kabat-Zinn in the 1970s, on the outcome of employee stress and well-being has been carried out. Further, due to modifications of the intervention, several analyses have been carried out to determine which type of intervention is the most effective in terms of stress reduction. The next chapters will outline the methods and results followed by a discussion about the implication of these findings, the limitations of this study and future research suggestions.

Chapter 2: Methodology

The Objective of a Meta-Analysis

In a meta-analysis, the researcher can investigate potential moderating effects in an intervention to determine whether the intervention is more or less effective with different kinds of intervention samples, in different doses and circumstances. This can be done by analysing between-study differences in samples and intervention components. The advantages of a systematic review and meta-analysis are that they can overcome limitations that are inherent in traditional narrative summaries of research (Littell, Corcoran, & Pillai, 2008). A major limitation of narrative review is the sole focus on *p*-values, looking at them separately in each study and making conclusions about an intervention's effectiveness based on the statistical significance of the *p*-value. A meta-analysis, on the other hand, allows a researcher to combine the effects of studies and evaluate the statistical significance of the summary effect. The consistency of effect size is an important factor when carrying out a meta-analytic study. If the effect size is consistent, we can focus on the summary effect and note that this effect is robust across studies included in the meta-analysis. If the effect size between studies varies modestly, the summary effect may still be reported, however, it must be noted that the true effect size in any given study may be somewhat higher or lower than this value. If effect sizes vary substantially among studies, dispersion itself, rather than effect size should be reported (Borenstein, Hedges, Higgins, & Rothstein, 2011).

Sample size and study design also have an impact on the precision of effect size estimates in meta-analyses. Larger samples generate a more precise estimate than small samples do. In a meta-analysis, we can assess the dispersion, meaning the scatter, of effects and differentiate between real dispersion and spurious dispersion. Moreover, there is no technical barrier to using different study designs such as independent groups (control/ intervention) and one-group pre-and post-data. One, however, has to be careful in examining that the studies do not differ in substantial ways, meaning that although intervention design and sample population can differ, they should measure the same variables in a fashion that shares the same fundamental concepts. For example, this study examines the

effect size of various types of MBSR interventions, all of which share the same philosophy.

To find studies that measure the same effects within the same target population, robust inclusion/ exclusion criterion have been used (Borenstein et al., 2011). In a meta-analysis, effect sizes are pooled across various studies, producing an outcome that is statistically more powerful than any stand-alone study (Lipsey & Wilson 2001).

Meta-analyses are carried out to assess the strength of evidence of a treatment or intervention that is currently known. Outcomes from a meta-analysis may include a more accurate estimate of the effect of an intervention or risk factor of a disease, than any stand-alone study contributing to the pooled analysis. The results of a meta-analysis can inform future evidence-based decision on whether an intervention or treatment works, or not (Haidich, 2010).

Critique of Meta-Analytic Methods

One common criticism of meta-analysis is that there is too much focus on the summary effect and not enough on the fact that intervention effects may differ from one study to another. If a meta-analysis is carried out properly however, a synthesised effect, which means the combination of several studies and their effects, is aimed for. Researchers need to keep in mind the dispersion of studies and report on heterogeneity, a measure of how much the sample and results differ from each other, not only the summary effect size. In this study, dispersion and heterogeneity were assessed. The interpretation of their outcomes is expanded upon in the result section of this study.

A concern when using a meta-analytic method is that if a biased sample of studies were included, the synthesized effect size computed through a meta-analysis would also be biased. This is a warranted argument because published studies are more likely to have a significant outcome than grey literature. It is important to include unpublished studies, such as dissertations, in systematic reviews, as significant research outcomes could be missed in a meta-analysis because of selective publication. If there is a discrepancy between the missing data outcomes (unpublished studies) and the published studies, the meta-analysis

will be biased with a false appraisal of the intervention effect (Schmucker, Blümle, Schell, Schwarzer, Oeller, Cabrera, ... & Meerpohl, 2017). To decrease this bias, dissertations and other grey literature should be included in a meta-analysis and tests on publication bias should be carried out. In this study, we have included dissertations in order to address publication bias. Further, funnel plots, as well as fail-safe tests, have been conducted to investigate bias, those tests are further explained in the result section. One should be aware that publication bias is an issue in narrative as well as systematic reviews.

Keyword Selection

The most suitable keywords to search for interventional studies examining the effects of employee stress and well-being in an MBSR programme were:

“Mindfulness-based stress reduction” AND “workplace AND “stress” AND “(well-being OR wellbeing)”*.

The decision to include both terms, “wellbeing”¹ and “well-being” was made due to the fact that they are uniformly used in literature. The following flowchart (Figure 2) portrays the process of the systematic review that has been undertaken in this study. There were no initial inclusion/ exclusion criteria applied.

¹ commonly spelled in literature written in American English

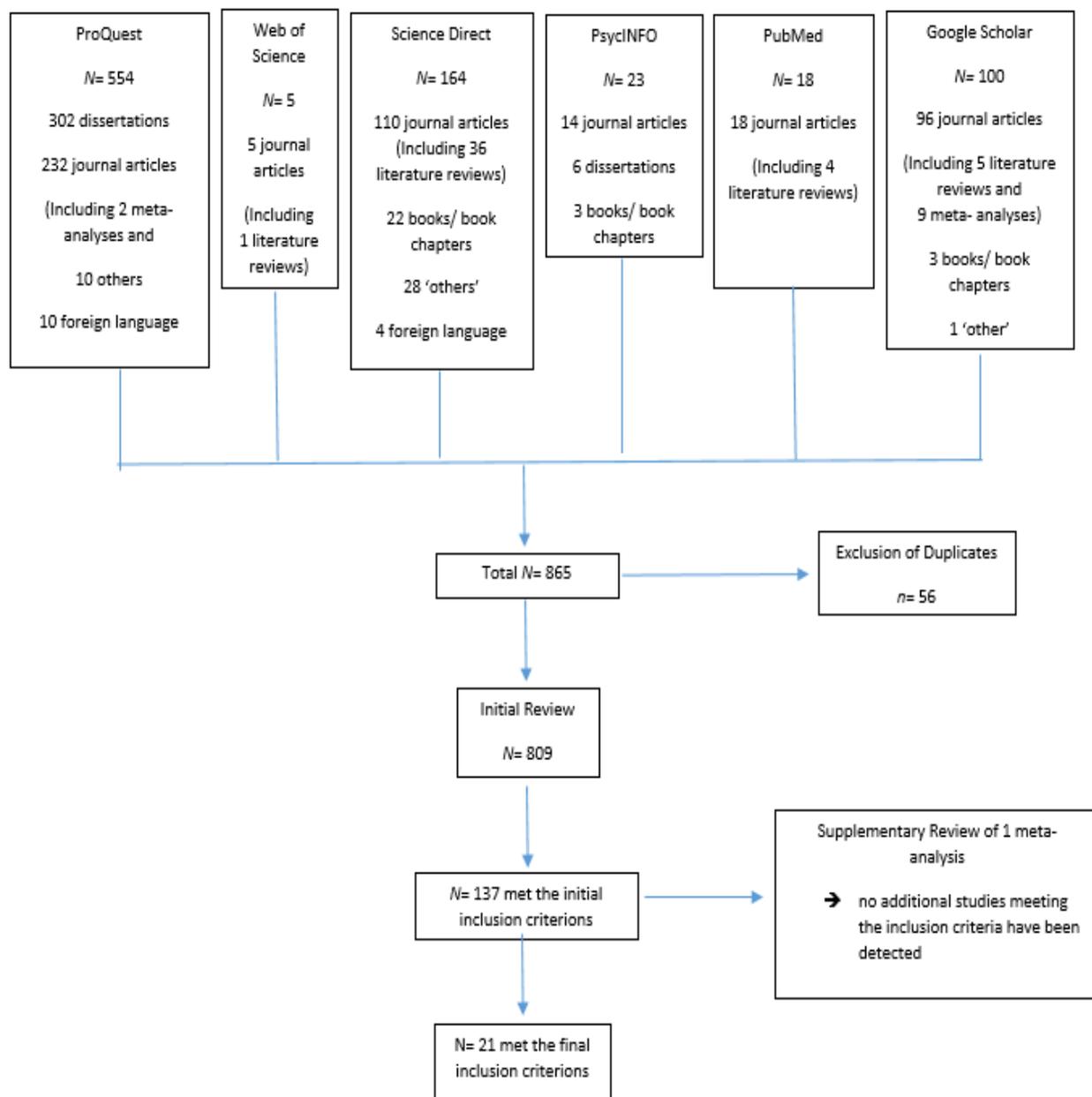


Figure 2. Review process flow diagram

Databases

A search for these keywords has been conducted using five databases and Google Scholar.

ProQuest Social Science, was chosen as a database due to its clearly defined sources of vocational information on social science and psychological topics. An initial search resulted in a total of 554 articles. Out of these 554, 302 were

dissertations, 232 journal articles, 10 written in a foreign language, and 10 were from 'other' sources such as newspapers, blogs, or trade journals.

PsycINFO was chosen due to its international coverage of psychology and related disciplines. This database is frequently updated and has global coverage of more than 50 countries. The initial search with the above key terms brought up 23 hits, 14 of these were journals articles, six were dissertations, and three were books or book chapters.

Web of Science Core Collection was used as this database stores over 12'000 articles across the domains of science, social sciences, arts and, arts, and humanities. The initial review on this database presented five papers, including one literature review and four journal articles.

PubMed Central has been chosen to be used due to its coverage and availability of life science articles. The results show 18 matches, four of which were literature reviews and 14 were journal articles.

Science Direct (Elsevier) was chosen due to its large collection of social sciences and humanities journals. The initial search resulted in 164 hits, 74 of which were journal articles (including 36 reviews), 22 were books, 28 were others (abstracts, discussions, short communications etc.), and four were not in English.

Although it is not technically a database, **Google Scholar** was used. The search engine allows one to search interdisciplinary scholarly literature, including published journal articles, as well as university dissertations and other grey literature. Google Scholar was also used to cover 'all bases' and see if there was any relevant literature that the other databases did not include. The same keywords as for the other five databases were used and brought up 6'480 results. The 'sort by relevance' setting was used to display results and only the first 100 results were considered for further examination. Nine of these were meta-analyses, 70 were journal articles, five were literature reviews, three were books and one was a course design.

Criteria for Considering Studies in this Review

To be considered eligible for this meta-analytic study, research had to meet several inclusion criteria. Potential studies were reviewed in two parts. The initial inclusion of studies was made after reviewing abstracts and titles for keywords such as mindfulness, well-being, stress, workplace, and employee. After the initial review and inclusion of studies that have met of the criteria, a second, and final review was carried out where studies were read in their entirety. No publication year or country was imposed. The inclusion and exclusion criteria are outlined below.

Initial Review of Exclusion Criteria

In the initial stage, 865 studies were reviewed. Studies were excluded if they met any of the following criteria:

1. Were duplicate articles/ dissertations.
2. Were poster/ abstract only and index only publications.
3. Were books or book chapters.
4. No access or full article was not provided.
5. The article was written in a foreign language.
6. The study had a title that was irrelevant and pointing to a completely different field of study.
7. None of the keywords were present in the abstract or title.
8. The population sample was under 18 years of age.
9. The sample had mental health issues or chronic pain diagnosis.
10. The study was published in a non-standard format such as a poster or a conference abstract, and not suitable for review.
11. Used qualitative outcome measures.

Initial Review of Inclusion Criteria

1. Published in English.
2. Sample population of adults (18+ years).
3. Sample of healthy and employed individuals.
4. Mindfulness-based intervention.

5. Quantitative outcome measures.
6. Unpublished material was included, aiming to reduce selective reporting bias.

The reference list of one meta-analysis was checked for relevant studies, however, none were found to meet the inclusion criteria for this study. By the end of the first review, 131 out of 865 studies were included.

Final Review of Exclusion Criteria

At this stage, included studies ($n= 131$) were read fully. Studies were excluded if they met any of the following criteria:

1. The sample was unemployed, students, minors or clinically ill.
2. The intervention was not a mindfulness-based stress reduction intervention but another stress reduction or mindfulness intervention.
3. The article does not discuss the outcomes that are of interest to this research (stress and/or well-being).
4. The outcome measure was of a qualitative nature.
5. Only one time-point measurement was included.

Final Review of Inclusion Criteria

1. Studies were eligible if they assessed perceived stress reduction and/ or changes in overall well-being within the setting of a mindfulness-based stress reduction (MBSR) intervention or a slightly abbreviated version of MBSR.
2. Interventions that have been altered from the traditional MBSR approach have been included as long as they were heavily based on the MBSR approach.
3. Outcome measures were quantitative.
4. Outcomes were measured using standardised instruments.
5. Participants were of the working population, 18 years and older, and not clinically ill.
6. Stress and/ or well-being was measured at baseline and post-intervention.

Data Set

A literature search in five databases and in Google Scholar was undertaken between September and October 2018 and has resulted in the inclusion of 21 studies of which six were dissertations, and 15 were journal articles. One article (Goodman & Schorling, 2012) included two separate samples which were computed as two separate study samples in the meta-analyses, leading to a total of 22 independent samples.

Most studies did not have a control group ($n= 16$), for those studies, pre- and post-mean values, as well as sample size, p -or t -value, and effect size direction, were entered into the Comprehensive Meta-Analysis software (CMA) used to run the meta-analysis.

When a study included a control and an intervention group ($n= 5$), the post-mean measure, the sample size for each (intervention and control group), as well as either a t -or a p -value, which is the value of the in-between group difference, were entered into CMA. The p -values were entered as 2-tailed unless otherwise specified. P -values published as $<.05$ or $<.001$ were reported as $.05$ or $.001$.

Quantitative Measures

Selected studies used different instruments to measure well-being and stress. Outlined below is a more detailed description of each measurement included in this analysis.

Measures of Stress

Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983)

The Perceived Stress Scale (PSS) is one of the most widely used psychological measurement of perceived stress (Linger, 2016). The scale was designed by Cohen, Kamarck and Mermelstein (1983) and is a 14-item self-report questionnaire (0-4 Likert scale) which assesses the degree to which a situation in one's life is perceived as stressful. Questions like: "In the last month, how often have you felt nervous and "stressed"? "are asked. The scale is said to be quick and

easy to administer as well as score and was designed to use on the general population rather than specific sub-groups (Cohen, Kamarck, & Mermelstein, 1983).

A short version of the scale called PSS-10 including 10-items was used in one of the studies (Irving, 2011). High scores on PSS indicate higher levels of stress. A score of 20 or above indicates stress.

Maslach Burnout Scale (MBI) (Maslach & Jackson, 1981)

The Maslach Burnout Scale (MBI) was designed in 1981 by Christina Maslach and Susan Jackson. The scale was initially designed for professionals working in the human service industry (MBI-HSS) such as nurses, physicians and others and was developed into various versions to suit different working sectors (MBI-Educator Scale (ES), MBI-General Scale (GS)). Maslach and Jackson (1981) discovered three key domains comprising burnout which are emotional exhaustion (EE), characterising the basic individual stress dimension of burnout and referring to feelings of exhaustion and depletion of one's emotional and physical resources. Depersonalisation (D), referring to interpersonal distancing, this occurs when individuals experience a negative, indifferent, or largely detached response to numerous aspects of the job. Thirdly, personal accomplishment (PA), this domain refers to an individual's self-evaluation of their ability to do their job.

The original MBI-HSS consists of 22-items rated on a 6-point Likert scale. The MBI-ES (Educator Survey) used for teachers, administrators and other staff members within an educational setting is almost identical to the MBI-HSS with the exception of changing the word 'recipient' to 'student'. The MBI-GS is shorter with only 16-items. Individuals scoring 17 and above in the EE scale experience moderate to high emotional exhaustion.

Emotional exhaustion investigates the depletion of emotional energy, distinct from physical or mental fatigue. Emotional exhaustion is a clear sign of distress in emotionally demanding work. The EE scale includes questions such as "I feel emotionally drained from my work".

EE measures basic individual distress and therefore has been selected as a stress outcome measure, rather than a composite burnout score for two reasons.

First, the research question focuses on the outcomes of stress reduction as opposed to burnout. Second, according to Golembiewski and Munzenrider (1981), the three dimensions are well distinguished and should not be combined due to different treatment approaches that could be applied.

Depression Anxiety Stress Scales (DASS) (Lovibond & Lovibond, 1995)

The DASS is a self-report questionnaire initially designed with 42-items across the three dimensions of depression, anxiety, and stress. The measure is also available in a short form of 21-items (DASS-21) and can be used in a non-clinical population. The depression dimension includes items on self-esteem, motivation, and expectation of achieving life goals for oneself. The anxiety dimension measures the state of anxiety and response to fear on a somatic as well as subjective symptom level. The stress scale measures a state of persistent arousal and tension (Lovibond, & Lovibond, 1995). For this analysis, only the subscale of stress was included, as according to Lovibond and Lovibond (1995), each subscale contains a coherent set of symptoms that can be differentiated from each other, therefore, DASS subscales should not be combined. This subscale has 14-items with questions such as “I find it difficult to relax” and is measured on a 4-point Likert-scale. A score of 19 and above indicates stress.

General Health Questionnaire (GHQ) (Goldberg, 1978)

The General Health Questionnaire (GHQ) was developed by Goldberg in 1978. Traditionally, the GHQ has 28-items scored on a 4-point Likert scale. Since its development, it has been modified into various versions such as the GHQ-12 (12-item). The questionnaire is aimed to measure emotional distress in the general population with questions such as ‘Have you recently been feeling run down or out of sorts?’. The overall score is out of 28 while a score of more than four is an indication of distress.

Measures of Well-Being

Subjective Psychological Well-Being Scale (SPWB) (Ryff, 1989)

Ryff’s Subjective Psychological Well-being scale (SPWB) (1989) measures well-

being on 54-items across a 6-point Likert scale. The SPWB is one of the most widely used tools to measure subjective wellness (Irwin, 2011). The scale looks at six dimensions of psychological well-being, each of those constructs point to different aspects of positive functioning. The six domains are: Self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth and a total score of these domains was included. Higher scores indicate greater subjective well-being. Questions such as “I lead a purposeful and meaningful life” are asked.

Satisfaction with Life Scale (SWLS) (Diener, Emmons, Larsen, & Griffin, 1985)

Diener, Emmons, Larsen, & Griffin developed the Satisfaction with Life Scale (SWLS) in 1985. It is a short 5-item instrument measuring overall life satisfaction rather than satisfaction within specific domains in the general population on a 7-point Likert scale. Questions such as “I am satisfied with my life” are asked. The scale was designed around the idea that the respondent needed to be asked for an overall judgment on their life to measure life satisfaction (Diener et al., 1985). A score of 25 and above indicates satisfaction with life.

Short Form Health Survey (SF-36 and SF-12v2) (Ware, Snow, & Kosinski, 1993)

Ware, Snow, and Kosinski developed the 36-item Health Survey (SF-36) in 1993. This instrument is a well-known measure of physical and mental health and is scored on a Likert scale. It includes two overall scores, the Physical Health Score and the Mental Health Score, each comprising of four subscales (Ware, Kosinski, & Keller, 1996). Physical health, assessing physical health on the basis of physical functioning and mental health, assessed through emotional functioning with the subscales of vitality, social functioning, role-emotion and mental health (Ware et al., 1996). For this analysis, only the total score of the mental health subscale was included. Mental health is more of a measure of mental well-being whereas physical health is more an assessment of physical functioning (Brazier, Harper, Jones, O'cathain, Thomas, Usherwood, & Westlake, 1992). A meta-analysis by Lins and Carvalho (2016) found that a global score for the SF-36

cannot be generated because it is aimed to measure two different constructs. Questions such as “In the past four weeks, have you felt calm and peaceful?” are asked in the mental health subscale.

Pittsburgh Sleep Quality Index (PSQI) (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989)

The PSQI is an 18-item measure of sleep quality and pattern in adults developed by Buysse, Reynolds, Monk, Berman, and Kupfer in 1989. The scale measures seven aspects of sleep including general sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, the use of medication to sleep, and daytime sleep-related dysfunction over the past month. Four of the questions are open-ended and 14 are rated on a 0–3 Likert scale with higher scores reflecting more seriously impaired sleep function (0= better sleep to 3= more impaired sleep). The maximum total score is 21, however, a score over five indicates poor sleep quality whereas a score of less than five is considered to be reflective of good sleep quality (Buysse et al. 1989). The total score of the PSQI was included in this analysis. Questions such as “During the past month, how would you rate your sleep quality overall?” are asked.

Reverse Scoring

The Pittsburgh Sleep Quality Index had to be reverse scored before entering the data into the CMA. This had to be done so the well-being scales were all set out to measure positive outcomes - meaning that if well-being has increased at the time of post-measurement, the score would increase from the pre-measurement score. The PSQI scale was reverse scored as a score of >5 on a 21-point scale indicates that an individual experiences poor sleep.

Data Analysis and Extraction

Comprehensive Meta-Analysis (CMA) Software [Version 3] was used to carry out the data analysis. This software has been proven user-friendly with the option of using an ‘assistant’, guiding the researcher through the various options of data templates that can be used to compute data. CMA offers various templates to enter data into and provides the option of combining templates with different effect size

values into the same analysis. A weighted mean difference with a 95% confidence interval was used for combining continuous outcomes of well-being and stress measures. In this study, continuous variables in one-group (pre-, post-measure) and unmatched groups (control-, intervention sample, pre- post-measure) were collected.

Four studies (one of which measured both, well-being and stress outcome) included a control group. Sixteen studies only included data for intervention samples. Sixteen out of 17 studies that included intervention samples only reported a paired p -value between time-points whereas the other one reported a t -value. Three of the control group studies provided p -values and one provided a t -value. If a study was published in a format without sufficient data to compute an effect size, further data was requested directly from the authors.

A few studies had a set of raw data included which was put into the Statistical Package for Social Sciences software (SPSS) [24] and paired t -tests were run to compute a p -value and a mean which were then transferred and added into CMA.

A forest plot was created to visualise confidence intervals, effect size and relative weight of each study in relation to the overall analysis. It gives a summary effect and confidence interval at the bottom of the forest plot. This allows for quick evaluation of studies and their significance. For example, if looking at mean differences, point 0.00 represents the Null Hypothesis of 'No difference in mean'.

Fixed Effect vs. Random Effect

In a random-effect analysis, it is assumed that the true effect sizes differ between studies and that the studies in this analysis represent a random sample of effect sizes that could have been observed (Borenstein et al., 2011). It is also assumed that the combined effect is our estimate of the mean of the distribution of effect size. The benefit of using a random-effect model is that large sample sizes do not receive too much weight and small effect sizes are not ignored. Therefore, the aim is to estimate the overall effect size without giving one study an overly large weight and dismissing another, can be achieved.

On the other hand, when using a fixed-effect model, it is assumed that all studies in our analysis share the same true effect size and the combined effect is our estimate of a common effect size. In the later model, all differences in observed effects are thought to be due to sampling error. Meaning that when weights are assigned to studies, smaller studies are predominantly ignored as larger sample sizes provide better information about the same effect size (Borenstein et al., 2011).

As studies used in this analysis have come from researchers who have been working independently from each other, it can be assumed that the studies have different subjects and modified interventions that influence results and therefore, a common effect should not be assumed (Borenstein et al, 2011). Due to this, a random-effect model was used in this study.

Assessment of Heterogeneity

Heterogeneity was assessed using *I*-squared, *Tau*, and *Tau*-squared. Due to the modified versions of the MBSR intervention, we expected to find content and methodological diversity arising from the slightly modified interventions as well as differences in outcome measures and study designs.

Assessment of Reporting and Publication Bias

If a study was published more than once across databases, data was only extracted once. Location bias was reduced by searching multiple databases. Funnel plots were used to assess possible reporting bias, however, this only worked with a larger number of studies (>10) as funnel plots with fewer studies might not give an accurate visual representation.

Chapter 3: Results

Sample Description

From the 21 studies included, 22 independent studies were extracted, one of the studies including two independent samples. Of these, all 22 samples measured stress outcomes and seven measured both stress and well-being outcomes after an MBSR intervention. Only four studies included a control group, one of which was a randomized-waitlist control condition (Flook et al., 2013), two were randomized-control group studies (Sorgi, 2016; Molek-Winiarska & Zolnierczyk-Zreda, 2018) and one was a non-randomized-control group trial (Frank, Reibel, Broderick, Cantrell, & Metz, 2015). The sample sizes ranged from six to 97 (total $N= 630$) in intervention groups and from eight to 108 (total $N= 168$) in control groups. Capital N was used when discussing total sample sizes whereas n was used when referring to a sample of a particular group.

The majority of samples were from North America ($n= 15$), two samples were from Europe, two from Australia, one from Asia and one from South America. Most samples (11) with a combined total of 288 participants, were from the healthcare sector, three samples were from the education sector including a total of 64 participants, and another three samples were of University staff ($n= 150$). The other five samples ($n= 310$) were working adults from other sectors.

Nine studies used the stress measures of PSS, seven used MBI, and DASS and GHQ were each used three times. When measuring well-being, the SWLS was the scale used the most frequently ($n= 3$), followed by PSQI used twice and SF-12v2 and SPWB used once each. The term MBSR was used when investigating all studies using any MBSR intervention whereas the term tMBSR was used when analysing the traditional MBSR by John Kabat-Zinn (1990). mMBSR refers to modified MBSR interventions while cMBSR refers to compressed (shortened) MBSR interventions.

Studies were conducted between 2005 and 2018 and all were written in English. Six studies were dissertations while 15 were journal articles. The following table (Table 1) provides an overview of included studies and their

sample, MBSR type, measures used if they were published or not, and, what data was extracted and used later on in the meta-analyses.

Author	Sample	Design	Measures of stress	Measures of well-being	Type	<i>p</i>-, & <i>t</i>-values
Trowbridge, K., Lawson, L. M., Andrews, S., Pecora, J., & Boyd, S. (2017).	USA - 21 Health Care Workers	cMBSR	PSS-10		Published	<i>p</i> = .052
Linger, R. A. (2016).	USA - 6 High-Level Executives	mMBSR	PSS	SWLS	Unpublished	PSS: <i>p</i> = .039 SWLS: <i>p</i> = .013
Frank, J. L., Reibel, D., Broderick, P., Cantrell, T., & Metz, S. (2015).	USA - 36 High School Educators 18 Intervention Group 18 Control Group	mMBSR	MBI	PSQI	Published	MBI: <i>p</i> = .630 PSQI: <i>p</i> = .010 Between groups
Flook, L., Goldberg, S. B., Pinger, L., Bonus, K., & Davidson, R. J. (2013).	USA - 18 Elementary School Teachers 10 Intervention Group 8 Control Group	mMBSR	MBI		Published	<i>p</i> = .604 Between groups
Foureur, M., Besley, K., Burton, G., Yu, N., & Crisp, J. (2013)	AUSTRALIA - 28 Nurses and Midwives	cMBSR	DASS		Published	<i>p</i> = .004

Bazarko, D., Cate, R., Azocar, F., & Kreitzer, M. J. (2013).	USA - 36 Nurses	tMBSR	PSS	SF-12v2	Published	PSS: $p = .001$ SF-12v2: $p = .05$
Goodman, M. J., & Schorling, J. B. (2012).	USA - Two Samples: 51 Physicians 42 Other Health Care Workers	tMBSR	MBI		Published	Physicians $p = .001$ Others $p = .028$
Geary, C., & Rosenthal, S. L. (2011).	USA - 59 University Staff	tMBSR	PSS	SF-36	Published	$p = .05$
Adams, R. L. (2011).	USA - 26 Community-based MBSR Participants	mMBSR	PSS-10	SWLS	Unpublished	PSS-10: $p = .002$ SWLS: $p = .001$
Davis, B. G. (2010).	USA - 7 Clergy	mMBSR	MBI		Unpublished	$p = .528$
Molek-Winiarska, D., & Zolnierczyk-Zreda, D. (2018).	POLAND - 66 Mining Workers 32 Intervention Group 34 Control Group	mMBSR	GHQ-28		Published	$t = -0.47$ Between groups
Dobie, A., Tucker, A., Ferrari, M., & Rogers, J. (2016).	AUSTRALIA - 9 Health Care Workers	mMBSR	DASS		Published	$p = .030$

Irving, J. A. (2011).	CANADA - 51 Health Care Workers	mMBSR	PSS	SPWB	Unpublished	PSS: $p = .001$ SPWB: $p = .031$
Edwards, L. W. B. (2015).	USA - 10 Health Care Workers	cMBSR	MBI-HSS		Unpublished	$t = 6.208$
Gold, E., Smith, A., Hopper, I., Herne, D., Tansey, G., & Hulland, C. (2010).	UK - 10 Primary School Teachers	tMBSR	DASS		Published	$p = .052$
Sorgi, A. (2016).	USA - 205 Military Personnel 97 Intervention Group 108 Control Group	mMBSR	PSS-10		Unpublished	$p = .034$ Between groups
Klatt, M. D., Buckworth, J., & Malarkey, W. B. (2009).	USA - 22 University Staff	mMBSR	PSS-10	PSQI	Published	PSS-10: $p = .003$ PSQI: $p = .002$
Hallman, I. S., O'connor, N., Hasenau, S., & Brady, S. (2014).	USA - 12 Health Care Workers	cMBSR	PSS-10		Published	$p = .050$
Galantino, M. L., Baime, M., Maguire, M., Szapary,	USA - 69 University Staff	mMBSR	MBI		Published	$p = .002$

P. O., & Farrar, J. T. (2005).						
Ando, M., Natsume, T., Kukihara, H., Shibata, H., & Ito, S. (2011).	JAPAN - 15 Nurses	cMBSR	GHQ		Published	$p = .001$
Dos Santos, T. M., Kozasa, E. H., Carmagnani, I. S., Tanaka, L. H., Lacerda, S. S., & Nogueira-Martins, L. A. (2016).	BRAZIL - 13 Nurses	mMBSR	PSS	SWLS	Published	PSS: $p = .001$ SWLS: $p = .535$

Table 1. *Description of included studies*

Effect Size

According to Borenstein et al. (2011), the term ‘effect size’ refers to the weight of treatment effect or strength of the relationship between two variables. Effect sizes are computed for each study, then, consistency of effect across all studies is assessed before computing a summary effect. The effect size represents the impact of an intervention on participants, in this case, the impact of an MBSR intervention on perceived stress and well-being of employees.

Traditionally, significance testing has been used to assess if an intervention has been successful or not. However, just because a test statistic is significant (p -value $< .05$), it does not mean that the effect that has been measured is important or meaningful in a real-life setting or application (Field, 2009). Another limitation of the p -value is that it is heavily impacted by sample size. In a meta-analysis, we are interested in the magnitude of an effect as opposed to the ability to draw conclusions about the effectiveness of an intervention from statistically significant or non-significant p -values (Borenstein et al. 2011).

This study uses Hedges g , CI and forest plots to evaluate effect sizes.

Cohen’s d and Hedges’ g

Effect sizes can be grouped into two categories, category d (standardised mean differences) and category r (measures of strength of relationship) (Lakens, 2013). Category d (Cohen’s d , Borenstein et al. 2011) effect sizes illustrates the difference between observations whereas category r (Cohen’s r , Borenstein et al. 2011) describes the correlation between two variables. Because Cohen’s d is based on sample averages, effect sizes for smaller samples ($N < 20$) are biased. Due to this, Hedges’ g (Borenstein et al. 2011), also known as the ‘corrected effect size’, is often used instead (Lakens, 2013). Both, Hedges’ g and Cohen’s d indicate the standardised difference between the means of two or more samples and transform effect sizes to a common metric (Borenstein et al., 2011).

In this research Hedges’ g has been used as it outperforms Cohen’s d on sample sizes smaller than 20 (Lakens, 2013). For Hedges’ g , 0.2 represents a

small effect size, 0.5 a medium effect size and any value greater than 0.8 can be interpreted as a large effect size.

Confidence Intervals

Confidence intervals (CI) of 95% were computed for sample weight Hedges' g to assess the accuracy of the mean effect size. The CI provides the range of values in which the mean effect size is expected to fall within if additional sets of studies were taken from the sample population. If a confidence interval crosses the midline (0.00), it means $p > .05$ for that study. This is because a CI including 0.00 indicates no difference between means. Therefore, if a rejection of the Null Hypothesis is expected, meaning that there is no statistically significant difference ($p > .05$) between two variables, the CI should not cross 0.00.

Forest Plots

Forest plots are one of the main components of a meta-analysis. On the X -axis, each study is represented with its CI and effect size. The size of the square plotted along the X -axis indicates the weight assigned to the effect size in a random-effect model for each study based on its sample size. A smaller square indicates a smaller sample size and therefore has been assigned less weight, whereas larger squares indicate larger sample sizes and are given more weight in the overall meta-analysis. The further the squares are to the right side of 0, the bigger the positive effect size, the further squares are to the left side of 0, the bigger the negative effect size (Hak, van Rhee, & Suurmond, 2018). The forest plots for this study are detailed below.

Outcomes of MBSR Interventions on Employee Stress

Overall, 22 study samples ($N = 630$) were used to measure the effects of MBSR on stress. Of these 22 samples, four included a control group. The summary effect size (Hedges' g) in a random-effect model analysis of an MBSR intervention on stress is of medium size ($g = -0.489$, $p < .001$, 95% CI [-0.597, -0.381]) (Figure 3.). This points to an overall positive effect of an MBSR intervention on employees perceived stress levels as it indicates a moderate decrease in distress.

Effects on Stress-all MBSR interventions

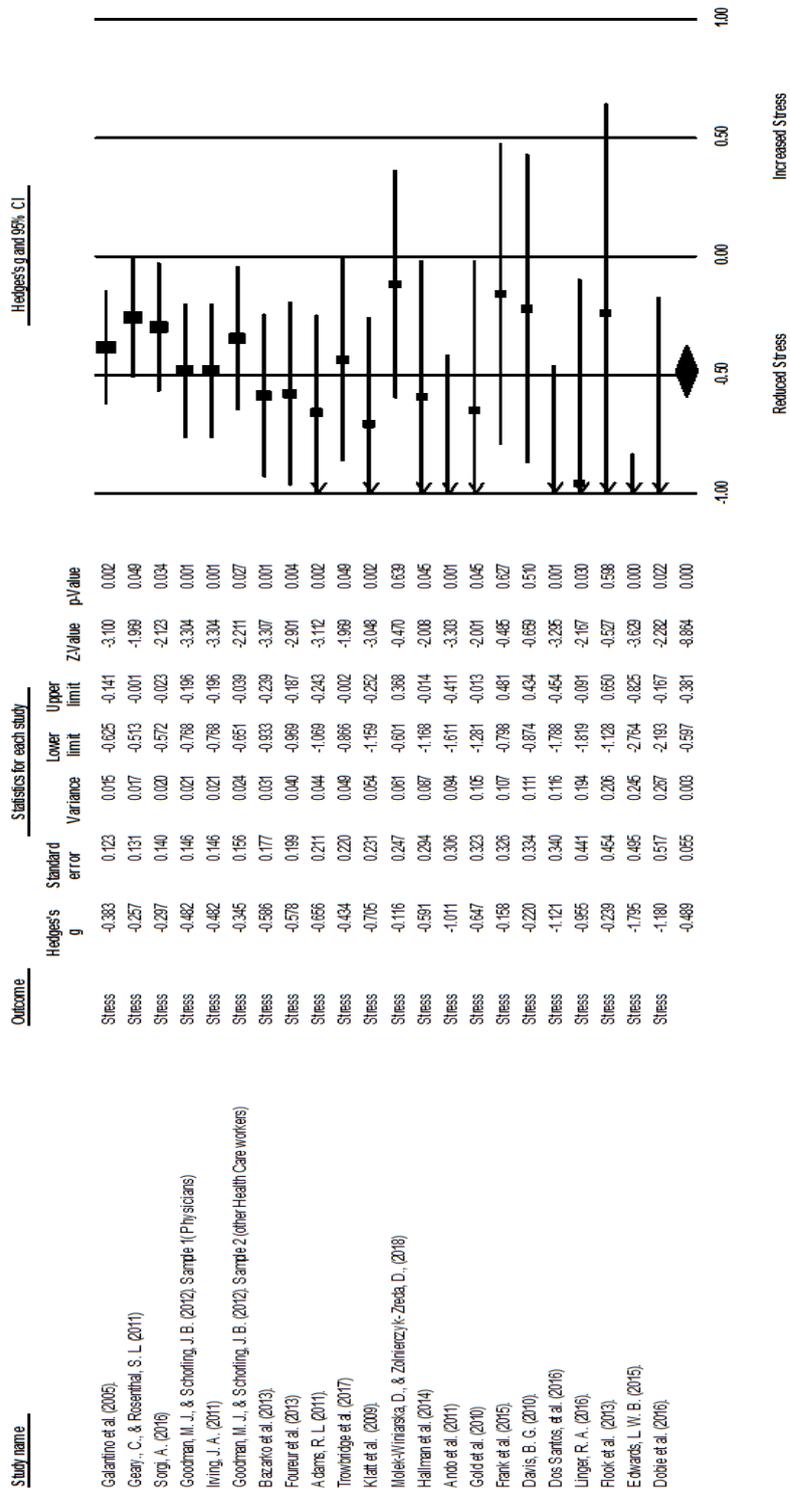


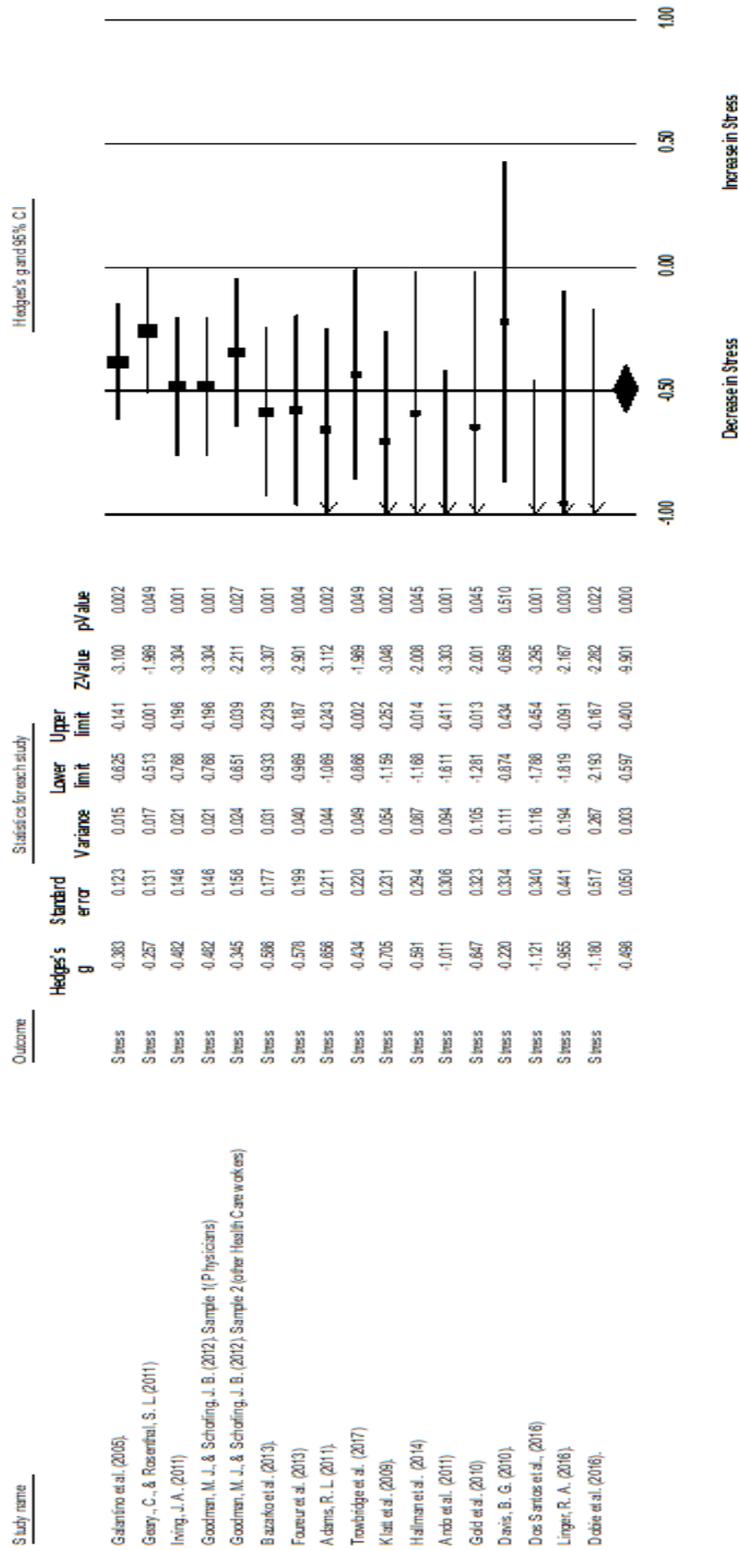
Figure 3. Forest plot of MBSR interventions on stress outcomes

Of these 22 samples, 17 were samples without a control group. This analysis has been carried out because the majority of our studies did not include a control group. When interpreting interventional studies without a control group, it should be considered that changes in the group can be due to either the intervention alone or due to some other factors that were not accounted for. The summary effect size for this sample population ($n= 473$) of MBSR and the effect on stress is also of medium size ($g= -0.498$, $p< .001$, 95% CI [-0.597 to -0.400]) (Figure 4). This effect size is slightly larger but very similar to the overall effect size reported above and therefore indicates moderately decreased stress levels of employees after an MBSR intervention.

Only four of the included studies reported employing a control group ($n= 157$) with the measures of stress. This analysis was carried out in an attempt to control for non-intervention related effects, such as workload, at the time of pre- and post-measure. The summary effect size for this analysis was small ($g= -0.242$, $p= .029$, 95% CI [-0.459, -0.025]) (Figure 5).

Further analysis of the various types of MBSR has been undertaken. Out of the 22 samples, the majority (14 samples, $n= 407$) measured stress in mMBSR interventions. A medium effect size was found ($g= -0.493$, $p< .001$, 95% CI [-0.626, -0.360]) (Figure 6). Four samples ($n= 162$) measured stress in tMBSR interventions. The synthesised effect size in this analysis was small ($g= -0.372$, $p< .001$, 95% CI [-0.529, 0.215]) (Figure 7). Lastly, four samples ($n= 88$) measured stress in cMBSR interventions. The summary effect size was medium to large ($g= -0.686$, $p< .001$, 95% CI [-1.079, -0.294]) (Figure 8).

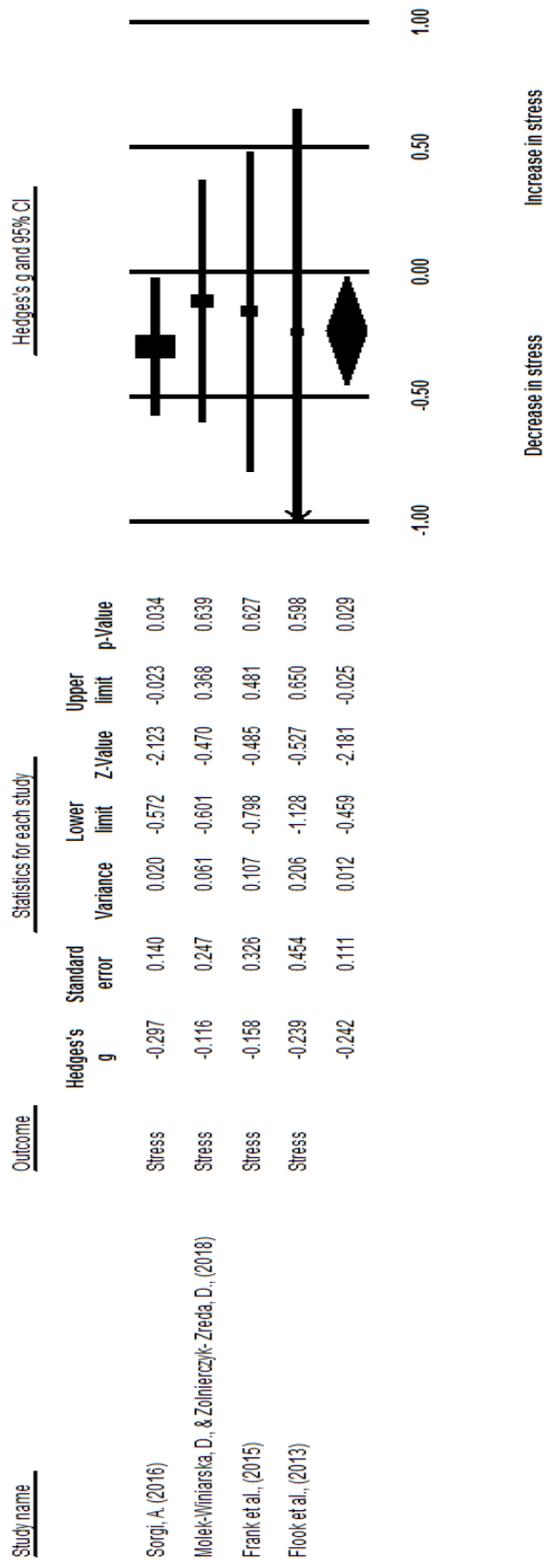
MBSR interventions and the effect on perceived stress in employees



* studies without a control group

Figure 4. Forest plot of MBSR interventions, excluding control group samples, on stress outcomes

Effects on Stress - all MBSR Interventions



* studies with control groups only

Figure 5. Forest plot of MBSR interventions, only including studies with a control-group, on stress outcomes

Effects on Stress - mMBSR Interventions

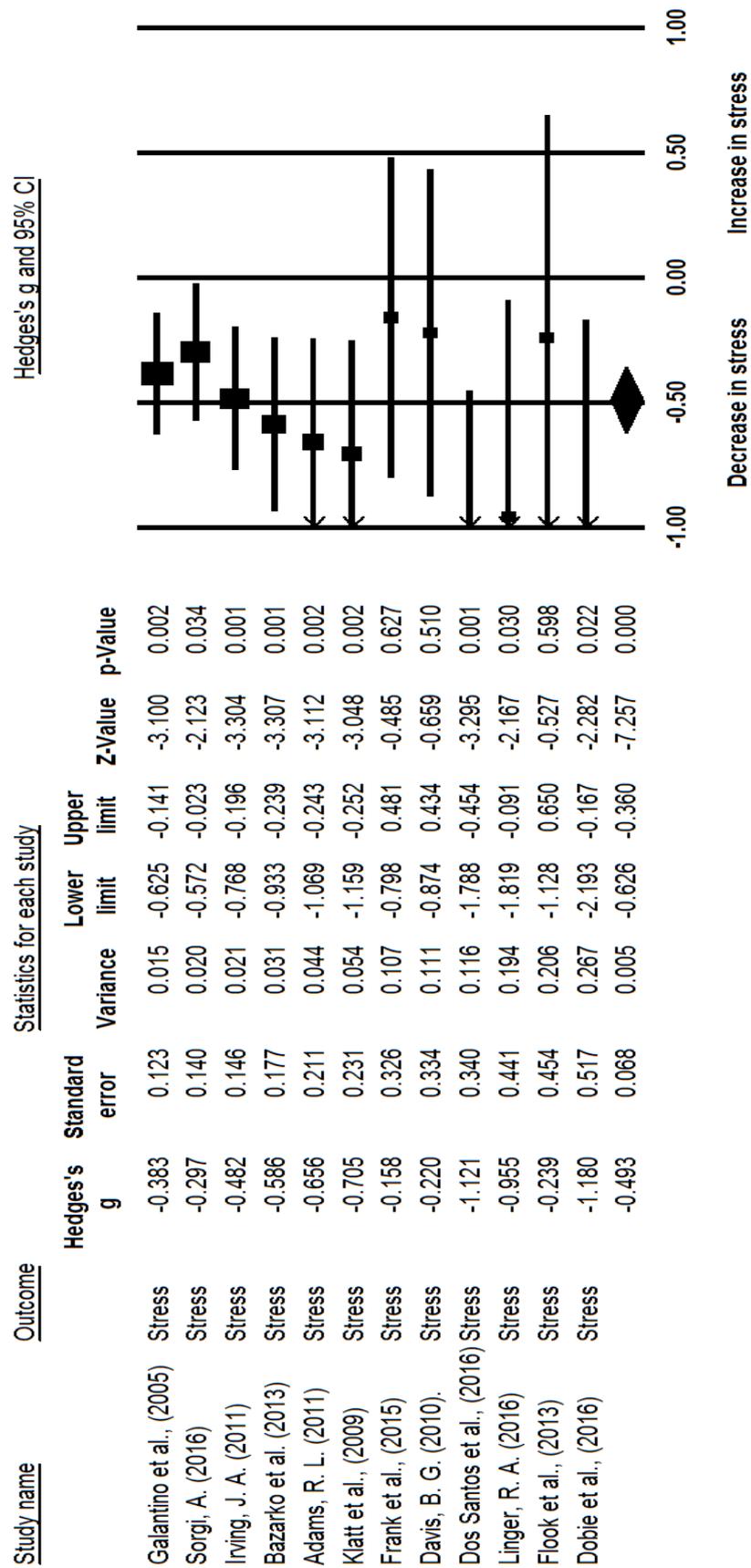


Figure 6. Forest plot of mMBSR interventions on stress outcomes

Effects on Stress - tMBSR Interventions

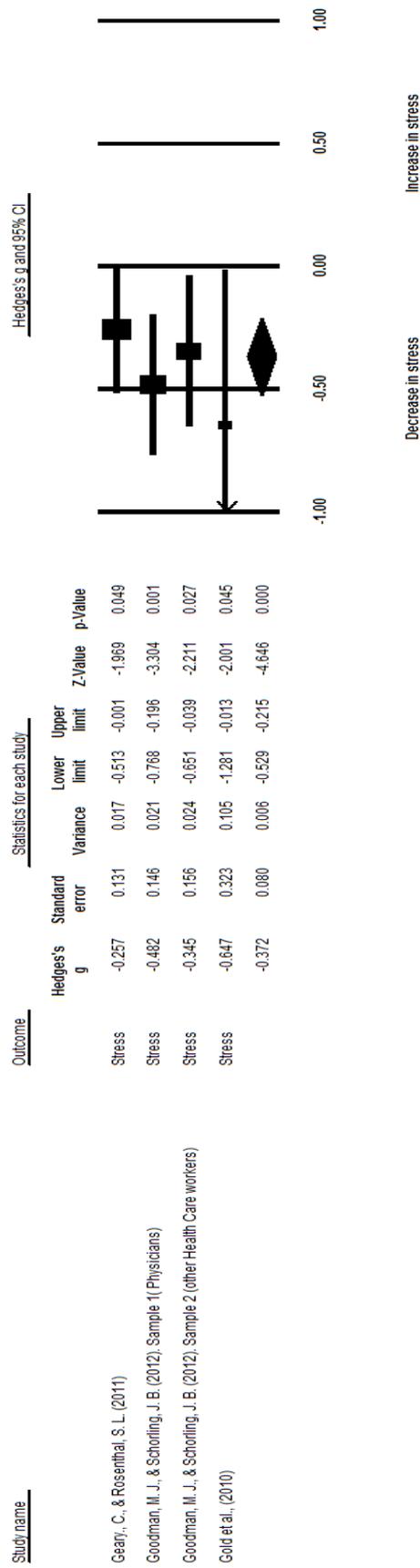
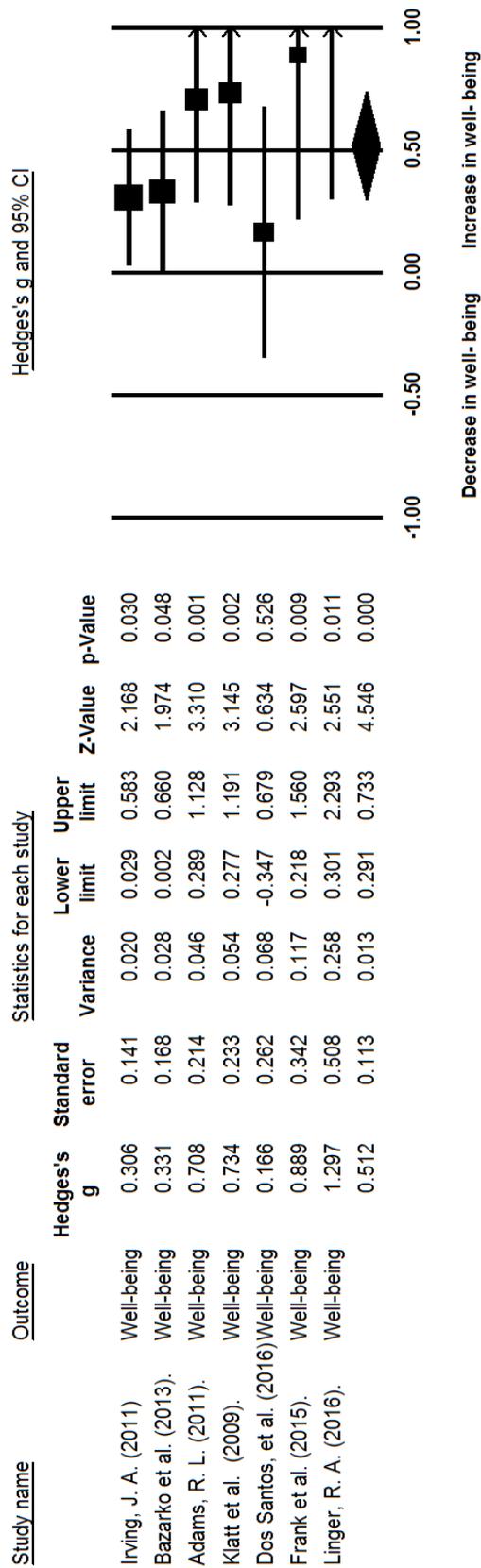


Figure 7. Forest plot of tMBSR interventions on stress outcomes

Outcomes of MBSR Interventions on Employee Well-being

Of the 22 study samples, seven measured well-being outcomes (Figure 9). Only one of the seven studies had a control group (Frank et al., 2015) and all of the studies used an mMBSR intervention. Due to this, only one meta-analysis with well-being outcomes was undertaken. The outcome shows a moderately-strong effect size of $g = 0.512$ ($p < .001$, 95% CI [0.291, 0.733]). This supports the notion of increased well-being post-MBSR intervention.

Effects on Well-being - all MBSR Interventions



*All samples

Figure 9. Forest plot of MBSR interventions on well-being outcomes

Heterogeneity

Heterogeneity measures the variability between studies and thus provides an indication of the comparability between studies in a meta-analysis (Borenstein et al., 2011). The test for heterogeneity aims to discover if there are real differences underlying the outcomes of the studies (heterogeneity) or if the variance in studies can be accounted for by chance alone (homogeneity). Some heterogeneity is expected due to the nature of meta-analyses because when studies varying in methodology and sample characteristics are brought together, heterogeneity will naturally occur. The measure of heterogeneity is a key part of meta-analysis because if the variance between studies is unknown, it would be impossible to decide whether findings are generalisable to a larger population or not (Higgins, Thompson, Deeks & Altman, 2003).

I-Square (I^2)

In this meta-analysis, I^2 is used to assess heterogeneity. I^2 is the proportion of the observed variance reflecting a real difference in effect size - more specifically, I^2 can be defined as a measure of inconsistency across findings between studies rather than a measure of the real variation of the underlying true effects (Borenstein et al., 2011). The scale ranges from 0-100% and can be interpreted as a ratio. In addition, I^2 is not directly impacted by the number of studies in a meta-analysis nor by scale (Hak, Van Rhee, & Suurmond, 2016) and is directly comparable between meta-analyses with varying numbers of studies and types of outcome data (Higgins et al., 2003). The rule of thumb when interpreting I^2 is that anything < 25% is considered little, between 25% to 50% is little to moderate, 50% to 75% is moderate to large and anything above 75%, is large in heterogeneity. Hak et al. (2016) suggest that if the value of I^2 is large (75% and above), the summary effect size for that analysis should not be interpreted as meaningful due to too much dispersion among effect sizes. According to Borenstein et al. (2011), little to moderate variance (20-45%) can exist without the conclusion of positive/ negative moderated effect size being impacted too much or needing to be nullified. This means that although there is some variance between samples, we can assume that the effect size stays roughly the same.

Tau-Square (T^2) and Tau (T)

However, if I^2 test has a result of $> 25\%$ of observed variance, Hak et al. (2016) suggest using Tau-squared (T^2) statistics as a measure of heterogeneity.

Borenstein et al. (2011) explain that T^2 and *Tau* (T) are measures of the dispersion of the true effect size between studies. T^2 is the estimate of the variance of true effect sizes but is not used by itself as a measure of heterogeneity, instead, T^2 is used to calculate T (*square root of Tau*). T is an estimation of the standard deviation of the dispersion of true effect sizes assuming they follow a normal distribution.

Heterogeneity Within Studies Measuring Stress Outcomes

In the overall analysis including all samples and all types of MBSR interventions, heterogeneity is small to moderate with $I^2 = 32.61$. Therefore, 33% of observed variance between studies is due to real differences in the effect size. Because $I^2 < 25\%$, we are reporting $T = 1.49$. This result indicates that the means of the sample sizes in the analysis are 1.49 standard deviations apart.

Heterogeneity is low ($I^2 = 6.28$) in the intervention only samples measuring stress in MBSR. Within these samples, only 6% of observed variance between studies is due to real differences in the effect size.

No heterogeneity was found between control only samples measuring stress in MBSR ($I^2 = 0.00$). This indicates that they are highly homogenous. This result should be interpreted with caution, however, because the number of studies used in this analysis is small ($n = 4$) and can hold substantial bias with under- or overestimation of I^2 (Von Hippel, 2015). According to Von Hippel (2016), if there are fewer than seven studies, one has to interpret I^2 with care due to possible bias.

Next, heterogeneity within the different types of MBSR interventions was analysed. The 14 samples in the analysis of mMBSR and the outcomes of stress computed little to moderate heterogeneity ($I^2 = 27.37$). Twenty-seven per cent of observed variance can be explained through real differences in effect sizes. In addition to I^2 , we also want to report T because of $I^2 > 25\%$. $T = 0.136$, this indicates that the means of the samples are 0.136 standard deviations apart. The

variance in the tMBSR intervention studies measuring stress ($n=4$) was 0% ($I^2 = 0.00$). Again, this needs to be interpreted with caution due to the limited number of samples. I^2 is 53 for cMBSR studies measuring stress ($n=4$). This is considered a moderate to large variance (53%) but might be biased due to the limited number of studies. The means of sample effect sizes in this analysis are 0.286 standard deviations apart ($T=0.286$). In other words, we found that the studies measuring stress outcomes in MBSR interventions have low to moderate heterogeneity. This means that we can be fairly confident that the changes in stress measured after the conducted meta-analyses on MBSR intervention are due to the intervention, and not due to some unknown extraneous variable. The moderate heterogeneity found in the cMBSR analysis could have been caused by some variable uncontrolled for in the studies, an example of this is workload.

Heterogeneity Within Studies Measuring Well-Being Outcomes

I^2 is 42.721 for MBSR studies measuring well-being ($n=7$). We can, therefore, assume that 43% of observed variance between studies is due to real differences in the effect size. $T=0.199$ indicates that the means of the samples effect size in the analysis are 0.199 standard deviations apart. In other words, we found that the heterogeneity in studies measuring well-being outcomes in MBSR interventions is moderate and studies can be compared. As mentioned above, moderate heterogeneity means that we need to be cautious when interpreting effect sizes as outcomes might have been influenced by mediators unaccounted for in this study.

Publication Bias

Funnel Plots

The funnel plot visually represents the relationship between study size and effect size. Funnel plots serve to visually evaluate publication bias in a meta-analysis. A symmetrical figure resembling a funnel shape indicates the absence of publication bias and other biases such as reporting bias or methodological bias (Borenstein et al., 2009). Caution is required however, as the interpretation of funnel plots is highly subjective to ones' interpretation of the funnel plot. The X-axis represents the effect size and on the Y-axis, the standard errors for each study are plotted. If publication bias is absent, the studies will be scattered symmetrically around the

mean effect size. If publication bias is present, the distribution of studies among the X - and Y -axis is asymmetrical.

According to Borenstein et al. (2011), we can categorise bias into three groups 1) No to little bias where the impact of bias is possibly trivial and even if all relevant studies would be included, the effect size would likely remain the same or very similar. 2) Moderate bias where if all relevant studies were included, the effect size might change but the key findings would likely stay the same. 3) Large bias in which case it is assumed that if all relevant studies were included, the key finding could change.

Examining the funnel plot, there is relative symmetry in the distribution, showing a healthy balance between study size and effect size for the analysis including the 21 studies (with 22 independent samples) examining the effects of stress after any MBSR intervention (Figure 10).

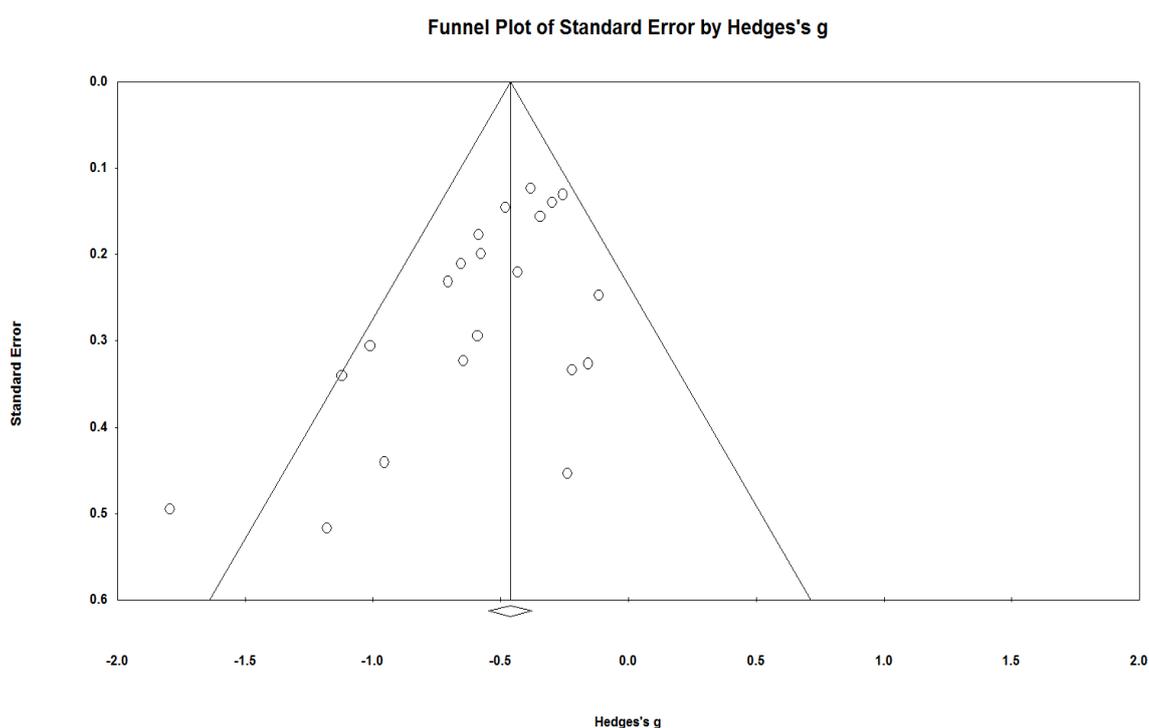


Figure 10. Funnel plot of studies including a measure of stress

The funnel plot of the outcome of well-being and mMBSR ($n=7$) is also relatively symmetrical. However, funnel plots of meta-analyses that combine fewer studies could have a misleading visual representation of publication bias and should not be looked at in isolation. It is important to note that a minimum of

10 samples are required for a funnel plot to detect publication bias, so this may have affected the results of this study. Due to this, there were no further funnel plots produced to assess publication bias in studies assessing stress outcomes and MBSR interventions ($k < 10$) (Figure 11).

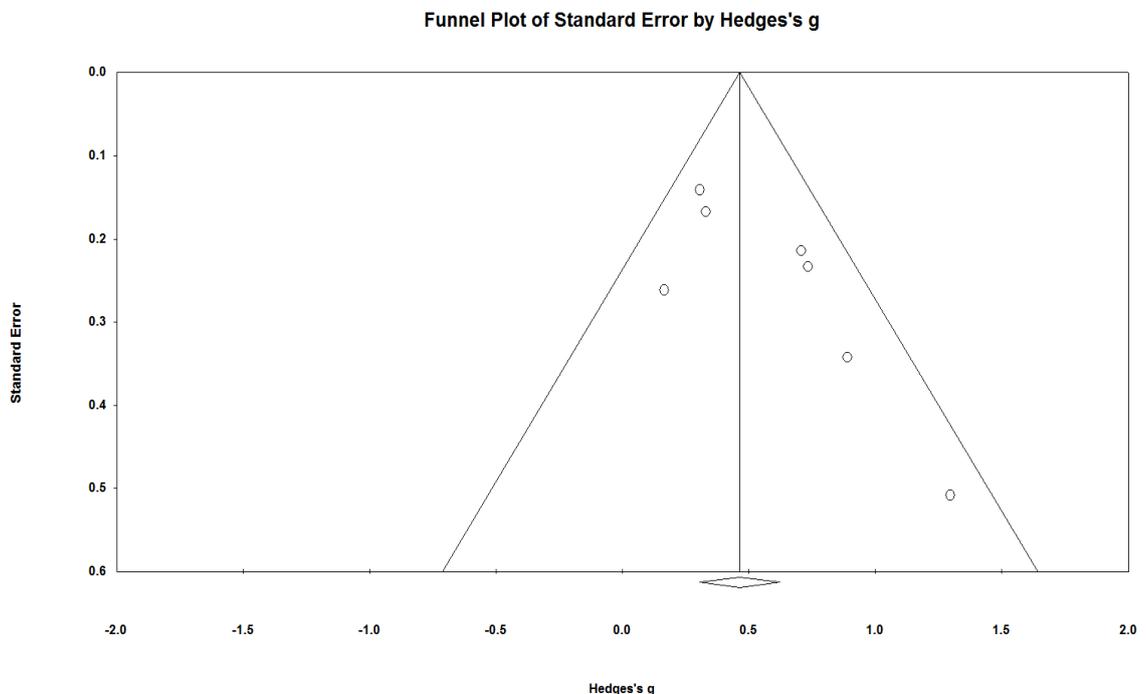


Figure 11. Funnel plot of studies including a measure of well-being

The Rosenthal Fail-Safe (Classic Fail-Safe N)

In addition to the funnel plot, two fail-safe tests have been carried out to measure whether the overall observed effect of studies is robust. To further investigate publication bias, Rosenthal's fail-safe N was calculated. Rosenthal (1979) was trying to compensate for the 'file drawer problem' which, according to Rosenthal, is the tendency of journals to publish only the 5% of studies that show statistically significant results while the remaining 95% of studies that have found non-significant results ($p > .05$) are filed away. Therefore, there is a notion that bias is caused by the overuse of published literature (Orwin, 1983). Rosenthal (1979) suggested that by summarising research areas in meta-analyses, all results (also the 95% previously not published) should be recorded with both an effect size and a level of significance (p -value). Rosenthal (1979) proposed the computation of missing studies with a non-significant effect size ($p > .05$) to determine the number of additional studies needed to achieve a non-significant p -value in a

meta-analysis. Presuming a meta-analysis finds a significant p -value based on selected studies, one would be concerned that studies with smaller effect sizes are missing. If those studies were retrieved and added to the analysis, the p -value for the summary effect would no longer be significant. If the overall result indicates that it would take only a few studies with null-results to increase the overall $p > .05$, then the finding is susceptible to the file drawer problem.

For the analysis looking at stress outcomes in all samples after an MBSR, Rosenthal's $N = 660$. This indicates that many more studies would have to be added to decrease the p -value to a non-significant level and therefore the analysis is very robust with little bias. Rosenthal's N was 240 for $p > .05$ for mMBSR and stress studies whereas the N statistic was 25 for cMBSR and stress and an even lower $N = 20$ for tMBSR for studies measuring stress. For intervention only sample studies measuring stress outcomes $N = 486$ whereas for control group only studies $N = 0$. For both cMBSR and tMBSR analyses, it looks like it would only take a few studies to 'nullify' the effect, therefore we need to be concerned that the true effect size could be zero. This result, however, could also have arisen due to few samples in those two analyses. It might also be an indication of large bias in which case it is assumed that if all relevant studies were included, the key finding could change. Rosenthal's fail-safe measure for studies measuring well-being in mMBSR interventions is $N = 63$. Therefore, this analysis is robust and not vulnerable to the file-drawer issue.

Orwin's Fail-Safe N

Due to a couple of limitations of Rosenthal's fail-safe approach, it has been decided to also report the Orwin's fail-safe N . Orwin (1983) proposed a variation of the Rosenthal's fail-safe formula addressing two limitations of Rosenthal's approach. Firstly, the focus on statistical significance (p -value) rather than effect size and secondly, the assumption that the mean effect size in the missing studies equals zero have been addressed. In Orwin's fail-safe method, the researcher can choose the smallest effect size value (other than zero) which can still be considered large enough to be of substantial importance. The formula computes how many missing studies it would take to reduce the overall effect size (Hedges' g) to that specified value. The criterion for a 'trivial Hedges' g ' was set to -0.05

for analyses with stress outcomes and to 0.05 in the analysis with well-being outcomes following an MBSR intervention.

Orwin's fail-safe in the analysis of MBSR on stress outcome in all samples was $N= 186$. This indicates that an additional 186 studies with a zero effect size would need to be added to decrease the synthesised effect size $g= -0.489$ down to -0.05 . Therefore, we can assume that even if 186 studies were added to this analysis, there would still be a trivial effect size indicating some effect, even if it is only a small one. In the analysis combining mMBSR studies measuring stress outcomes, Orwin's $N= 121$ whereas for cMBSR, Orwin's $N= 46$ and for tMBSR $N= 26$. In mMBSR studies measuring well-being outcomes, Orwin's $N= 60$. It would take $N=151$ studies added to the intervention only sample analysis and $N= 16$ for control group only studies measuring stress outcomes to decrease the effect size to a trivial $g= -0.05$. This indicates that only a few studies would need to be added to the tMBSR analysis to decrease $g= 0.05$ and therefore bias needs to be considered. Whereas almost 200 studies would have to be added to lower g to a trivial effect size of -0.05 in MBSR studies measuring stress. Therefore, this analysis appears very robust.

Chapter 4: Discussion

Chapter Overview

In this chapter, an overall summary of the present study is outlined and discussed. Implications of these findings in regard to employee stress and well-being at the workplace are outlined. Strength and limitations of this study as well as suggestions for future research are made.

Summary of Aim and Constructs

Employee well-being and stress-reduction have been of interest to the field of organisational psychology for a few years now. This is because of the impact distress and poor well-being has on employees and their workplaces in terms of absenteeism, turnover, loss of productivity, workplace incidents, increased cardiovascular disease, increased health-related costs, sleep disturbance, increased family conflict, and substance abuse (Tennant, 2001; Murphy & Sauter, 2003; Chrousos, 2009).

There are various tools used in employee well-being programmes, one of which is mindfulness. The mindfulness-based stress reduction programme (MBSR) aims to integrate mindfulness within clinical mainstream medicine and psychology. Since its creation, the MBSR intervention has been modified to suit various audiences. In the current study, we have categorised MBSR into three groups: tMBSR (traditional), mMBSR (modified), and cMBSR (compressed).

The main objective of this study was to examine the effect of an MBSR intervention on stress and well-being of healthy employees. Further, various meta-analyses with different modes of MBSR were carried out to investigate differences in effect size due to the mode of MBSR used.

Summary of Results

The most commonly used type of MBSR intervention in this study was mMBSR. This is not surprising as organisations can address barriers known to traditional MBSR intervention participation through modifications to the traditional MBSR. Organisations can also address specific topics in mMBSR by tweaking the weekly

teaching schedules to fit a certain profession, for example, having a session on mindfulness teaching to educators. The majority of samples were from Westernised countries, the results, therefore, might not be representative of populations in non-Western parts of the world that have different belief systems, traditions, and customs. Furthermore, the majority of samples included in this study were working in a healthcare profession, this could have also impacted the generalisability of the outcomes to other work sectors.

The first analysis included all control group studies and intervention-only group studies, on any types of MBSR intervention and the effectiveness of stress. This meta-analysis showed an overall positive effect of an MBSR intervention on employees' perception of levels of stress. This indicates a moderate decrease in distress after an MBSR intervention. The analysis of MBSR studies without a control group showed a medium effect size while studies with a control-group sample showed a small effect size. Both of these analyses show that an MBSR intervention can lead to a decrease in employee stress levels. It has been found that studies without a control group tend to portray an inflated effect size (Newell, 1992). This is because extraneous variables such as workload, for example, are not accounted for. Control-group studies, therefore, produce results that are closer to the real effect size than studies without a control group. This is further expanded upon in the limitations section in this study. The meta-analysis measuring stress in mMBSR interventions resulted in a medium effect size.

The outcome of stress after a tMBSR intervention resulted in a small effect size. The outcome of stress after a cMBSR produced a summary effect size of medium strength.

Seven out of the 22 samples measured well-being outcomes after an MBSR intervention. Out of those, all were mMBSR interventions and only one had a control group sample. Therefore, only one meta-analysis was performed on the outcomes of well-being after an MBSR intervention. This meta-analysis resulted in a moderately-strong effect size. Those results support previous findings of increased well-being and decreased stress after an MBSR intervention.

Heterogeneity testing showed that we can be fairly confident that in all meta-analyses, except for the analysis of mMBSR on the outcome of stress and the analysis of MBSR on the outcome of well-being, the changes in stress and well-being post-measure are due to the MBSR intervention and not due to some unknown extraneous variable. For the remaining two meta-analyses, we need to be aware of the small sample size as well as extraneous variables, such as workload, that might have impacted the summary effect size.

The publication bias analysis indicates the absence of publication bias and other biases such as reporting bias or methodological bias. A further analysis to conclude if the overall observed effect size of the study is robust was carried out using Rosenthal's fail-safe N test and Orwin's fail-safe N test. Those tests confirmed that the meta-analyses carried out in this study are robust and not vulnerable to the file-drawer issue.

From those results, it becomes apparent that MBSR interventions have a positive effect on well-being and a negative effect on stress. This means that stress can be decreased, and well-being heightened through MBSR interventions as supported by previous research (Fries, 2009; Linger, 2016; Hyland et al., 2015).

Although the summary effect size of MBSR is of moderate strength, it should be mentioned that results of the meta-analysis including studies with only a control group show a small effect size. It is known that studies with intervention samples only are prone to show larger effects. The possibility of a placebo effect should also be taken into account. This is an effect that is not associated with the actual MBSR intervention but instead, changes in outcomes can be associated with an individuals' positive or negative beliefs about an intervention (Crum & Langer, 2007). Further, without a wait-list control group, we cannot rule out the impact individual motivation has had on these results (Bazarko, Cate, Azocar, & Kreitzer, 2013). It would be valuable therefore to include more control-group studies in future research and also look further into the role of motivation and the impact it has on employee stress and well-being in MBSR interventions.

The current study shows an absence of publication bias when studies were combined and carried out in CMA. The inspection of the funnel plots shows no

indication of publication bias for MBSR interventions and stress outcomes as well as well-being measures. This was also supported with the two fail-safe tests; the Rosenthal's fail-safe N and Owin's fail-safe N, that were carried out to further check for bias. This means that we can be fairly confident in our results as there are no missing studies that might prove the opposite effect. Further, the quality of studies was high with regard to clarity of aims, data collection, and analysis.

Despite the few control-group studies included in this meta-analysis, we can still be certain that there is a stress-reducing effect due to an MBSR intervention, though not a very large one. This is due to the small effect size that has resulted from this analysis. Furthermore, it was found that the compressed version of MBSR had the largest effect size, suggesting that cMBSR might be the most efficient type of MBSR to reduce stress. This is good news for organisations as well as employees because cMBSR interventions do not require as much time commitment and organisational resources as other types of MBSR interventions (mMBSR, tMBSR). Therefore, cMBSR interventions are more affordable to implement for organisations and might be more attractive to employees to participate in. The implementation of cMBSR programmes into organisations could bear a high return of investment in terms of increased well-being and decreased stress levels, leading to higher performance, decreased turnover and absenteeism, and lower overall healthcare costs for organisations. Further research on this, however, needs to be undertaken due to a limited number of studies included in the meta-analysis using a cMBSR intervention.

Limitations

During this meta-analysis, numerous limitations became apparent. The present study was limited to studies published in English only. This means the exclusion of several potentially relevant studies published in other languages. Despite an extensive search on five databases and Google Scholar, only 21 studies, which met the final inclusion criteria, were found. Further, due to the lack of communication from authors of previous research that matched the criteria but lacked statistical information that could be transferred into an effect size, these studies were not able to be included. With less time-constraint, missing data could have been followed up more thoroughly which might have resulted in further

samples that could have been included, and subsequently, could have added robustness to the current study.

A limitation of most studies are extraneous variables, which are variables that are not accounted for in the study but are likely to have influenced the outcomes of it. In our study, variables unaccounted for might include personal beliefs around the effectiveness of mindfulness, supportiveness of a workplace environment towards an employee participating in an MBSR intervention, workload at pre- and post-measure, and participant engagement in MBSR intervention. It needs to be taken into consideration when interpreting results that caseload and work environment can fluctuate over time and contribute to the observed changes in stress and well-being (Dobie, Tucker, Ferrari, & Rogers, 2016).

Participant's previous mindfulness meditation experience might also have had an impact on the summary effect sizes in the various meta-analyses performed. Only a few studies provided data on previous mindfulness meditation and yoga experience of participants. A further limitation in regard to sample demographic is that we do not know the sex of the majority of the sample population ($n= 527$). We do know that 226 of the participants were females and 71 were males. In future studies, it would be interesting to examine further into sex differences in outcomes of stress and well-being after an MBSR intervention to determine if sex could be considered a moderating variable.

The environment in which the practice was held could have also influenced the outcomes. For example, whether weekly meetings were held in the workspace, at an external space, or held over the phone. Limitations within the sample include that the majority of the studies were carried out in Westernised cultures. Although MBSR is said to be free of cultural and religious context, it might still have impacted the results in terms of the generalisation of results. This might be due to differing cultural beliefs and customs. Another shortcoming is that not all studies have mentioned who the teachers of the MBSR intervention were and what experience with mindfulness they have had. In the 21 studies included in this meta-analysis, the majority employed an experienced MBSR teacher ($n= 12$). Four studies used instructors with no formal MBSR training but

who had a psychology background, were trained in family therapy or stress management. In one study, nurses received a three-hour long MBSR training before they instructed their colleagues (Ando et al., 2011). In five studies, the experience of the MBSR instructors is unknown. According to Irving et al. (2009), a fundamental principle of teaching mindfulness practice is the notion that teachers embody mindful qualities themselves. To become a certified MBSR teacher, it is imperative for instructors to undergo extensive training over several years and demonstrate a commitment to their personal practice (Irving et al., 2009). Therefore, the various experiences of instructors might have impacted the outcomes of stress and well-being in participants.

Another limitation of the current research is that only five studies included a control group in their sample. Pooling statistical data from studies that only have an intervention group can lead to an overestimation of the effect size (Newell, 1992). The inclusion of a control group is an important part of the scientific method in experimental procedures as it allows the researcher to isolate the effect of the experimental treatment. Studies with control groups gain reliability and validity because we can compare intervention groups with control groups and determine if it was indeed the intervention that caused any changes. Without a control group, the outcomes of an experiment can be misleading. It is important to use control samples that are as similar as possible to the intervention samples in an attempt to eliminate the effect of outside variables.

All scales used to measure stress and well-being outcomes were self-report measures (Donaldson & Grant, 2002). This is a limitation because it has been found that research participants generally want to respond in a socially desirable way. This means that participants have a tendency to under-report behaviours that are considered inappropriate by the researcher and are inclined to over-report behaviours viewed as appropriate by the researcher. In organisational research, self-report bias is particularly probable because workers feel that there is a likelihood that their employer could see their responses at some time in the future. In their research, Donaldson and Grant (2002) found that employees with a tendency to provide socially desirable responses reported more favourable behaviours than employees who had a low score on this dispositional

characteristic. This suggests that irrespective of situational factors in a measurement setting, some participants are naturally more susceptible to distort their answers (Donaldson & Grant, 2002). Furthermore, various scales to measure stress and well-being outcomes have been used. The scales used were all well-established and commonly-used measurements in the field of psychology. Despite this, it needs to be kept in mind that the combination of effect sizes gathered from different scales might have impacted the summary effect size in the meta-analyses undertaken in the current study.

Although this meta-analytic research study included samples of individuals working in a range of professions, the fact that the majority of samples were working in the healthcare sector might present a limitation in terms of the generalisation of outcomes. A large amount of mindfulness-based intervention studies has been conducted within the healthcare sector because professionals in this field have been found to be working under particularly stressful situations and appear to be at high risk of developing stress-related symptoms and burnout. This, in turn, can lead to errors and poor patient care (Amutio, Martínez-Taboada, Hermosilla, & Delgado, 2015).

It is common for researchers to have to convert data before running meta-analyses (Tang, Caudy, & Taxman, 2013). In some studies, raw data has been provided which made it possible to run *t*-test analyses in SPSS to determine effect size. The data was then entered into CMA. Due to the fact that not all studies provided raw data, we had to suffice with the outcomes of statistical tests provided. This means that the results of this meta-analysis may not be as reliable as if researchers had provided raw data for each study.

As most studies only collected outcome data from two time-points, immediately before and immediately after the intervention, we cannot make assumptions about the durability of the observed effects (Dobie et al., 2016). A suggestion for future research is to employ a longitudinal evaluation of the outcome effects.

The quality of studies was high with regard to clarity of aims, data collection, and analysis. There were, however, some conceptual and

methodological issues with very small sample sizes (<10), self-selection, and non-randomized samples in some studies.

The use of independent sample *t*-tests with a related sample may also create bias due to the inability to match pre- and post-test responses. Due to the self-selection of participants in most samples, the representativeness of the group on baseline outcome measure scores may be questioned (Trowbridge et al., 2017). Self-selected samples are arguably highly motivated to participate, as demonstrated by their willingness to participate in a full-day retreat, as well as several hours of face-to-face, phone or online group participation in addition to spending time on home practice, in the selected studies. Other methodological issues included the lack of control for factors such as group support, home practice, environment in which practice is held, and the environment in which questionnaires were filled out.

Implications for the Workplace

Results have shown positive effects in terms of a decrease in stress and an increase in well-being in employees after they have participated in any type of MBSR intervention. The adaptability of MBSR interventions to workplace settings and professions has been supported in this study.

Sorgi (2016) found that an online adaptation of the MBSR programme can produce positive results that are comparable to those found in studies that used the traditional version of the programme. There is also evidence suggesting that compressed versions of MBSR (cMBSR) interventions developed for use in organisational settings are equally as effective as the standard 8-week version originally developed for clinical settings. This finding is consistent with those of Carmody and Baer (2009) and Virgili (2015) who concluded that there was no evidence that a shortened version of MBSR was less effective than a traditional version of MBSR in reducing psychological distress in clinical and nonclinical populations. MBSR interventions can, therefore, be adapted to suit a workplace environment and can be made more attractive to employees and organisations by changing the mode of group interaction (e.g. online, phone, or face-to-face),

shortening the time for mindfulness home practice, and by reducing resources required to implement the intervention into the workplace.

Transportation difficulties, scheduling conflicts with other activities (Sibinga, Kerrigan, Stewart, Johnson, Magyari, & Ellen, 2011), distance (Merkes, 2010), time commitment, misconception about and lack of knowledge about meditation, as well as lacking confidence to try something new (Gryffin, Chen, & Erenguc, 2014), were found to be major barriers in terms of MBSR participation. Further, yoga practice is often utilized in MBSR interventions, however, limited work-site space and the need to change clothing may make the inclusion of it difficult and thus diminishes its usefulness as a stress management tool at the office (Carmody, Baer, Lykins, & Olendzki, 2009). Moreover, commitments to family, work, caregiving, education, and so on, may prevent individuals from participating in a traditional length MBSR. This barrier, however, might be overcome with adaptations of MBSR by offering compressed MBSR interventions that do not ask for a large time commitment or modifying MBSR to make participation more accessible for employees, for example, by replacing weekly face-to-face meetings with online or over the phone dialogues.

NZ Context

MBSR interventions have been shown to be applicable and effective in a variety of settings and countries. Organisations in New Zealand could profit from MBSR interventions and reduce employee stress, heighten their employees' well-being, as well as increase productivity, reduce absenteeism, decrease turnover, and diminish healthcare costs. These are all partially a result of distress at the workplace.

Further, because MBSR is said to be free of cultural and religious context (Van Gordon et al., 2015), and has been applied to many organisations in Westernised cultures, the implementation in New Zealand organisations should show similar positive employee and organisational outcomes.

Organisations in New Zealand could profit from implementing the use of MBSR interventions due to the costs related to employee healthcare, absenteeism, and increased stress levels (The Treasury, 2010; Business NZ, n.d.). Furthermore,

organisations can profit from increased team morale, work satisfaction, organisational trust, work commitment, and employee loyalty which are fostered through the use of MBSR interventions (Berry et al., 2010).

Future Research Suggestions

Future research could investigate possible differences in effect size between a novel and expert meditators and if meditation experience impacts stress and well-being outcomes after an MBSR intervention. As the majority of samples were healthcare workers and from Westernised countries, future studies could focus on a more diverse workforce and cultural background to achieve a more generalizable conclusion of MBSR interventions in the workplace. Further, future meta-analyses should make sure to include studies including a control group, this is to ensure extraneous variables are accounted for as much as they can be.

Due to the fact that cMBSR had the largest summary effect size, future research could focus on implementing cMBSR for workplaces and explore why they may have a larger effect size than traditional MBSR. This is also an opportunity as cMBSR puts less time constraint on its participants and might, therefore, be a more attractive version compared to the traditional MBSR to participate in. Furthermore, in today's world of technological advances, it would be interesting to see if a mobile app with psychoeducational sessions just as effective as face-to-face meetings with an instructor would be. This would make MBSR more flexible in the way it is taught, employees would not be time- or place-bound, and organisations could save on teaching and facility resources.

In future research, it would be interesting to keep in mind whether incentives to participate in an intervention impact the results. Further, dropout rates of interventions could be more closely studied to see if there are any differences between the number of participants who drop out from pre- and post-measurement testing and if there is a pattern to which type of MBSR has the highest/ lowest drop-out rate. This might indicate what works best for employees. Lastly, previous research has been focused on the positive sides of mindfulness-interventions, it would be interesting to investigate any negative effects such as an intervention may have on employees.

Overall Conclusion

In conclusion, the present study examined how a mindfulness-based stress reduction intervention impacts stress and well-being in employees. To assess effect sizes of implemented interventions, various meta-analyses of relevant literature have been carried out. Outcomes of the meta-analysis measuring the effect size of MBSR interventions on stress, resulted in a moderate effect size. An examination of studies including a control-group only resulted in a slightly smaller effect size. This indicates that MBSR interventions are effective in stress reduction, but future studies should focus on research including control groups in an attempt to limit outcomes due to extraneous variables. The compressed version of MBSR (cMBSR) resulted in the largest effect size, indicating that this mode of MBSR was the most effective in employee stress reduction. However, due to only a few studies included in this meta-analysis, future research could look into replicating this analysis with additional samples. The meta-analysis on MBSR and well-being outcomes resulted in a medium effect size. This indicates that employee well-being increases after an MBSR intervention. Further research, however, is needed to identify other possible mediating and moderating variables.

To increase well-being and reduce stress in employees, an MBSR intervention could be part of the solution to creating a healthier, more resilient and productive workforce. This study adds to the field of organisational psychology by giving practitioners an indication of which type of mindfulness-based stress reduction works best as well as pointing to future research opportunities.

References

- Adams, J. D. (1980). On consuming human resources: Perspectives on the management of stress. In W. B. Eddy & W. W. Burke (Eds.), *Behavioral science and the manager's role* (pp. 75-90). San Diego, CA: University Associates.
- Allen, M., Dietz, M., Blair, K. S., van Beek, M., Rees, G., Vestergaard-Poulsen, P., Lutz, A., & Roepstorff, A. (2012). Cognitive-affective neural plasticity following active-controlled mindfulness intervention. *The Journal of Neuroscience*, *32*(44), 15601-15610.
<https://doi.org/10.1523/JNEUROSCI.2957-12.2012>
- Allen, T. D., & Kiburz, K. M. (2012). Trait mindfulness and work–family balance among working parents: The mediating effects of vitality and sleep quality. *Journal of Vocational Behavior*, *80*(2), 372-379.
<https://doi.org/10.1016/j.jvb.2011.09.002>
- Amutio, A., Martínez-Taboada, C., Hermsilla, D., & Delgado, L. C. (2015). Enhancing relaxation states and positive emotions in physicians through a mindfulness training program: A one-year study. *Psychology, Health & Medicine*, *20*(6), 720-731. <https://doi.org/10.1080/13548506.2014.986143>
- Ando, M., Natsume, T., Kukihara, H., Shibata, H., & Ito, S. (2011). Efficacy of mindfulness-based meditation therapy on the sense of coherence and mental health of nurses, *Health*, *3*(2), 108-122.
<https://doi.org/10.4236/health.2011.32022>
- Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*, *10*(2), 125–143. <https://doi.org/10.1093/clipsy.bpg015>
- Bain, L. L. (1995). Mindfulness and subjective knowledge. *Quest*, *47*(2), 238-253.
<https://doi.org/10.1080/00336297.1995.10484154>
- Baicker, K., Cutler, D., & Song, Z. (2010). Workplace wellness programs can generate savings. *Health Affairs*, *29*(2), 1-8.
<https://doi.org/10.1377/hlthaff.2009.0626>
- Bakker, A. B., Van Veldhoven, M., & Xanthopoulou, D. (2010). Beyond the demand-control model. *Journal of Personnel Psychology*, *9*, 3-16.
<https://doi.org/10.1108/02683940710733115>

- Benson, H., & Proctor, W. (1984). *Beyond the relaxation response*. Retrieved from https://openlibrary.org/works/OL11018202W/Beyond_the_relaxation_response
- Berger, G.H., 1994, Coping with stress: the effectiveness of exercise and other techniques, *Quest*, 46(1), 100-119.
<https://doi.org/10.1080/00336297.1994.10484112>
- Berry, L., Mirabito, A., & Baun, W. (2010). What's the hard return on employee wellness programs? *Harvard Business Review*, 88(12).104-112.
- Bishop, S. R. (2002). What do we really know about mindfulness-based stress reduction?. *Psychosomatic Medicine*, 64(1), 71-83.
- 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.
<https://doi.org/10.1093/clipsy.bph077>
- Boyd, A. (1997). Employee traps-corruption in the workplace. *Management Review*, 86(8), 9. Retrieved from <https://link.galegroup.com/apps/doc/A20076969/AONE?u=googlescholar&sid=AONE&xid=d9b5f61d>
- Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2011). *Introduction to meta-analysis*. Chichester, UK: John Wiley & Sons. Ltd.
- Business Nz. (2017). *Wellness in the Workplace 2017: Survey Report*. Retrieved from <https://www.businessnz.org.nz/data/assets/pdf/0009/128547/Wellness-in-the-Workplace-Survey-2017.pdf>
- Buysse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Research*, 28(2), 193-213.
[https://doi.org/10.1016/0165-1781\(89\)90047-4](https://doi.org/10.1016/0165-1781(89)90047-4)
- Brazier, J. E., Harper, R., Jones, N. M., O'cathain, A., Thomas, K. J., Usherwood, T., & Westlake, L. (1992). Validating the SF-36 health survey questionnaire: new outcome measure for primary care. *BMJ: British Medical Journal*, 305,160-164. <https://doi.org/10.1136/bmj.305.6846.160>
- Brewer, J. A., Worhunsky, P. D., Gray, J. R., Tang, Y. Y., Weber, J., & Kober, H. (2011). Meditation experience is associated with differences in default mode network activity and connectivity. *Proceedings of the National*

Academy of Sciences, 108(50), 20254-20259.

<https://doi.org/10.1073/pnas.1112029108>

- 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. <https://doi.org/10.1037/0022-3514.84.4.822>
- Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological inquiry*, 18(4), 211-237. <https://doi.org/10.1080/10478400701598298>
- Cacioppo, J. T., & Hawkley, L. C. (2003). Social isolation and health, with an emphasis on underlying mechanisms. *Perspectives in Biology and Medicine*, 46(3), 39- 52. <https://doi.org/10.1353/pbm.2003.0063>
- Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine*, 31(1), 23-33. <http://dx.doi.org/10.1007/s10865-007-9130-7>
- Carmody, J., Baer, R. A., LB Lykins, E., & Olendzki, N. (2009). An empirical study of the mechanisms of mindfulness in a mindfulness-based stress reduction program. *Journal of Clinical Psychology*, 65(6), 613-626. <https://doi.org/10.1002/jclp.20579>
- Caulfield, N., Chang, D., Dollard, M. F., & Eishaug, C. (2004). A review of occupational stress interventions in Australia. *International Journal of Stress Management*, 11(2), 142-166. <http://dx.doi.org/10.1037/1072-5245.11.2.149>
- 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. <https://doi.org/10.1089/acm.2008.0495>
- Chrousos, G. P. (2009). Stress and disorders of the stress system. *Nature Reviews Endocrinology*, 5(7), 374- 381. <https://doi.org/10.1038/nrendo.2009.106>
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24(4), 385-396. <http://dx.doi.org/10.2307/2136404>

- Crane, R. S., Brewer, J., Feldman, C., Kabat-Zinn, J., Santorelli, S., Williams, J. M. G., & Kuyken, W. (2017). What defines mindfulness-based programs? The warp and the weft. *Psychological Medicine*, *47*(6), 990-999. <https://doi.org/10.1017/S0033291716003317>
- Curran, C., Knapp, M., & Beecham, J. (2004). Mental health and employment: Some economic evidence. *Journal of Mental Health Promotion*, *3*(1), 13-24. <http://dx.doi.org.ezproxy.waikato.ac.nz/10.1108/17465729200400003>
- Dane, E. (2011). Paying attention to mindfulness and its effects on task performance in the workplace. *Journal of Management*, *37*(4), 997-1018. <https://doi.org/10.1177/0149206310367948>
- Danna, K., & Griffin, R. W. (1999). Health and well-being in the workplace: A review and synthesis of the literature. *Journal of Management*, *25*(3), 357-384. <https://doi.org/10.1177/014920639902500305>
- Davis, B. G. (2010). *Preventing clergy burnout: Assessing the value of a mindfulness-based intervention as part of a holistic clergy wellness program* (Doctoral thesis, Chestnut Hill College, 2010). Retrieved from <https://search.proquest.com/docview/820745053?pq-origsite=gscholar>
- Dickson-Swift, V., Fox, C., Marshall, K., Welch, N., & Willis, J. (2014). What really improves employee health and wellbeing: Findings from regional Australian workplaces. *International Journal of Workplace Health Management*, *7*(3), 138-155. <https://doi.org/10.1108/IJWHM-10-2012-0026>
- Diener, E., Emmons, R., Larsen, R., & Griffin, S. (1985). The Satisfaction With Life Scale. *Journal of Personality Assessment*, *49*(1), 71-75. https://doi.org/10.1207/s15327752jpa4901_13
- Dodge, R., Daly, A. P., Huyton, J., & Sanders, L. D. (2012). The challenge of defining wellbeing. *International Journal of Wellbeing*, *2*(3), 222-235. <https://doi.org/10.5502/ijw.v2i3.4>
- Donaldson, S. I., & Grant-Vallone, E. J. (2002). Understanding self-report bias in organizational behavior research. *Journal of Business and Psychology*, *17*(2), 245-260.
- Dos Santos, T. M., Kozasa, E. H., Carmagnani, I. S., Tanaka, L. H., Lacerda, S. S., & Nogueira-Martins, L. A. (2016). Positive effects of a stress reduction program based on mindfulness meditation in Brazilian nursing

- professionals: Qualitative and quantitative evaluation. *Explore: The Journal of Science and Healing*, 12(2), 90-99.
<https://doi.org/10.1016/j.explore.2015.12.005>
- Eberth, J., & Sedlmeier, P. (2012). The effects of mindfulness meditation: a meta-analysis. *Mindfulness*, 3(3), 174-189. <https://doi.org/10.1007/s12671-012-0101-x>
- Edwards, L. W. B. (2015) *A mindfulness and health promotion program to decrease the perception of stress and burnout in psychiatric mental health nurses who provide direct patient care to individuals in mental health units with a diagnosis of Alzheimer's type dementia* (Doctoral thesis, The University of Southern Mississippi, 2015). Retrieved from https://aquila.usm.edu/dnp_capstone/7
- Epstein, L. H., & Perkins, K. A. (1988). Smoking, stress, and coronary heart disease. *Journal of Consulting and Clinical Psychology*, 56(3), 342-349. <https://doi.org/10.1037/0022-006X.56.3.342>
- Feldman, C., & Kuyken, W. (2011). Compassion in the landscape of suffering. *Contemporary Buddhism*, 12(1), 143-155. <https://doi.org/10.1080/14639947.2011.564831>
- Feuerstein, M., Labbé, E. E., & Kuczmierczyk, A. R. (2013). *Health psychology: A psychobiological perspective*. New York, USA: Plenum Press.
- Field, A. (2009). *Discovering statistics using SPSS: (and sex and drugs and rock 'n' roll)* (4th ed.). London, England: SAGE Publications.
- Flook, L., Goldberg, S. B., Pinger, L., Bonus, K., & Davidson, R. J. (2013). Mindfulness for teachers: A pilot study to assess effects on stress, burnout, and teaching efficacy. *Mind, Brain, and Education*, 7(3), 182-195. <https://doi.org/10.1111/mbe.12026>
- Foureur, M., Besley, K., Burton, G., Yu, N., & Crisp, J. (2013) Enhancing the resilience of nurses and midwives: Pilot of a mindfulnessbased program for increased health, sense of coherence and decreased depression, anxiety and stress. *Contemporary Nurse*, 45(1), 114-125. <https://doi.org/10.5172/conu.2013.45.1.114>
- Frank, J. L., Reibel, D., Broderick, P., Cantrell, T., & Metz, S. (2015). The effectiveness of mindfulness-based stress reduction on educator stress and

- well-being: Results from a pilot study. *Mindfulness*, 6(2), 208-216.
<https://doi.org/10.1007/s12671-013-0246-2>
- Fries, M. (2009). Mindfulness based stress reduction for the changing work environment. *Journal of Academic and Business Ethics*, 2, 1-10.
- Galantino, M. L., Baime, M., Maguire, M., Szapary, P. O., & Farrar, J. T. (2005). Association of psychological and physiological measures of stress in health-care professionals during an 8-week mindfulness meditation program: Mindfulness in practice. *Stress and Health*. 21(4), 255-261.
<https://doi.org/10.1002/smi.1062>
- Gauthier, T., Meyer, R. M., Grefe, D., & Gold, J. I. (2015). An on-the-job mindfulness-based intervention for pediatric ICU nurses: A pilot. *Journal of Pediatric Nursing*, 30(2), 402-409.
<https://doi.org/10.1016/j.pedn.2014.10.005>
- Geary, C., & Rosenthal, S. L. (2011). Sustained impact of MBSR on stress, well-being, and daily spiritual experiences for 1 year in academic health care employees. *The Journal of Alternative and Complementary Medicine*, 17(10), 939-944. <https://doi.org/10.1089/acm.2010.0335>
- Gebhardt, D. L., & Crump, C. E. (1990). Employee fitness and wellness programs in the workplace. *American Psychologist*, 45(2), 262- 272.
- Gethin, R. (1998). *The foundations of Buddhism*. New York, USA: Oxford University Press.
- Gold, E., Smith, A., Hopper, I., Herne, D., Tansey, G., & Hulland, C. (2010). Mindfulness-based stress reduction (MBSR) for primary school teachers. *Journal of Child and Family Studies*, 19(2), 184-189.
<https://doi.org/10.1007/s10826-009-9344-0>
- Goldberg, D. 1978. Manual of the General Health Questionnaire. Windsor, UK: National Foundation for Educational Research.
- Golembiewski, R. T., & Munzenrider, R. (1981). Efficacy of three versions of one burn-out measure: MBI as total score, sub-scale scores, or phases?. *Journal of Health and Human Resources Administration*, 4(2), 228-246.
- Good, D. J., Lyddy, C. J., Glomb, T. M., Bono, J. E., Brown, K. W., Duffy, M. K., ... & Lazar, S. W. (2016). Contemplating mindfulness at work: An integrative review. *Journal of Management*, 42(1), 114-142.
<https://doi.org/10.1177/0149206315617003>

- Goodman, M. J., & Schorling, J. B. (2012). A mindfulness course decreases burnout and improves well-being among healthcare providers. *International Journal of Psychiatry in Medicine, 43*(2), 119-128. <https://doi.org/10.2190/PM.43.2.b>
- Glomb, T. M., Duffy, M. K., Bono, J. E., & Yang, T. (2012). Mindfulness at work. *Research in Personnel and Human Resource Management, 30*, 115–157. [https://doi.org/10.1108/S0742-7301\(2011\)0000030005](https://doi.org/10.1108/S0742-7301(2011)0000030005)
- Grawitch, M. J., Gottschalk, M., & Munz, D. C. (2006). The path to a healthy workplace: A critical review linking healthy workplace practices, employee well-being, and organizational improvements. *Consulting Psychology Journal: Practice and Research, 58*(3), 129-147. <https://doi.org/10.1037/1065-9293.58.3.129>
- Gryffin, P., Chen, W., & Erenguc, N. (2014). Knowledge, attitudes and beliefs of meditation in college students: barriers and opportunities. *American Journal of Education, 2*(4), 189-192. <https://doi.org/10.12691/education-2-4-2>
- Haidich, A. B. (2010). Meta-analysis in medical research. *Hippokratia, 14*(1), 29-37.
- Hallman, I. S., O'connor, N., Hasenau, S., & Brady, S. (2014). Improving the culture of safety on a high-acuity inpatient child/adolescent psychiatric unit by mindfulness-based stress reduction training of staff. *Journal of Child and Adolescent Psychiatric Nursing, 27*(4), 183-189. <https://doi.org/10.1111/jcap.12091>
- Hak, A, van Rhee, H.J, & Suurmond, R. (2018). *How to interpret results of meta-analysis (Version 1.3)*. Retrieved from <http://hdl.handle.net/1765/80102>
- Hasenkamp, W., Wilson-Mendenhall, C. D., Duncan, E., & Barsalou, L. W. 2012. Mind wandering and attention during focused meditation: A fine-grained temporal analysis of fluctuating cognitive states. *NeuroImage, 59*(1), 750-760. <https://doi.org/10.1016/j.neuroimage.2011.07.008>
- Hülshager, U. R., Feinholdt, A., & Nübold, A. (2015). A low-dose mindfulness intervention and recovery from work: Effects on psychological detachment, sleep quality, and sleep duration. *Journal of Occupational and Organizational Psychology, 88*(3), 464-489. <https://doi.org/10.1111/joop.12115>

- Hülshager, U. R., Lang, J. W. B., Depenbrock, F., Fehrmann, C., Zijlstra, F. R. H., & Alberts, H. J. E. M. (2014). The power of presence: The role of mindfulness at work for daily levels and change trajectories of psychological detachment and sleep quality. *Journal of Applied Psychology, 99*(6), 1113-1128. <http://dx.doi.org/10.1037/a0037702>
- Higgins, J. P., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *BMJ: British Medical Journal, 32*(7), 557-560. <https://doi.org/10.1136/bmj.327.7414.557>
- Hölzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science, 6*(6), 537-559. <https://doi.org/10.1177/1745691611419671>
- Hyland, P. K., Lee, R. A., & Mills, M. J. (2015). Mindfulness at work: A new approach to improving individual and organizational performance. *Industrial and Organizational Psychology: Perspectives on Science and Practice, 8*(4), 576–602. <https://doi.org/10.1017/iop.2015.41>
- Irving, J. A. (2011). *Mindfulness-based medical practice: A mixed-methods investigation of an adapted mindfulness-based stress reduction program for health care professionals* (Doctoral thesis, McGill University, 2011). Retrieved from http://digitool.library.mcgill.ca/webclient/StreamGate?folder_id=0&dvs=1_550629526855~937
- Janssen, M., Heerkens, Y., Kuijer, W., van der Heijden, B., & Engels, J. (2018). Effects of Mindfulness-Based Stress Reduction on employees' mental health: A systematic review. *PLoS ONE, 13*(1), 1- 37. <http://doi.org/10.1371/journal.pone.0191332>
- Kabat-Zinn, J. (1994). *Wherever you go there you are*. New York, USA: Hyperion.
- Kabat-Zinn, J. (2003a). Mindfulness-based stress reduction (MBSR). *Constructivism in the Human Sciences, 8*(2), 73- 83.
- Kabat-Zinn, J. (2003b). Mindfulness-based interventions in context: past, present, and future. *Clinical psychology: Science and practice, 10*(2), 144-156. <https://doi.org/10.1093/clipsy.bpg016>

- Kabat-Zinn J (1990). *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain and Illness*. New York, USA: Delacorte.
- Karasek Jr, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly*, 24(2), 285-308. <https://doi.org/10.2307/2392498>
- Khoury, B., Lecomte, T., Fortin, G., Masse, M., Therien, P., Bouchard, V., ... & Hofmann, S. G. (2013). Mindfulness-based therapy: a comprehensive meta-analysis. *Clinical Psychology Review*, 33(6), 763-771. <https://doi.org/10.1016/j.cpr.2013.05.005>
- Klatt, M. D., Buckworth, J., & Malarkey, W. B. (2009). Effects of low-dose mindfulness-based stress reduction (MBSR-ld) on working adults. *Health Education & Behavior*, 36(3), 601-614. <https://doi.org/10.1177/1090198108317627>
- Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for t-tests and ANOVAs. *Frontiers in Psychology*, 26(4), 1-12. <https://doi.org/10.3389/fpsyg.2013.00863>
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York, USA: Springer Publishing Company.
- Linger, R. A. (2016). *A qualitative study of a mindfulness-based coaching intervention for perception shifts and emotional regulation around workplace stressors and quality of worklife* (Doctoral thesis, Saybrook University, 2014). Retrieved from <https://search.proquest.com/docview/1658210042?pq-origsite=gscholar>
- Lins, L., & Carvalho, F. M. (2016). SF-36 total score as a single measure of health-related quality of life: Scoping review. *SAGE Open Medicine*, 4, 1-12. <https://doi.org/10.1177/2050312116671725>
- Lipsey, M. W., & Wilson, D. B. (2001). *Applied social research methods series; Vol. 49. Practical meta-analysis*. Thousand Oaks, CA, US: Sage Publications, Inc.
- Littell, J., Corcoran, J., & Pillai, V. (2008). *Systematic reviews and meta-analysis (Pocket guides to social work research methods)*. New York, USA: Oxford University Press.
- Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with

- the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy*, 33(3), 335-343. [https://doi.org/10.1016/0005-7967\(94\)00075-U](https://doi.org/10.1016/0005-7967(94)00075-U)
- Lutz, A., Slagter, H. A., Rawlings, N. B., Francis, A. D., Greischar, L. L., & Davidson, R. J. (2009). Mental training enhances attentional stability: neural and behavioral evidence. *Journal of Neuroscience*, 29(42), 13418-13427. <https://doi.org/10.1523/JNEUROSCI.1614-09.2009>
- Marks, D. F. (1999). Consciousness, mental imagery and action. *British Journal of Psychology*, 90(4), 567-585. <https://doi.org/10.1348/000712699161639>
- Marks, N., & Shah, H. (2004). A well-being manifesto for a flourishing society. *Journal of Public Mental Health*, 3(4), 9-15. <https://doi.org/10.1108/17465729200400003>
- Maslach, C., & Jackson, S. E. (1981). The measurement of experienced burnout. *Journal of Organizational Behavior*, 2(2), 99-113.
- Merkes, M. (2010). Mindfulness-based stress reduction for people with chronic diseases. *Australian Journal of Primary Health*, 16(3), 200-210. <https://doi.org/10.1071/PY09063>
- Molek-Winiarska, & Żołnierczyk-Zreda. (2018). Application of mindfulness-based stress reduction to a stress management intervention in a study of a mining sector company. *International Journal of Occupational Safety and Ergonomics*, 24(4). 546-556. <https://doi.org/10.1080/10803548.2018.1452843>.
- Moore, A., & Malinowski, P. (2009). Meditation, mindfulness and cognitive flexibility. *Consciousness and Cognition*, 18(1), 176-186. <https://doi.org/10.1016/j.concog.2008.12.008>
- Murphy, R. L. (1995). Managing job stress: an employee assistance/human resource management partnership. *Personnel Review*, 24(1), 41-50. <https://doi.org/10.1108/00483489510079075>
- Murphy, L. R., & Sauter, S. L. (2003). The USA perspective: Current issues and trends in the management of work stress. *Australian Psychologist*, 38(2), 151-157. <https://doi.org/10.1080/00050060310001707157>
- Mrazek, M. D., Franklin, M. S., Phillips, D. T., Baird, B., & Schooler, J. W. (2013). Mindfulness training improves working memory capacity and GRE performance while reducing mind wandering. *Psychological Science*, 24(5), 776-781. <https://doi.org/10.1177/0956797612459659>

- Neubauer, A. C., & Fink, A. (2009). Intelligence and neural efficiency. *Neuroscience & Biobehavioral Reviews*, *33*(7), 1004-1023.
<https://doi.org/10.1016/j.neubiorev.2009.04.001>
- Newell, D. J. (1992). Intention-to-treat analysis: implications for quantitative and qualitative research. *International Journal of Epidemiology*, *21*(5), 837-841. <https://doi.org/10.1093/ije/21.5.837>
- Ocasio, W. (2011). Attention to attention. *Organization Science*, *22*(5), 1286-1296. <https://doi.org/10.1287/orsc.1100.0602>
- Ortner, C.N.M., Kilner, S.J., & Zelazo, P.D. (2007). Mindfulness meditation and reduced emotional interference on a cognitive task. *Motivation and Emotion*, *31*(4), 271–283. <https://doi.org/10.1007/s11031-007-9076-7>
- Orwin, R. G. (1983). A fail-safe N for effect size in meta-analysis. *Journal of Educational Statistics*, *8*(2), 157-159. Retrieved from <https://www.jstor.org/stable/1164923>
- Otenyo, E. E., & Smith, E. A. (2017). An overview of employee wellness programs (EWPs) in large US cities: Does geography matter?, *Public Personnel Management*, *46*(1), 3-24.
<https://doi.org/10.1177/0091026016689668>
- Pagnoni, G. 2012. Dynamical properties of BOLD activity from the ventral posteromedial cortex associated with meditation and attentional skills. *The Journal of Neuroscience*. *32*(15), 5242-5249.
<https://doi.org/10.1523/JNEUROSCI.4135-11.2012>
- Price, R. H., & Hooijberg, R. (1992). Organizational exit pressures and role stress: Impact on mental health. *Journal of Organizational Behavior*, *13*(7), 641-651. <https://doi.org/10.1002/job.4030130702>
- Quaglia, J. T., Brown, K. W., Lindsay, E. K., Creswell, J. D., & Goodman, R. J. (2015). *From conceptualization to operationalization of mindfulness*. Retrieved from <https://pdfs.semanticscholar.org/234b/a4cf66586b4a8f0f4c6bb70b538711ff7f3c.pdf>
- Quick, J. C., Wright, T. A., Adkins, J. A., Nelson, D. L., & Quick, J. D. (2013). *Preventive stress management in organizations* (2nd ed.). Washington, DC, US: American Psychological Association.
- Reber, A. (1995). *Dictionary of psychology* (2nd ed.). Harmondsworth, England: Penguin.

- Richardson, K. M., & Rothstein, H. R. (2008). Effects of occupational stress management intervention programs: A meta-analysis. *Journal of Occupational Health Psychology, 13*(1), 69-93. <https://doi.org/10.1037/1-76-8998.13.169>
- Roche, M., Haar, J. M., & Luthans, F. (2014). The role of mindfulness and psychological capital on the well-being of leaders. *Journal of Occupational Health Psychology, 19*(4), 476.-489.
<http://dx.doi.org.ezproxy.waikato.ac.nz/10.1037/a0037183>
- Roeser, R. W., Schonert-Reichl, K. A., Jha, A., Cullen, M., Wallace, L., Wilensky, R., ... & Harrison, J. (2013). Mindfulness training and reductions in teacher stress and burnout: Results from two randomized, waitlist-control field trials. *Journal of Educational Psychology, 105*(3), 787- 804. <http://doi.org/10.1037/a0032093>
- Rosenthal, R. (1979). The file drawer problem and tolerance for null results. *Psychological Bulletin, 86*(3), 638- 641. <http://dx.doi.org/10.1037/0033-2909.86.3.638>
- Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57*(6), 1069-1081.
<http://dx.doi.org/10.1037/0022-3514.57.6.1069>
- Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology, 52*(1), 141-166.
<https://doi.org/10.1146/annurev.psych.52.1.141>
- Santorelli S (2000). *Heal Thy Self: Lessons on Mindfulness in Medicine*. NY, USA: Bell Tower Publications.
- Seligman, M. E. P. (2002). *Authentic happiness: Using the new positive psychology to realize your potential for lasting fulfilment*. London, England: Nicholas Brealey Publishing.
- Selye H. (1976) Stress without Distress. In G. Serban G. (Eds.), *Psychopathology of Human Adaptation* (pp. 137- 146). Boston, MA: Springer.

- Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*(3), 373-386.
<https://doi.org/10.1002/jclp.20237>
- Shilpashree, R. & Sathish Kumar, B.Y. (2011). A study on anti-stress property of Nardostachys jatamamsi on stress induced Drosophila melanogaster. *Journal of Stress Physiology & Biochemistry, 7*(3). 159- 164.
- Sibinga, E. M., Kerrigan, D., Stewart, M., Johnson, K., Magyari, T., & Ellen, J. M. (2011). Mindfulness-based stress reduction for urban youth. *The Journal of Alternative and Complementary Medicine, 17*(3), 213-218.
<https://doi.org/10.1089/acm.2009.0605>
- Sorgi, A. (2016). *Online mindful stress management for the military: A study using a civilian population* (Doctoral thesis, Adler University, 2015). Retrieved from <https://search.proquest.com/docview/1845881537?pq-origsite=gscholar>
- Strauman, T. J., & Merrill, K. A. (2004). The basic science/clinical science interface and treatment development. *Clinical Psychology: Science and Practice, 11*(3), 263-266. <https://doi.org/10.1093/clipsy.bph081>
- Tang, Y. Y., Hölzel, B. K., & Posner, M. I. (2015). The neuroscience of mindfulness meditation. *Nature Reviews Neuroscience, 16*(4), 213- 225.
- Tennant, C. (2001). Work-related stress and depressive disorders. *Journal of Psychosomatic Research, 51*(5), 697-704. [https://doi.org/10.1016/S0022-3999\(01\)00255-0](https://doi.org/10.1016/S0022-3999(01)00255-0)
- Troop, N. A., Holbrey, A., & Treasure, J. L. (1998). Stress, coping, and crisis support in eating disorders. *International Journal of Eating Disorders, 24*(2), 157-166. [https://doi.org/10.1002/\(SICI\)1098-108X\(199809\)24:2<157::AID-EAT5>3.0.CO;2-D](https://doi.org/10.1002/(SICI)1098-108X(199809)24:2<157::AID-EAT5>3.0.CO;2-D)
- The Treasury. (2010). *Health Care*. Retrieved from <http://www.treasury.govt.nz/publications/research-policy/wp/2010/10-01/23.htm>
- Trowbridge, K., Lawson, L.M , Andrews, S., Pecora, J., & Boyd, S. (2017). Preliminary investigation of workplace-provided compressed mindfulness-based stress reduction with pediatric medical social workers. *Health & Social Work, 42*(4), 207-214. <https://doi.org/10.1093/hsw/hlx038>.

- Trunnell, E. P., & Braza, J. F. (1995). Mindfulness in the workplace. *Journal of Health Education, 26*(5), 285-291.
<https://doi.org/10.1080/10556699.1995.10603116>
- Van den Hurk, P. A., Giommi, F., Gielen, S. C., Speckens, A. E., & Barendregt, H. P. (2010). Greater efficiency in attentional processing related to mindfulness meditation. *Quarterly Journal of Experimental Psychology, 63*(6), 1168-1180.<https://doi.org/10.1080/17470210903249365>
- Van Gordon, W. V., Shonin, E., & Griffiths, M. D. (2015). Towards a second generation of mindfulness-based interventions. *Australian & New Zealand Journal of Psychiatry, 49*(7), 591–592.
<https://doi.org/10.1177/0004867415577437>
- Virgili, M. (2015). Mindfulness-based interventions reduce psychological distress in working adults: a meta-analysis of intervention studies. *Mindfulness, 6*(2), 326-337. <https://doi.org/10.1007/s12671-013-0264-0>
- Walach, H., Nord, E., Zier, C., Dietz-Waschkowski, B., Kersig, S., & Schüpbach, H. (2007). Mindfulness-based stress reduction as a method for personnel development: A pilot evaluation. *International Journal of Stress Management, 14*(2), 188-198. <http://dx.doi.org/10.1037/1072-5245.14.2.188>
- Ware Jr, J. E., Kosinski, M., & Keller, S. D. (1996). A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. *Medical Care, 34*(3), 220-233.
- Weick, K. E., & Roberts, K. H. (1993). Collective mind in organizations: Heedful interrelating on flight decks. *Administrative Science Quarterly, 38*(3), 357-381. <https://doi.org/10.2307/2393372>
- World Health Organisation (WHO). *Mental health: a state of well-being*. Retrieved from https://www.who.int/features/factfiles/mental_health/en/
- Wright, T. A., Cropanzano, R., Bonett, D. G., & Diamond, W. J. (2009). The role of employee psychological well-being in cardiovascular health: When the twain shall meet. *Journal of Organizational Behavior, 30*(2), 193-208.
<https://doi.org/10.1002/job.592>