Mindfulness and Employees in the Workplace

By

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Date: 5th October, 2018
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Abstract

The overall aim of this research is to identify the impact of a brief, low-cost mindfulness meditation training program for employees in a workplace setting, specifically in the UK higher education sector. Although there has been extensive research on the efficacy of mindfulness training for perceived stress of employees, to date, there has been limited research exploring the following: (a) impact of mindfulness-based training interventions on work-related outcomes (b) long-term impact of those interventions, and (c) use of self-help training interventions (low-cost) without supplementary guidance.

This thesis aimed to address the research gaps through three empirical studies. Firstly, Study 1 used a randomised waitlist control trial design ($N = 125$) to assess the impact of offering a mindfulness-based intervention to employees. Intention-to-treat analysis showed improvements in mindfulness and perceived stress after the offer of the Headspace® app. With higher levels of participation, results showed progressively greater improvements in mindfulness, perceived stress and two work-related outcomes, work-life-balance and emotional job engagement. Study 2 then used a longitudinal (12 months) repeated-measures design ($N = 60$) to investigate the extent to which the amount of Headspace app usage predicted mindfulness, perceived stress and work-related outcomes. Simple regression analysis showed that higher Headspace usage led to greater improvements in work-life-balance and emotional job engagement, however other outcomes were not significant. Study 3 used a qualitative design ($N = 13$) to explore participants’ 12-months experiences of practicing mindfulness, and the perceived impact on their workplace issues. From a thematic analysis of phone interview transcripts, three themes evolved: challenges (workplace related), selective focus (experience of mindfulness), and work impact (from more mindful approach to workplace).

Overall, the findings from this thesis provide support for the effectiveness of brief mindfulness-based training in improving mindfulness and perceived stress. The findings demonstrate that those who use a mindfulness training app can improve their work-life balance and emotional job engagement within two months and both work-related outcomes can be improved with increased usage over one year, although improvements do not increase in mindfulness and perceived stress, and other work-related outcomes. Finally, this thesis contributes to research on the use of digital smart-phone apps as an effective delivery method of mindfulness-based training.
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CHAPTER ONE

Introduction and Literature Review

This PhD research programme began in 2015 with the aim of identifying the impact of a brief, low-cost mindfulness meditation training program for employees in a workplace setting. Workplaces, especially in the higher education sector, can be stressful environments for employees, and mindfulness training can be effective in reducing perceived stress levels. However, a low-cost training program is needed since mindfulness training for employees has tended to be based on costly training programs which are primarily delivered face-to-face to groups (Lomas et al., 2017). Furthermore, there are many alternative stress-management interventions available for employers to choose from, so this thesis set out to provide convincing evidence to employers of the additional positive benefits from a mindfulness-based training intervention.

In the current chapter, I discuss the general background of the thesis, starting with a problem statement, and then introduce key concepts and relevant research literature related to both stress and mindfulness, with a conclusion presenting how gaps in the existing literature will be addressed by this thesis, and finally, the thesis structure.

1.0 Background to Present Research

Problem statement.

Work-related stress is an issue for many organisations, for example, in the higher education sector. Organisations can implement stress management interventions (SMIs) as part of their well-being or wellness programs. SMIs can include actions targeted at an organisational-level to remove, reduce or replace the work-related causes (stressors), and at an individual-level to help employees manage stress more effectively.

However, management and employees have concerns which should be considered when selecting an intervention to help employees manage stress. Many employers have limited budgets so they need affordable interventions which can be seen to address their work-related concerns (e.g. turnover, productivity). The UK higher education (HE) sector is an example of organisations with budget constraints and increased regulatory demands (Kinman & Court, 2010). Additionally, employees have very busy work and home lives so they need a flexible stress management intervention to fit around these demands. Employees
in the UK higher education sector work long hours which can generate high levels of work and home life conflict (Kinman, Jones, & Kinman, 2006).

**Interest in mindfulness.**

There are a number of effective stress-management interventions, and mindfulness meditation training is an intervention which has been shown to be effective in reducing stress in employees.

Interest in the benefits of mindfulness in the workplace has been increasing over time. In 2014, a special mindfulness all-party parliamentary group was set up in the United Kingdom (UK), and in 2016, with the contributions of representatives from major UK corporations in the Private Sector Working Group (2016), a report was published to aid organisations who are considering introducing mindfulness training. Although the report identified three areas where mindfulness can benefit workplace functioning (wellbeing, relationships, and performance), and included a number of case studies where increased mindfulness was effective, they acknowledged that research on the benefits of mindfulness training is in its infancy. They stated that research could be improved by the adoption of better methods, using for example randomised control trials (RCT), and conducting a mix of quantitative and qualitative studies.

Although mindfulness-based training interventions in the workplace are typically associated with improvements in mental health and well-being, benefits which resonate with more work-related objectives could help in the assessment of training for employers considering an investment in mindfulness training. The UK Private Sector Working Group (2016) report listed mindfulness training options which included teacher-led programs, virtual webinars, and digital programs and apps. Of course, this assumes that mindfulness can be improved by training.

Given my interest in the benefits of mindfulness training for employees and employers, I started my search of literature in 2015 exploring how mindfulness has been linked to work-related contexts. I found observational studies which examined the association of dispositional mindfulness with aspects of employee workplace functioning (e.g., job performance, job engagement, work-family balance), however the conclusions from my search were that the focus of most mindfulness-based intervention (MBI) literature has been on employee health and wellbeing (e.g., stress) with relatively few studies examining
work-related improvements. Following an early assessment of the literature, I identified a number of work-related outcomes which could potentially help individuals to build a business case for introducing mindfulness-based training that would be of benefit to employees and employers. I observed from the early assessment of literature that, although there was interest in low-cost and effective mindfulness-based training interventions, most workplace interventions included at least some components requiring group-based delivery which relied on skilled instructors and, as a result the interventions did not provide fully flexible training that could be conducted whenever and wherever an employee wished. One of my considerations is that organisations operate in different circumstances (e.g., large corporates may require very flexible training delivery for their employees across the globe, and small companies may have limited budgets available to fund training). For the findings of this research to have applicability to a wide range of organisations, particularly those in the higher education sector, a reputable, fully flexible, and low-cost MBI was required. Depending on the organisational culture, organisations can then separately determine how they would support the training offer with marketing and on-going support. Although costs and return on investment are important parts of building a business case, they are excluded from this thesis since they are influenced by aspects which are specific to an organisation. This thesis therefore aims to explore the impact of a flexible, low cost mindfulness-based intervention in a workplace setting, and uses a multi-methods approach as a means to assess the impact of the intervention and participants’ experiences of change.

This chapter is structured as follows: (a) an introduction to work-related stress and stress management interventions provided by organisations, specifically applied to the UK higher education sector, (b) an introduction to mindfulness and its relevance in the general workplace context, mindfulness-based interventions (MBI), and information about the MBI selected for use in this thesis, (c) an overview of two different environments, clinical and educational, in which MBIs have been applied before presenting, (d) literature on workplace MBI studies, a critical analysis of the literature, and the identification of gaps to be addressed this thesis, and (e) a presentation of outcomes used in this thesis. Lastly, this chapter presents a thesis summary, explaining how the gaps will be addressed, with the aims and hypotheses of the thesis, thesis structure, and a study methods flow chart.
1.1 Stress and Stress Management Interventions

Work-related stress.

Work-related stress is a concern for employers. Individuals experience stress when they perceive that their capacity to cope with their environment (or event) is exceeded by the demands made of them and which threatens their wellbeing (Lazarus, 1984). The objective characteristics of working conditions (stressors) are different to stress, which is an employee’s perception and response to the stressors (Belkić & Savic, 2013). Work-related stress is associated with job content, work intensity, work-life balance, social environment, job security and career development (European Commission, 2016). Work-related stress can result in negative psychological conditions such as burnout (Marin et al., 2011), and depression (J. S. Lee, Joo, & Choi, 2013), and physical health problems such as cardiovascular heart disease. The European Commission (2016) published a booklet which provided practical guidance for employers on work-related stress and listed the impact on organisations (e.g., absenteeism, high staff turnover, aggressive communication, reduced output, increase health service referrals and costs). In the UK, the Health and Safety Executive (HSE) provided extensive guidance on work-related stress (Health and Safety Executive, ca. 2018) including a set of management standards covering the sources of work-related stress (stressors), and the organisational characteristics and culture needed to manage and control the risks of work-related stress. The need for guidance to UK employers is made evident by a recent report by the Health and Safety Executive (2018) which stated that, of work-related ill health in 2017/18, the greatest numbers of cases (44%) were from work-related stress, anxiety or depression, and these cases accounted for 57% of lost working days. Workload was the highest cause (44%) of work-related stress, anxiety or depression, and of the 595,000 workers affected, 239,000 were new cases. The Health and Safety Executive (ca. 2018) stated that, in 2017/18, there was an average of 25.8 days taken off work for each affected worker. A recent study examined litigated cases in UK courts where claimants (worker making the complaint) cited workplace stress in their complaint (Lockwood, Henderson, & Stansfeld, 2017). Commonly cited causes were excessive workload; and to a lesser extent poor management practices (organisation or economic); or technical changes, management style or colleague bullying. Most claimants did not return to work for the employer (defendant). In their analysis, they found that claimants were successful in only six percent of the cases analysed. The study found that a significant factor in avoiding legal action was the existence of effective workplace stress management policies, and that such
policies gave employees confidence that their employer was seriously trying to deal with the contributors to workplace stress.

**Stress in the UK higher education (HE) sector.**

Past research into work-related stressors and stress in the UK higher education (HE) sector has shown high levels of stressors, an indication of associated levels of stress, with studies concluding that stress management interventions are needed in the UK HE sector to address work-related stress. Tytherleigh, Webb, Cooper, and Ricketts (2005) conducted a study which examined the levels of eight job-related stressors and two outcomes (physical health and psychological well-being) in a sample of 3808 UK higher education (HE) employees and compared their levels with norms for 9188 UK public and private sector organisations. The eight stressors were interpersonal relationships, work–life balance, work overload, job security, control, resources and communication, remuneration, and overall job. They found that, across the role categories (academic, clerical and support), four of the eight stressors exceeded the norms (job security, work relationships, lack of control, resources and communication), with job security the highest concern. They found that commitment levels perceived from and towards their organisations, were significantly lower than norm, however psychological well-being was normative. In a study comparing levels of stressors in the UK higher education sector between 1998 and 2004, (Kinman et al., 2006) found that full-time employees worked long hours which generated high levels of work and home life conflict, the predictor of high levels of psychological distress. More recently, (Kinman & Court, 2010) conducted a study which examined the levels of seven job-related stressors in a sample of 9740 UK higher education (HE) employees and compared their levels with the UK Health and Safety Executive (HSE) recommended levels. The seven stressors were demands, control, managerial support, peer support, interpersonal relationships, role clarity and fit, and involvement in organisational change. They found that six of the seven stressors exceeded the HSE recommended levels (job control was the exception) with two stressors, demands and management of change representing the largest difference. They suggested that the increased numbers of students, budget constraints and increased regulatory demands faced by the UK higher education sector exacerbated the pressures. In 2012, more than 14,000 UK university employees completed an occupational stress survey conducted by the University and College Union. Reporting on the survey results, Grove (2012) stated that work-life was too demanding for staff, and that staff stress levels were high and were increasing. Stated
causes of stress included conflicting demands from management, workloads, time pressures and unachievable deadlines.

**Stress and the individual.**

An individual’s recognition of stress and their decision to seek help may arise after a period of sustained stress rather than occasional events (Lazarus, 1984). There are a number of ‘helping’ models which attribute responsibility for problem creation and solution. An example is a *compensatory* model, where people are responsible for the solutions to their problems but not responsible for their problems (Lazarus, 1984). If people attribute responsibility for the solution with themselves, they may increase their competence. An example of an individual acknowledging responsibility for solving stress caused by their workplace environment is conveyed in an interview with an American university student services employee who believed that he had three choices in responding to his stressful workplace: changing the situation, leaving the job or accepting the situation and dealing with it (Santovec, 2010).

There are differences in the way individuals are affected by stressors (Lazarus, 1984) and these differences may influence stress outcomes (Ivancevich, Matteson, Freedman, & Phillips, 1990). To cater for these differences organisations are encouraged to implement stress management interventions (SMI) which consist of multiple stress management service offerings. People may try a number of options before finding an approach which is effective for them (Lazarus, 1984).

**Stress management interventions (SMIs).**

The European Commission (2016) booklet provided guidance for employers which suggested that organisations can take steps to implement prevention and protection measures related to occupational risk factors. Stress management interventions (SMI) can form part of organisation wellbeing programs provided on or off-site which are aimed at improving employee health and well-being (Richardson, 2017). SMIs are activities or programs developed by organisations which focus on either reducing work-related stressors, or offers of help for individuals to reduce the negative outcomes arising from exposure to the stressors (Ivancevich et al., 1990). Organisations have implemented a variety of stress management interventions (SMI), which can be categorised as one of three types (Giga, Noblet, Faragher, & Cooper, 2003; Ivancevich et al., 1990). SMIs can be targeted at the level of the: (1)
organisation, or (2) interface between the individual and organisation (both levels are sometimes labelled primary prevention where collective measures are taken to address the source of stress to remove, reduce or replace it), and (3) individual (providing help to individual employees which includes stress education and training in arousal reduction skills and coping strategies). Good examples of organisation level interventions are the provision of clear job descriptions, a positive work environment (e.g., recognition and reward for employee achievements), regular training, and sense of job security; suggestions made in a study by Halkos and Bousinakis (2010). And more recently, alternative organisational level approaches have been explored, for example incentivising managers to promote employee health and wellness by linking their actions to part of their annual salary increases (Robbins & Wansink, 2016). Individual and organisation interface interventions are role related (e.g., interpersonal relationships, employee participation in decision-making). Examples of interventions targeted at individuals are employee assistance programs (EAP) which are usually third-party workplace counselling services, cognitive-behavioural therapy (CBT), relaxation training, meditation, journaling, and physical exercise. Giga et al. (2003) conducted a review of research on UK stress management interventions and found that most SMIs were targeted at the individual level, and they found that two interventions, CBT and EAP, were most common. All three SMI levels are inter-dependent; and individual level SMIs have little effect without addressing stressors that employees encounter at an organisation level (Wheeler & Lyon, 1992). Without an integrated approach, it is suggested that employees may be less motivated to participate in SMIs (Flaxman & Bond, 2010). Additionally, Murphy (1995) suggested that active involvement by employees in SMI program development, implementation and evaluation is important to long-term success. Schabracq et al. (2003) suggested that organisations need to change their perspective on stress prevention and management from one of cost containment to one of improving organisational health and increasing productivity. These recommendations put into context the scope of this thesis which examines the impact of an intervention targeted at the individual level.

When selecting individual level stress management interventions, there is a variety to choose from. Most interventions, with the exception of meditation, are significantly modified versions of interventions which originated from the field of clinical psychology. Interventions include progressive muscle relaxation intervention (PMR; where muscle groups are alternatively tensing and relaxing), biofeedback training for reactivity to arousal in
muscle and skin, meditation techniques to relax the mind while remaining attentive, physical exercise to increase resilience to stress, and cognitive-behavioural skills training to help individuals evaluate and change their thoughts, attitudes and behaviours.

There are three strategies in individual level stress management interventions and they can be classed as: (1) somatic, where a state of deep muscle relaxation is achieved by focusing on the reduction of muscle tension levels, this is considered to be an emotion-focused coping method to reduce symptoms but not the sources of stress; (2) mental, another emotion-focused coping method where the focus is on mental quieting and this can also be accompanied by physical relaxation; and (3) cognitive, a problem-coping method where the focus is on analysing thinking patterns and learning how to deal with problems directly (Schabracq et al., 2003). PMR focuses on somatic processes, and meditation focuses on mental processes; both do not seek to change the sources of stress. In a consolidation of the findings of three reviews of SMI research, Schabracq et al. (2003) highlighted that the combination of cognitive-behavioural skills training (cognitive focus) and muscle relaxation (somatic focus) was the most common and effective type of stress intervention.

More recently, Richardson and Rothstein (2008) conducted a meta-analysis of 36 randomised control trial (RCT) research studies on individual-level programs for stress-management interventions (excluding EAPs) with participants from working populations. The studies included a range of occupations and countries (predominately US), and used self-reports for psychological measures. They found that relaxation techniques were the most common primary treatment, followed by meditation; both techniques (used by 69% of the studies) generated medium effect sizes. They speculated that treatment simplicity could account for the treatment popularity. The primary intervention for seven of the reviewed studies used cognitive-behavioural interventions (CBI), and CBIs generated larger effect sizes than other interventions. Richardson and Rothstein (2008) speculated that the large effect sizes of CBIs, compared with other techniques might be attributed to the different goals of the methods. They stated that relaxation and meditation techniques are passive with the aim of transferring attention from stressors by increasing awareness of body tension and letting the tension go; whereas CBI techniques are more active with the aims of empowering individuals to control negative thoughts and feelings, and changing behaviour by identifying and practicing responses that are more functional.
Recent advances in technology have provided new opportunities to provide stress management interventions to a wide population (Blázquez Martín, De La Torre, García-Zapirain, Lopez-Coronado, & Rodrigues, 2018). Ebert et al. (2016) conducted a RCT study to evaluate the impact over six months of a self-guided internet-based stress management intervention on German insurance company employees’ perceived stress. The intervention content included material on problem-solving and emotional regulation. The results of their intention-to-treat analysis showed that perceived stress was significantly lower compared with their waitlisted control group at post-intervention (7-weeks; large effect size) and at follow-up (6-months; moderate effect size). Additionally, they found a significant improvement in work engagement at post-intervention. It can be costly for organisations to implement and run well-being programs (Parks & Steelman, 2008) so recent advances in technology expand the number of affordable stress management intervention options available.

**Individual-level stress management interventions in the higher education sector.**

Since 2000 in the UK, there have been a number of publications and organisations promoting mental wellbeing in higher education, for example the Healthy Universities Network (Universities UK, 2015). As of 2015, a mental health policy was in place in around 85% of UK universities (Shaw, 2015). In addition to providing mental health information and training to their community of staff and students, universities provide advice on local or national external agencies such as National Health Services (NHS) General Practitioners or specialist services; and they promote mental health and wellbeing by developing partnerships with institutions and agencies such as the Samaritans and Mind (Universities UK, 2015) and Mental Health First Aid England (MHFA; Matthews, 2017).

As explained earlier, there are many individual-level stress-management interventions available to universities to offer. A few examples of research on individual-level stress-management interventions trialled in HEs include: walking, relaxation, mindfulness. The following studies have examined psychological measures of stress.

Some wellbeing programs offer programs which address individuals’ fitness, focusing on fitness only or incorporate additional components such as nutritional advice and stress reduction training (Parks & Steelman, 2008). In an analysis of data from a 1994 health survey sample of 17,626 Canadian residents, Iwasaki, Zuzanek, and Mannell (2001) found that paid workers who had higher levels of participation in physically active leisure had
significantly lower levels of work stress. One study (Hecht & Boies, 2009) examined the association of engagement in sports, recreation or fitness for a sample of 293 Canadian university employees and found a higher level of life satisfaction for those who engaged in those activities, although they found no relation to work outcomes. These studies provide background to two, more recent pre/post cross-sectional design studies which examined the impact on perceived stress from brief (4-5 weeks) walking interventions with US university employee samples (Fischer, 2016; Leininger, Orozco, & Adams, 2014). Perceived stress reduced significantly in both studies.

A three-arm RCT design study (Gustitus, 1997) compared the impact on occupational stress from a progressive muscle relaxation intervention (PMR), an adapted version of autogenic training (consisting of passive relaxation with self-directed mental images to reduce arousal) and wait-list control. The results for the small sample group of 39 employees of a US university, showed no significant results for either of the two relaxation groups.

A two-arm, RCT design study examined the impact on perceived stress from a brief (6 weeks) mindfulness-based stress-reduction intervention with a small sample of 48 employees in a US university (Klatt, Buckworth, & Malarkey, 2009). Perceived stress reduced significantly.

**An individual-level stress management intervention for this thesis.**

It is acknowledged that individual level interventions should not to be implemented in isolation; organisational level issues must be addressed as well. However, an individual level intervention, mindfulness meditation, has been selected for use in this thesis since each level of intervention is worthy of research on its own, and employees often are not able to influence the stressors in their work environment. Meditation is a stress management intervention which focuses on mental processes but does not seek to change the sources of stress. Since one is less likely to avoid unpleasant stimuli when mindful, it may take time to adjust to attending these stimuli (mindfulness concepts are presented in section 1.2).

Results of studies using CBIs have generated larger effect sizes than other interventions (Richardson & Rothstein, 2008), however a more recent meta-analysis of a larger number (209) of studies (Khoury et al., 2013) found no difference between mindfulness-based therapies (MBT) and traditional cognitive-behaviour therapy (CBT). They found that MBTs were very effective in reducing anxiety, depression, and stress. Although stress levels of university employees, the sample population for this thesis, may be high, meditation
interventions should be appropriate when used with non-clinical populations. Individuals may experience discomfort or anxiety when practicing relaxation techniques during meditation although this is associated with individuals diagnosed with chronic anxiety (Schabracq et al., 2003) or in some long-term meditators (D. H. Shapiro, 1992). Lastly, based on the findings of Richardson and Rothstein (2008), medium effect sizes can be expected for meditation interventions which is lower than the sizes found for CBT interventions.

**Summary.**

Work-related stress is a concern for employers. Pressures faced by the higher education sector in the UK generate high levels of stressors, ranging from workplace demands, a lack of managerial support and peer support, difficult interpersonal relationships, lack of role clarity and fit, and a lack of involvement in organisational change. Universities can develop and implement stress management interventions which include actions at an organisational level to address stressors that would help to prevent the development of employee stress, and at an individual level to help equip their employees to manage stress. There are two type of coping: emotion and problem. There are three types of strategies used by individual level interventions: somatic, mental, and cognitive processes. Meditation training is an example of an emotion-coping technique which focuses on mental processes. Cognitive-behavioural interventions (CBI) are problem-coping techniques which focus on cognitive processes. One meta-analysis of studies on individual-level programs for stress-management interventions (Richardson & Rothstein, 2008) found that cognitive-behavioural interventions (CBI) and CBIs generated larger effect sizes than other interventions. A second meta-analysis (Khoury et al., 2013), found no difference between mindfulness-based therapies and traditional cognitive-behaviour therapy (CBT). Meditation training, specifically mindfulness meditation training was selected as the stress management intervention for this thesis.

An introduction to the key concepts and relevant research literature related to mindfulness, mindfulness training interventions and key applications follows.
1.2 Mindfulness and its Applications

What is mindfulness.

Mindfulness is a popular term in society today but what does it mean? A widely used definition of mindfulness is from Kabat-Zinn (2004, p. 4) “Mindfulness means paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally”, and he suggests that mindfulness is a dynamic process that is intra- and inter-personal. This is one example of the secular definitions that have developed in the West since the 1970s; some of which are based on Eastern contemplative traditions (e.g., Buddhism).

The western association of mindfulness with Buddhism started in 1881 with the publication of the T.W. Rhys Davids translation of a Pali text, Mahāparinibbāna Sutta (Sun, 2014). Most western mindfulness meditation centres have their roots in the Theravada branch of Buddhism, one of two main branches of Buddhism, Theravada and Mahayana (Cullen, 2011). When practicing mindfulness meditation, one contemplates the four foundations of body, feelings, states of mind and the experience of phenomena, with the intention of eliminating suffering and attaining nirvana (Cullen, 2011; Sun, 2014).

Sati, otherwise known as mindfulness (Sun, 2014), is one of the mental factors in Theravada psychology. Sati is a lucid awareness (lacking confusion and remembering), with a skilful attentiveness in the present that is good or right, supporting ethical conduct (Cullen, 2011; Sun, 2014). The application of awareness in support of ethical conduct is not common across all Buddhist branches. The Tibetan branch views mindfulness as a neutral mental factor where individuals can be mindful regardless of ethical conduct (Cullen, 2011).

Mindfulness brings together other factors of enlightenment such as basic goodness (loving kindness, compassion and sympathetic joy) and equanimity which provides the insight required to experience with openness, and an understanding of the equality of living beings. By combining these factors, mindfulness is orientated to non-harming (Cullen, 2011).

Bare attention and metacognition.

Mindfulness was further characterised as bare attention by a German monk, Ven. Nyanaponika Thera during the 1960s (Sun, 2014). Bare attention is the observation of
stimuli in an open, receptive and non-judgmental way without reaction in reference to self (Sun, 2014). The idea of mindfulness as bare attention has influenced the development of secular mindfulness and, in particular, the Kabat-Zinn (2004) definition of mindfulness which is based on three components: (a) the intention of mindfulness practice, (b) attention to moment-to-moment experience, and (c) attitude of openness, curiosity and non-evaluation.

The concept of bare attention can be applied to employees learning mindfulness. For people to mindfully change their habitual responses, they first need to notice what is happening at the time something occurs and often this is not the case. Where the bare attention of mindfulness is wide and in the present, in mind wandering there is attentional breadth but attention to the present is low and it involves thinking about events or experiences that are not relevant to the immediate task. A workplace example of mind wandering is an employee thinking about the next meeting during a recruitment interview and writing notes down in preparation for the next meeting. Mind wandering can be beneficial in some work situations (e.g., it is associated with “ah-ha” moments that can be useful in brainstorming). However, in the workplace, employees need to be aware of the situations they are in and how that is affecting them, in a non-judgmental way so that, depending on the situation, they can selectively focus their attention or self-regulate their responses. Bennike, Wieghorst, and Kirk (2017) conducted a study with university staff participants to compare a mindfulness-based intervention (MBI; Headspace app) and a cognitive brain training intervention and found that the MBI was significantly more effective in reducing behavioural markers of mind wandering when performing a task requiring sustained attention. Although the Bennike et al. (2017) study did not examine the mechanisms of mindfulness which were responsible for the results, this study illustrates the concept of bare attention in mindfulness and how it might apply in the workplace.

Bare attention is a meta-cognitive ability which is often referred to in secular definitions of mindfulness as decentering. The process of meta-cognition can be viewed in two ways (Good et al., 2016). The first is conceptual processing where the understanding of stimuli revolves around implications to the self, often leading to negative automatic thoughts such as worrying about the future or ruminating about the past. The second is the experiential processing in mindfulness where stimuli are observed and understandings developed without bias toward the implications to self.
Jankowski and Holas (2014) suggested that the metacognition can occur implicitly and that the metacognition associated with mindfulness requires the additional prerequisite of a conscious act of an intention to be aware. This appears to align with Kabat-Zinn’s (2004) inclusion of the component *intention of mindfulness practice* in his definition of mindfulness. A difference between the two metacognitive processes was supported by a study examining the effects of an 8-week MBI on university students (Frewen, Evans, Maraj, Dozois, & Partridge, 2008). Frewen et al. (2008) found that individuals with higher mindfulness scores had negative thoughts but there were fewer of them, and when negative thoughts occurred, the more mindful individuals were better able to let the thoughts go.

In the workplace, an employee’s ability and intention to recognise negative external stimuli, such as excessive workloads, and to recognise negative internal thoughts, such as anger, can be an important step in letting the negativity go so that the employee can perform their job more effectively and not let the negativity spill over into their home life.

**Secular evolution of mindfulness.**

Western interest in mindfulness rapidly increased from the 1960s. An increased usage of the word mindfulness in published books commenced in 1960 with substantial increases in usage in the 1980s, which coincides with the publication of Kabat-Zinn’s (1982) study using a mindfulness-based stress-reduction (MBSR) program (Sun, 2014). This publication usage expansion is reflected in the number of psychology-related journal articles, increasing from 12,244 articles in 1980 to 27,113 in 2010 (Valerio, 2016). During 2008-2012, the ratio of mindfulness articles to total articles in psychology-related journals was less than 1:120. As the concept of mindfulness entered the mainstream western culture, it became increasingly removed from its Buddhist contexts. In psychology journals during 1966-2007, 95.7% of mindfulness literature was disassociated from Buddhism, and this separation increased to 97.6% of literature during 2008-2012 (Valerio, 2016).

Although there are a number of different definitions of secular mindfulness, there are three common features to many of them (Dane, 2011). First, as a state of consciousness, it is an inherent human capability to attain mindfulness, although there are dispositional differences in the levels of mindfulness between people (Dane, 2011). Second, is that a mindful state of consciousness is where attention is in the present rather than past or future. Third, mindful attention is given to both internal and external phenomena. Some of the
definitions elaborate further, for example incorporating an element of non-judgment of the experience (Dane, 2011; Kabat-Zinn, 2004).

Summary.

Mindfulness, an Eastern contemplative tradition, was adopted by the West where it evolved into a secular concept, the roots of which are based in Buddhism. An awareness and attentiveness in the present, orientated to non-harming are some of the mental factors of mindfulness. The meta-cognitive ability, bare attention, which is practiced in mindfulness, is the observation of stimuli in an open, receptive and non-judgmental way without reacting in reference to self. A common secular term for this ability is decentering and it is useful in the workplace where individuals are exposed to multiple, and sometimes negative, external and internal stimuli. There are a number of secular definitions of mindfulness and most have three common features: (a) mindfulness can be developed, although there are dispositional differences between people, (b) attention is in the present, and (c) attention is to internal and external stimuli. An element of non-judgment is incorporated in some secular definitions.

This thesis adopts the Kabat-Zinn (2004) secular definition of mindfulness comprising the three components: (a) intention of practice, (b) attention to moment-to-moment experience, and (c) attitude of openness, curiosity and non-evaluation/judgment. The Kabat-Zinn (2004) suggestion that mindfulness is a dynamic process that is intra- and inter-personal forms the basis that mindfulness can be developed through training.

1.3 How is Mindfulness Training Delivered and the Intervention Used in this Thesis

Delivery methods of mindfulness training.

The development of mindfulness can be achieved through meditation; it is not limited to one technique and meditation has been shown to elevate mindfulness levels with continuous, current practice (Bergomi, Tschacher, & Kupper, 2015). Kabat-Zinn (1982) developed one of the first mindfulness-based training interventions (MBI) for clinical populations. His intervention program, mindfulness-based stress reduction (MBSR) and other programs developed since then, such as mindfulness-based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002), were developed to be used for specific clinical conditions (respectively general stress, and depression and negative automatic thoughts).
MBCT integrates mindfulness meditation and cognitive-behavioural therapy (CBT). MBSR and MBCT programs are delivered over 8 weeks, combining weekly teacher-led group-based training with individual daily mindfulness practice. There is extensive evidence-based research which supports the efficacy of MBSR and MBCT programs.

Eberth and Sedlmeier (2012) conducted research on the effect on mindfulness by comparing pure meditation practice with programs such as MBSR and its variants. Pure meditation practice is associated with cultivating levels of mindfulness, whereas MBSR and related programs incorporate mindfulness meditation as one part of the training which includes non-mindfulness components that provide education on topics such as stress and self-care. Eberth and Sedlmeier (2012) found that MBSR programs, compared with mindfulness meditation, appear to have a greater impact on psychological wellbeing outcomes than on mindfulness which indicates that research outcomes of studies using programs such as MBSR may not be solely attributed to mindfulness meditation. Another intervention created for clinical applications, Acceptance and commitment therapy (ACT; Hayes, 2004) is sometimes classed as an MBI in systematic reviews (Eby et al., in press 2017; Jamieson & Tuckey, 2017; Lomas et al., 2017) because it includes some mindfulness exercises in addition to techniques for participants to change their avoidance of present-moment behaviour by being open and accepting of all psychological events and to align their behaviour with their values. Variants of ACT have been developed for use with non-clinical populations (McConachie, McKenzie, Morris, & Walley, 2014; S. J. Noone & Hastings, 2010).

The efficacy of MBSR and MBCT programs with clinical populations has led to an interest in their applicability to non-clinical populations; however the training can be time consuming, inflexible and costly. This has given rise to the development of abbreviated versions of MBSR and MBCT which have the potential to generate issues regarding the efficacy of content and qualifications of the teachers. Studies have been conducted to examine the impact of MBSR and MBCT, and their variants, with non-clinical populations (Brooker et al., 2014; Eberth & Sedlmeier, 2012). Additionally, new mindfulness-based (MBI) programs have been developed which have been customised for specific non-clinical populations or studies (Malarkey, Jarjoura, & Klatt, 2013; Ramsey & Jones, 2015).

A plethora of delivery methods are used in MBIs beyond face-to-face, group-based training, for example, some organisations use virtual webinars to provide training.
sessions to individuals via their computer or digital device, and some training is provided using a mix of group-based, CD, book, and digital applications (apps) and communications via text or emails. Mindfulness-based self-help (MBSH) interventions can include one or multiple delivery formats: written material, digital apps, and other multi-media (audio, visual). Some MBSH interventions are completely self-administered and others have limited degrees of supplementary therapist support. In addition to the digital and smart-device apps developed for specific research studies (Carissoli, Villani, & Riva, 2015; Chittaro & Vianello, 2016; Glück & Maercker, 2011; Plaza García et al., 2017; Wahbeh & Oken, 2016), there are MBSH apps that have been developed for free or commercial distribution to members of the general public (Mani, Kavanagh, Hides, & Stoyanov, 2015; Plaza, Demarzo, Herrera-Mercadal, & García-Campayo, 2013; van Emmerik, Berings, & Lancee, 2017).

The intervention used in this thesis.

In this thesis, the intervention is a mindfulness-based self-help (MBSH) app with no supplementary guidance which will be used to train participants in mindfulness and meditation practices. MBSH interventions can based on modified MBSR or MBCT protocols, although not always. With continuing technological advances, research using MBSH interventions is still in its infancy. MBSH interventions, particularly using apps that are readily available to the general public (off-the-shelf) and that require no supplementary guidance, can offer multiple advantages over the alternative delivery methods: (a) consistency of delivery for thesis participants and generalised applicability for like-populations beyond the thesis, (b) low-cost since there is no customised development cost, (c) flexibility since participants can choose when and how to use the app, and (d) some apps provide usage statistics which is a more accurate source of mindfulness intervention practice (i.e., dosage) data. Literature on the efficacy of MBSH or digital interventions has been included in at least two reviews (Cavanagh, Strauss, Forder, & Jones, 2014; Spijkerman, Pots, & Bohlmeijer, 2016).

Cavanagh et al. (2014) examined 15 RCT studies in a meta-analysis of MBSH interventions published up to May 2013. Clinical and non-clinical study populations with symptoms of anxiety or depression were recruited from community adult samples, employees, students, and clinical patients. Interventions lasted from two to nine weeks with a combination of delivery methods. There were no app-only (e.g., via website, smartphone) interventions. There was an average post-treatment measures completion rate of 73%.
Significantly higher levels of mindfulness in the intervention groups were revealed by the meta-analysis in addition to significantly lower measures of anxiety and depression. Cavanagh et al. (2014) concluded that individuals from a range of populations can learn mindfulness and acceptance via self-help training that includes little or no supplementary therapist guidance. The literature search criteria used by Cavanagh et al. (2014) included a specific population (adults with anxiety or depression symptoms) so existing literature of studies using app-only interventions was missed. Spijkerman et al. (2016) conducted a meta-analysis of RCT studies published up to March 2015 which used online mindfulness-based interventions ranging from two to twelve weeks in duration. They found that 8 of the 17 studies examined offered no additional therapist guidance beyond the material available via website or smartphone. Post-treatment intervention completion rates were between 35% and 73%. Outcome measures in these studies were primarily mental-health and well-being related, and mindfulness. Significantly higher levels of mindfulness in the intervention groups were revealed by the meta-analysis, in addition to significantly improved well-being and mental health measures (e.g., anxiety and depression). Two studies included in the meta-analysis illustrate the app-only intervention studies missed in Cavanagh et al. (2014). Glück and Maercker (2011) used a 13-days app-only mindfulness-based intervention, with a post-treatment questionnaire completion of 89.8%. Participants were 46 adults recruited through the Internet and emails. The post-intervention, intention-to-treat results were not significantly different between the intervention and control groups for mindfulness (small effect) and perceived stress (medium effect). Morledge et al. (2013) used an 8-week ‘app only’ mindfulness-based intervention, with a post-treatment questionnaire completion of more than 57%. Participants were 312 adults recruited through healthcare providers and healthcare websites or newsletters. Mindfulness and perceived stress were significantly better than the control group, results that were sustained four weeks post intervention. Morledge et al. (2013) found the improvements increased with higher dosage levels during the 8-week period.

The Headspace® app, is an example of a commercially available MBSH app and it has been increasingly used in MBI studies. Since the two meta-analyses of MBSH and digital mindfulness interventions were conducted, there have been a number of studies published between 2016 and 2018 which used the Headspace app. The studies have been conducted with a variety of sample populations (e.g., young adults, employees in medical professions and large UK corporations, university students, and cross-section of adult
populations recruited online) and have examined the challenges in training for mindfulness, and a number of outcomes, primarily related to well-being but including: mind wandering in the workplace, workplace stress and well-being, aggression, affect, irritability, compassion, burnout, critical thinking, and of course, mindfulness (Bennike et al., 2017; Bostock, Crosswell, Prather, & Steptoe, in press 2018; DeSteno, Lim, Duong, & Condon, 2018; Economides, Martman, Bell, & Sanderson, 2018; Laurie & Blandford, 2016; Morrison Wylde, Mahrer, Meyer, & Gold, 2017; C. Noone & Hogan, 2016; Taylor, Hagman, & Brown, 2016; Wen, Sweeney, Welton, Trockel, & Katznelson, 2017)

Headspace was selected for use as the intervention in this thesis to reduce the risk of developing and using an untried digital application. Headspace is an internet-based/smartphone (audio) application with global downloads in excess of 20 million (£60/$72 for a one year individual subscription). Officially launched in 2010, Headspace provides guided meditations delivered by Andy Puddicombe, a former Buddhist monk (Puddicombe, 2011). The Headspace app was chosen because: (a) Headspace had the highest average score of commercially available mindfulness-based apps reviewed for quality and features by Mani et al. (2015); (b) the involvement of a trained Buddhist monk in the app’s development and delivery hence potentially providing an efficacious development of mindfulness; and (c) the possible brand recognition factor due to widespread use in the general population. Recently, Hafenbrack (2017) recommended that organisations provide support for employees to practice mindfulness meditation on-the-spot in their workplace and named Headspace as an example to facilitate this. Furthermore, in the appendix of further resources of the Private Sector Working Group (2016) report, Headspace is listed as a leading digital platform for training in mindfulness and meditation. Headspace training reinforces the concept of mindfulness — where individuals pay attention to and accept experiences as transitory —for the benefit of the individual and for those around them. Headspace uses audio, video, animations and exercises which incorporate opportunities for breath awareness, body scans, focus, and motivation and intentions. Headspace consists of 30 foundation sessions, 10 to 20 minutes each, and the sessions are available for individuals to use at their convenience. Individuals have the option to complete the sessions in any order: the first foundation level (which is freely available to the public), the remaining foundation levels, and other mindfulness series (e.g., health, relationships, and performance). All sessions can be repeated and most sessions have default durations of 10 minutes. Headspace periodically updates its app with new content. There are up to four emails sent to inactive subscribers
during the first 15 days after enrolment and three emails sent to congratulate subscribers on achieving milestones within the first ten days. Additionally, there is a comprehensive set of Question & Answers (FAQs) to support the individual, a personal progress report summarising usage, and a buddy system (to communicate with other Headspace users).

Summary.

Meditation has been shown to elevate mindfulness levels with continuous, current practice. Although there is no single method to develop mindfulness, mindfulness meditation techniques have been incorporated in numerous interventions, starting with some of the earliest programs, MBSR and MBCT. Since MBSR and MBCT are costly, inflexible and time-consuming, other intervention programs have been developed which are less-expensive and shorter. Research indicates interventions which include non-mindfulness components may make it difficult to attribute measured changes to mindfulness. More recently, digital and smart-device apps have been developed to provide training which is research specific or suitable for distribution to the general public. This thesis uses a smart-device app, Headspace, which is available to the general public. It is used without supplementary guidance.

1.4 Research Examples of the Different Applications of MBIs

Mindfulness-based interventions have been used in numerous environments. A brief overview of research in two types of environments, clinical and educational (with students) is presented now, before moving to the next section (1.4) which contains a more detailed description of research in workplace environments.

Clinical.

MBSR and MBCT interventions were first introduced in this chapter as examples of early mindfulness-based interventions developed specifically for clinical populations. MBIs for clinical use have continued to evolve. In an example of an early clinical intervention, Miller, Fletcher, and Kabat-Zinn (1995) conducted a three-year study into the effectiveness of an 8-week mindfulness-based stress reduction and relaxation program in outpatient clinics. They found that most of the 57 patients who received the treatment continued the meditation
practice and that data showed post-intervention reductions in anxiety, depression and panic attacks had been maintained at three year follow-up.

In a review of research using MBCT interventions, Metcalf and Dimidjian (2014) gave examples of MBCT being used to treat a range of clinical issues with populations experiencing anxiety, depression, and eating disorders. They found that MBCT had also been used to treat behavioural medicine applications such as cancer and diabetes, and life-cycle situations such as childhood, pregnancy, and adult caregiving, and clinical healthcare providers. One of their conclusions was that the impact of the mindfulness practice dosage compared with other components in MBCT programs is unknown. A more recent meta-analysis examined the impact on anxiety disorders by assessing the results of nine RCT studies which compared mindfulness-based, with cognitive behavioural-based interventions (Singh & Gorey, 2018). They found no statistically significant differences in the reduction of anxiety. They concluded that mindfulness training has equally large clinical benefits and may be a more cost-beneficial option to treat clients since teaching mindfulness requires less training and delivery/participation time.

The application of group-based and individual, one-to-one MBIs in clinical populations has continued over time with published results of numerous studies and meta-analyses. In summarising the key findings of clinical studies, Shonin, Van Gordon, and Griffiths (2013) stated that MBIs (e.g., MBSR, MBCT and other customised MBIs) used in the treatment of anxiety and/or mood-spectrum disorders demonstrate the strongest effect sizes, although moderately sized effects have been reported for somatic illnesses (e.g., chronic pain). Clinical improvements from MBIs have not been consistent across all applications with Shonin et al. (2013) citing research that showed small effect sizes for outcomes related to cancer treatments. Shonin et al. (2013) also pointed out that there is some confusion between the intentions of MBIs and the original Buddhist teachings, with MBIs’ intentions of improving well-being and the Buddhist mindfulness intentions of spiritual development when combined with other practices and understandings. Shonin et al. (2013) compared the decades-long mindfulness training within Buddhism to the typical 8-week mindfulness training of MBI instructors and concluded that the underlying intentions of MBIs need to be understood and communicated to avoid misrepresentations to recipients of MBI treatments.
Goldberg et al. (2017) recently conducted a systematic review of the quality of mindfulness intervention research in psychiatric clinical applications, including 142 randomised-control-trial (RCT) studies published between 2000 and 2016. They noted that there had been some improvements in research quality over the sixteen years. For example, designs had larger sample sizes, treatment fidelity (was the treatment delivered as intended) was reported, and analysis had improved with an increased use of intention-to-treat (ITT), where estimates of treatment effects are more conservative because data is included for participants who have dropped out of studies or not completed an intervention. However, Goldberg et al. (2017) stated that the improvements had not been more rigorous over time, and that improvements in some methodological features (e.g., active control groups, including post-intervention assessment follow-ups, conducting follow-up periods of longer duration) had not been made in the studies reviewed.

**Schools.**

With the evolution of MBIs, new populations for applying training have been identified, one of which is educational environments with students, specifically the grade levels or years prior to university. MBIs in educational environments are popular (Zenner, Herrnleben-Kurz, & Walach, 2014).

Roeser (2014) describes the emergence of school-based MBIs for students, stating that stress reduction and self-regulation were the early focus of MBIs in classrooms and that there are additional outcomes of positive social-emotional and academic development which can benefit from mindfulness skillsets. A recent shift in MBIs for students in educational settings has been the joint training of students and teachers (Roeser, 2014). Mindfulness skillsets are not commonly taught in classrooms and Roeser (2014) stated that there were few studies examining the developmental benefits from MBIs and that more rigorous research was needed. A meta-analysis conducted by Zenner et al. (2014) found only 24 intervention studies (13 published and 11 unpublished) up to 2012 and the results were significant for cognitive performance, stress and resilience.

It appears that effectiveness of MBIs in school settings continues to be an under-researched area. In a more recent review of ten American pre-university school-based MBIs, Semple, Droutman, and Reid (2017) stated that there has been little research into the effectiveness of the many MBIs implemented in pre-university, public-funded schools (K-12). They listed a number of programs developed for and implemented in schools (e.g., Inner
Explorer, Mindful Schools, and Resilient Kids). These programs used many of the delivery methods described earlier in this chapter when explaining how mindfulness training is delivered: audio-files, teacher-led classes, and supplementary activities such as journaling, storytelling, and mindfulness practices. Some of the teacher-led classes were performed by teachers and others by trained mindfulness instructors, and training duration varied from four weeks to two years, depending on the program.

Semple et al. (2017) read published and unpublished sources, and interviewed the program developers to culminate in an assessment of the program strengths and weaknesses. In one example of these programs, Inner Explorer, teachers and students jointly participated in the daily class-based practice, listening to audio-files over 18-weeks. At the time of the review, the program had been implemented in 250 schools across ten states. Some schools tracked academic performance improvements with different measures but the results of a controlled trial in one school found a significant improvement in grade-point-average (GPA), with significant improvements in math, science and social studies. Another school had non-significant differences in GPA and five academic subjects, but significant improvements in math. Improvements may have been attributed to changes in teachers as well as students. Semple et al. (2017) stated that none of the programs in their review had been independently researched, and that research designs did not include RCTs, did not control treatment fidelity, did not use outcome measures which were reliable and externally validated, and that studies were under powered. Semple et al. (2017) stated that more rigorous program evaluations by researchers in collaboration with educators were required.

**Summary.**

The two areas, clinical and schools, demonstrate the differences in the maturity of the application of MBIs. There have been numerous clinical studies conducted by external researchers, compared with no studies of school applications by external researchers. Many of the clinical studies examined the impact of more established interventions such as MBCT and MBSR, compared with the more recent development of interventions tailored for schools. The research design improvements identified by reviewers reflect the difference in research maturity but none-the-less share common concerns: a need for designs based on RCTs, with sufficient sample sizes, and reports on treatment fidelity. Separately, improvements in analysis based on ITTs were discussed in clinical applications, and the use of externally validated outcome measures were discussed for school research. The next section presents
research applied in the workplace, identifying opportunities for improvements in research
design and analysis when relevant.

1.5 Past Workplace Research Studies

Mindfulness research overview.

Mindfulness-based training has been applied in another population, employees in the
workplace. For the workplace, mindfulness research has taken three forms: (a) theoretical
papers, (b) published studies examining outcome associations with state and dispositional
(trait) mindfulness, and (c) studies using MBIs to examine associations and causal
relationships with outcomes.

The theoretical papers have discussed the implications of mindfulness for topics such
as task performance (Dane, 2011), and well-being and work relationships (Glomb, Duffy,
Bono, & Yang, 2011).

Dispositional mindfulness research in the workplace has examined associations of
mindfulness and outcomes such as health (mental and physical), life satisfaction, stress,
negative emotions, anxiety, depression, and workplace functioning (Mesmer-Magnus,
Manapragada, Viswesvaran, & Allen, 2017). There are a number of examples of
dispositional mindfulness association studies for workplace functioning. Dane and Brummel
(2014) examined the relationship of mindfulness to job performance and turnover; Reb,
Narayanan, Chaturvedi, and Ekkirala (2017) examined turnover intentions; Silver, Caleshu,
Casson-Parkin, and Ormond (2018) examined work engagement; and Zivnuska, Kacmar,
Ferguson, and Carlson (2016) examined work-related mindfulness behaviours and the
outcomes job engagement, turnover intention and work-family balance. An example of
conclusions that are made from reviews of dispositional mindfulness studies is a statement
made by Mesmer-Magnus et al. (2017). They concluded that knowledge of employees’ trait
mindfulness may help employers when selecting employees and in employee development.
Their conclusion exemplifies a contradiction in the adoption of mindfulness as a measure to
help organisations to improve productivity and profitability from its roots as an Eastern
contemplative tradition.
Research in mindfulness-based training for the workplace has escalated recently with increasing numbers of studies examining the impact of MBIs on employees. Two recent reviews of literature published up to January 2016 reflect this increased interest (Eby et al., in press 2017; Lomas et al., 2017). Eby et al. (in press 2017) noted in their qualitative literature review of 67 articles, that 73% were published between 2013 and end of January 2016. In the Lomas et al. (2017) systematic literature review, only 33 (22%) of the 112 MBI studies reviewed were published prior to 2013. Although a reasonably thorough review of studies examining MBIs in the workplace was conducted for this thesis in 2015, some of the more recent research will be included throughout this thesis.

Given this thesis’ focus on mindfulness-based interventions for employees in the workplace, the following sections in the chapter present literature on MBI research study outcomes examined, the methods used, and types of analyses performed. A critical analysis of this evidence and a summary of gaps to be addressed in this thesis will follow prior to a new section which presents the outcomes which will be the focus of this thesis.

**Outcomes examined.**

In the context of work, MBIs have been used to address some of the same concerns as the two previous areas (clinical, schools): mental health (e.g., stress reduction), behaviour (e.g., self-regulation), and performance (e.g., task performance). However, early mindfulness-based training research in the workplace, like the previous two MBI application areas, focused on well-being outcomes such as stress reduction and the research has continued to focus predominately in this area.

A number of meta-analyses and systematic reviews of studies on the impact of MBIs in the workplace are consistent in identifying health and well-being (e.g., perceived stress, anxiety, burnout) as the most commonly studied outcome category. Studies examining other types of outcomes such as physiological indicators (e.g., blood pressure), health behaviours (e.g., sleeping, eating) and work-specific outcomes (e.g., work-life balance, job engagement, relationships) are less common (T. D. Allen et al., 2015; Eby et al., in press 2017; Jamieson & Tuckey, 2017; Lomas et al., 2017). Two of the latest reviews (Eby et al., in press 2017; Lomas et al., 2017) found that stress reduction was the most frequently examined outcome and that job engagement was the least examined outcome of the pre-2016 studies reviewed. Examples of studies examining mindfulness, stress, and work-related outcomes are presented next.
**Mindfulness outcome.**

In addition to health and well-being, mindfulness is one of the more commonly included outcomes in MBI in studies, usually combined with other outcomes that are the focus of the research. Of the 112 intervention studies, there were 42 studies examining outcomes of mindfulness measures in the Lomas et al. (2017) review. Two examples of studies examining mindfulness that were included in two reviews (Eby et al., in press 2017; Lomas et al., 2017) are: the Cohen-Katz, Wiley, Capuano, Baker, and Shapiro (2005) study of American nurses, and the Flook, Goldberg, Pinger, Bonus, and Davidson (2013) study of American teachers. Both used randomised control trial (RCT) designs, had small sample sizes (respectively N =25 and N = 18), and the pre-/post-intervention analysis showed significant results for the intervention group participants who completed their post-intervention questionnaire. Two other RCT study examples included in the reviews are: the Aikens et al. (2014) and Malarkey et al. (2013) studies. Their sample sizes were larger (respectively N =89 and N = 186), and their intention-to-treat (ITT) analysis showed significant results. A more recent study Bennike et al. (2017) of Danish university employees used an RCT design comparing group differences, with an additional post-intervention analysis which showed that “dosage” of the intervention (Headspace) for 54 participants predicted increases in mindfulness.

**Health-related: stress outcome.**

Returning to the most commonly examined outcome, stress, two types of measures were used: physiological and self-report psychological. Of the 112 intervention studies in the Lomas et al. (2017) review, 37 studies examined outcomes of psychological stress and 24 of those studies used the same measurement, the perceived stress scale (PSS; S. Cohen, Kamarck, & Mermelstein, 1983) or one of its variants. Two examples of studies examining employee perceived stress that were included in the two recent reviews are: the Klatt et al. (2009) study of American university employees and the Manotas, Segura, Eraso, Oggins, and McGovern (2014) study of Columbian healthcare workers. Both were RCT designs that had small sample sizes (respectively N =48 and N = 76), and the pre-/post-intervention analysis showed significant results (medium effect sizes) for the intervention group participants who completed the interventions. These studies compare with two other studies (Aikens et al., 2014; Wolever et al., 2012) included in the reviews. Aikens et al. (2014) conducted a post-intervention and 6-months follow-up analysis of American chemical company employees,
splitting the participants into two intervention usage volume groups to assess the impact of higher intervention usage “dosage”. Although the sample size was small for this design ($N = 31$), they found a larger effect size for improved perceived stress with increased usage.

Wolever et al. (2012) conducted an RCT design with a larger sample size of 239 American insurance employees, and the ITT analysis showed significantly lower stress (medium effect size) for the intervention group compared with the wait-list control group. From 2016, the focus in quantitative workplace MBI studies on wellbeing outcomes such as stress has continued, as exemplified in the de Bruin, Formsma, Frijstein, and Bögels (2017) study. In their study, employees with work-related stress participated in a combined physical exercise, yoga and mindfulness intervention. They used a single-arm design and the pre-/post-intervention and 6-weeks follow-up perceived stress results were significantly better (large effect size) for the small sample size ($N = 26$). Although the study captured practice data, there was no analysis of the impact of dosage on stress.

**Work-related outcomes.**

Of the more work specific outcomes examined in the 112 intervention studies of the Lomas et al. (2017) review, there were topics such as: classroom assessments (1 study), job performance (4), job self-efficacy (5), job satisfaction (6), patient distress (1), role performance (3), and work engagement (3). Many of the topics were related to specific jobs in the education or healthcare sectors, which is not surprising since most research has been conducted with occupations related to healthcare (Eby et al., in press 2017; Lomas et al., 2017).

**Job satisfaction.**

There are five MBI studies included in the two reviews (Eby et al., in press 2017; Lomas et al., 2017) which reported results on a job satisfaction outcome, and none of the studies used the same measure (Brooker et al., 2013; Gauthier, Meyer, Grefe, & Gold, 2015; Gregory, 2015; Hulsheger, Alberts, Feinholdt, & Lang, 2013; Shonin, Van Gordon, Dunn, Singh, & Griffiths, 2014). Two studies examining general job satisfaction are given as examples (one from health-care and one from an office-based management population). In the Brooker et al. (2013) study of Australian healthcare employees and managers, the intervention was an 8-week combination of MBSR and MBCT programs, with a single-arm design, and a small sample size ($N = 34$). The pre-/post-intervention analysis showed no significant change in general job satisfaction. The Shonin et al. (2014) study of managers
from a cross-section of companies in England used an 8-week meditation program intervention focused on mindfulness and other concepts. The study used an RCT, active control group design, and had a good sample size (N = 133). The pre-/post-intervention ITT analysis showed a significant group difference in general job satisfaction (large effect size).

Job engagement.

Only three examples of MBI studies in the two reviews (Eby et al., in press 2017; Lomas et al., 2017) reported results on the least examined non-occupation specific outcome, job engagement. The studies are: Aikens et al. (2014), the Leroy, Anseel, Dimitrova, and Sels (2013) study of employees attending an in-company training program, and the van Berkel, Boot, Proper, Bongers, and van der Beek (2014) study of employees from Dutch research institutes. The first two studies used randomised control trial (RCT) designs, small sample sizes (respectively N = 89 and N = 76), and the pre-/post-intervention analyses showed significant improvements in job engagement for the intervention group participants who completed their post-intervention questionnaire. However, Leroy et al. (2013) found no change associated with the amount of self-reported informal meditation practice when they examined job engagement at 2-months post-intervention (N = 76) and at 4-months follow-up (N = 68). van Berkel et al. (2014) conducted an RCT study (N = 257) and a 12-month follow-up analysis using a 6-month intervention. In their follow-up analysis, they split the participants into two intervention compliance groups to assess the impact of higher intervention usage “dosage”. They had an adequate sample size (N = 120), and found no significant difference with increased usage. More recent studies have examined job engagement (Klatt, Norre, Reader, Yodice, & White, 2017; Petchsawang & McLean, 2017). The Klatt et al. (2017) study of 57 Danish bank employees used a randomised control trial (RCT) design to analyse the differences between participants who completed the 8-week intervention and the wait-list-control (WLC) groups, and found no significant post-intervention difference (small effect size). The Petchsawang and McLean (2017) study of a cross-section of employees of Thai organisations, compared employees working for companies who offered secular mindfulness meditation courses with employees of companies where no courses were offered. The study used a two-arm design to analyse the differences between two groups. The sample size was large (N = 563) and they found a significant difference between the two groups for total and facet-levels of job engagement.

Work-life balance.
Satisfaction with work-life balance is another work-related outcome and a study by Michel, Bosch, and Rexroth (2014) used an RCT design, with a large sample size \((N = 246)\) of employees from a cross-section of German companies. Their pre-/post-intervention and 2-week follow-up analyses showed significant differences (small effect size) in improved work-life balance between the control and intervention group participants who completed a minimum level of training. A more recent study (Kiburz, Allen, & French, 2017) examined work-family conflict, an outcome which is sometimes included in research on work-life balance. Kiburz et al. (2017) conducted a study with a sample size of 102 American university employees and alumni, using an intervention comprising of 1-hour mindfulness training with 13-day behavioural self-monitoring. Participants were randomly assigned to intervention training dates for comparative analysis, with no resulting group differences in work interfering with family (WIF) conflicts. However, a pre-/post-intervention analysis of all participants showed significantly reduced WIF.

**Organisational-citizenship behaviour.**

In an unpublished thesis, (Giluk, 2010) examined the impact of two MBIs (MBSR and MBCT) on the outcome organisational-citizenship-behaviour between individuals as assessed by the employees’ supervisors. The sample included employees who were offered the MBIs after completing a university wellness centre’s health assessment. The design was two-armed with employees taking up the training offer assigned to the intervention group, and those not taking up the offer assigned to the control group. The data from the two MBI groups were combined to compare with the control group. The sample size was small \((N = 54)\) and the post-intervention difference in organisational-citizenship-behaviour between the groups was not significant, with a small effect size.

**Summary.**

Examples of outcomes examined in MBI studies serve to reinforce the conclusion that research on work-related outcomes has not been as prolific as studies on stress, a health and well-being outcome. Furthermore, the heterogeneity of the work-related outcomes used in many studies make generalisations to different population groups difficult.

1.6 Methods and Analyses Used
The examples of studies included in the section on outcomes examined (see above) were selected not only to illustrate the outcomes but to demonstrate the variety of design methods, populations and sample sizes used in workplace MBI research. This section of the chapter describes the methods and analyses used in the previously cited studies and is informed by the Lomas et al. (2017) review and reading of primary sources.

**Interventions.**

Mindfulness-based interventions specially developed for specific research applications or populations (e.g., for carers, teachers, or sports) were more frequently used in workplace studies. Of the two early clinical MBIs, MBSR and its adaptations were more frequently used than MBCT in workplace studies. Most interventions (or the mindfulness component of interventions) ranged between four and ten weeks. Most interventions used a mix of delivery methods (e.g., face-to-face, group-based, and online or audio components for home-practice) with very few studies using self-help interventions (MBSH) with no supplementary guidance (see 1.2 for training intervention descriptions).

**Populations.**

There were a wide variety of occupational groups in workplace studies, including for example: healthcare workers, social workers, teachers, military, and employees of various businesses. The most common occupations studied came from the healthcare sector, which included roles such as nurses, physicians, and therapists. Examples of populations that were used in workplace studies are now included in some of the following descriptions of designs.

**Designs and analyses.**

In this section, the method of data collection, the designs and analyses used in quantitative then qualitative studies are discussed and summarised before the next section which is a critical analysis of the workplace literature.

**Quantitative designs.**

The most common method of obtaining outcome measurement data was via self-reports recorded in surveys. Even studies (Bostock et al., in press 2018) which examined physiological indicators as well as psychological outcomes relied on self-measurement (blood pressure) and self-reporting. Perhaps because most studies were field-based, most surveys were completed online and in a few studies, participants recorded information in written
A few studies used both survey questionnaires for outcomes (e.g., mindfulness) and lab-based tests to conduct more controlled tests on outcomes, for example mind-wandering in Bennike et al. (2017; see section 2.1 of this thesis).

Some designs were multi-arm to allow for an analysis of differences between groups. Most studies collected pre- and post- intervention data to analyse group differences of participants who completed post-intervention questionnaires. Fewer studies used ITT analyses to analyse data for all participants who completed pre-intervention questionnaires but may not have completed post-intervention questionnaires or a minimum amount of the intervention.

The most frequently used designs for intervention studies were two-arm, with one group (experimental) assigned to the intervention and another to a control group for comparison. Some control groups were waitlisted (where the control group receives the intervention when the intervention period has expired) and an example of this design is the Aikens et al. (2014) study which used a pre-/post-intervention ITT analysis of differences in mindfulness and job engagement. Some control groups were active (where participants engage in an alternative intervention during the experiment), although this design was not common. Shonin et al. (2014) used an active control group to conduct an ITT analysis of group differences in job satisfaction. Other control groups were inactive (where participants receive no intervention). This design was used by Giluk (2010) to examine job engagement using a pre-/post-intervention analysis of job engagement for participants, who with their supervisors completed all questionnaires. Giluk (2010) stated that the circumstances of the study prevented an alternative control group approach. Few studies using control groups had more than one control group. The Wolever et al. (2012) study of stress is an example of a study using both wait-list and active controls. Sample sizes achieved in studies using multi-arm designs were often small (Cohen-Katz et al., 2005; Flook et al., 2013; Giluk, 2010), and studies with large sample sizes were the exception (Michel et al., 2014; Shonin et al., 2014; van Berkel et al., 2014). A large sample size ($N = 246$) of employees from a cross-section of German companies in the Michel et al. (2014) RCT study enabled them to conduct an analysis of group differences of work-life balance at post-intervention, and a further analysis of differences, with a large sample size ($N = 191$), two weeks following post-intervention. The allocations of participants to groups in multi-arm designs were randomised or non-randomised. Although randomised control trials are viewed as the ‘gold standard’ of
experimental designs supporting comparative analyses, the Lomas et al. (2017) review of 112 intervention studies reported that only 44% of the studies used RCT designs.

Multi- or two-arm designs did not necessarily only compare experimental and control group results. Sometimes, studies which used control groups conducted further analyses on their experimental groups by splitting the experimental group into two-arms. For example, the Aikens et al. (2014) study which examined group differences in mindfulness and job engagement outcomes also split the experimental group (N = 34) into two categories of intervention usage to compare self-report “dosage” effects on post-intervention perceived stress. The van Berkel et al. (2014) study, which examined pre-/post-intervention group differences in job engagement, split their participants into two instructor-led session attendance compliance groups at 12-months follow-up to compare “dosage” effects on job engagement. The van Berkel et al. (2014) dosage analysis had an adequate sample size (N = 120), made possible by the large sample size for their RCT design.

The Petchsawang and McLean (2017) study exemplifies a two-arm, observational design with their study which compared a cross-section of 563 employees from companies who provided mindfulness meditation training with employees from companies who provided no training. They collected data once to find the correlation between the training condition and job engagement. However, their study is unusual.

Single-arm designs (no control group) were used in many studies, for example, 31 of the 112 pre-2016 intervention studies in the Lomas et al. (2017) review. The single-arm design was used for analysis of pre-/post-intervention changes. Examples of studies using single-arm only are: the de Bruin et al. (2017) study of perceived stress and Brooker et al. (2013) study of job satisfaction, both of which had small sample sizes which were typical of the studies using this design. Some studies using RCT designs included further analysis of a single-arm (i.e., intervention group). An example of this is the Bennike et al. (2017) study which conducted a post-intervention analysis of the intervention dosage (recorded by the app) impact on mindfulness in the experimental group.

**Qualitative designs.**

In addition to studies using quantitative designs, a few studies used qualitative designs to examine the impact of MBIs or the experiences of engaging with an MBI.
Most interventions ranged between four and nine weeks, with the exception of the Beckman et al. (2012) study which used a 10 month, 52-hour mindful communication intervention, which included 8 weekly and 10 monthly group-based sessions and a retreat.

Most MBI studies examined the experiences of healthcare professionals (Banerjee, Cavanagh, & Strauss, 2017; Beckman et al., 2012; Cohen-Katz et al., 2005; Nugent, Moss, Barnes, & Wilks, 2011; Slatyer et al., 2018). Sample sizes of studies ranged from five (university staff in Wongtongkam, Krivokapic-Skoko, Duncan, & Bellio, 2017) to twenty-five participants (teachers in C. Taylor et al., 2016).

Designs either used exclusively qualitative methods (Banerjee et al., 2017), or mixed methods, in conjunction with quantitative designs (Cohen-Katz et al., 2005). Some qualitative studies used surveys to collect data, usually to obtain information about participant engagement with an intervention (Cohen-Katz et al., 2005; C. Taylor et al., 2016). Other studies used primarily semi-structured interviews (Banerjee et al., 2017; Hugh-Jones, Rose, Koutosopoulou, & Simms-Ellis, 2018; Slatyer et al., 2018), to obtain information about participant experiences of changes resulting from mindfulness training, or their engagement experiences with an intervention, and sometimes studies collected information for both purposes. Less frequent were the use of focus groups and journal entries (McGarrigle & Walsh, 2011; Nugent et al., 2011) and the use of multiple qualitative methods such as the survey questions, interviews and focus groups used in C. Taylor et al. (2016).

The most common interview method was semi-structured and the interviews were conducted immediately or shortly after intervention completion. The primary analytical method used in studies was thematic analysis (TA; Braun & Clarke, 2006). However, in one qualitative study, interviews were conducted from 6 to 16 months following the completion of a 8-week intervention (Hugh-Jones et al., 2018) and researchers used an abbreviated version of grounded theory to analyse the data, which enabled them to better understand participants’ motivations in learning mindfulness and the process of change.

There has been some consistency of results in the qualitative analyses. For example, studies of healthcare professionals’ experiences identified improved people interactions in clinical settings (Beckman et al., 2012; Nugent et al., 2011). In other studies, participants reported feeling calmer at work as a result of their training (Banerjee et al., 2017; Slatyer et al., 2018; Wongtongkam et al., 2017).
Summary of designs and analyses.

To summarise the workplace study designs, a few points follow: Although increasing in number, a MBSH intervention with no supplementary guidance was the least used delivery method. Occupation groups in study populations were heterogeneous, however most studies examined MBI effects on individuals from the health-care industry. The most common design used control groups. However, the most common design using control groups was a non-randomised allocation. The majority of studies used pre-/post-intervention analyses to examine group differences for participants who completed questionnaires at both measurement times. ITT analysis was less commonly incorporated. When follow-ups were included for analysis in quantitative studies, most were conducted shortly after the end of the intervention, and this short duration also applied to most qualitative studies since interviews were conducted immediately or shortly after a brief intervention. Because workplace studies used MBIs with different content and delivery formats, this meant that when dosage data was available, it was primarily sourced by self-reports and analysis of dosage was sometimes achieved by splitting an intervention group into two compliance groups to compare practice or usage amount. The sample sizes of studies, particularly single-arm designs were small, leaving findings open to a lack of power.

Critical analysis of workplace research.

This analysis of workplace research includes commentary on the outcomes examined, methods and analyses used.

Outcomes examined in MBI studies have focused on health and well-being outcomes, leaving a gap in the research of work-related outcomes which might resonate with employers who could be expected to fund intervention programs. Many of the studies used occupation specific work-related outcomes which makes it challenging to apply conclusions to different occupational population groups. Not surprisingly, the use of questionnaires in studies using quantitative designs dictated the use of self-report measures which leaves the results open to social desirability or response bias.

Interestingly, participants from studies across a number of heterogeneous occupations showed some consistency in their experiences following mindfulness-based training. The use of qualitative designs, either as part of multi methods or single method designs may still be open to social desirability bias. However, if designs were based on semi-structured
interviews rather than qualitative surveys, the results are likely to accurately reflect participants’ current views.

Customised MBIs and MBSR adaptations have been used extensively in workplace studies and the wide range of multi-component MBIs used (e.g., mixes of mindfulness, cognitive, eating), makes it difficult to compare results and to isolate the impact of mindfulness from other concepts that might have been used. The reliance on self-reports of intervention compliance, due to the constraints of MBI designs, may have influenced analyses of intervention dosage, a variable which more studies may wish to examine in the future. Given that RCTs are the gold standard of designs, the low volume of studies using this design highlights room for improvement since the lack of randomisation inhibits generalisation of results. In study designs which used control groups, the least common type of control was active rather than waitlist or inactive. This may reflect the aims of the studies where few were examining the relative merits of interventions. The follow-ups included in studies tended to be of short duration (e.g., 2-weeks, 2-months), with 6-month and 12-month follow-ups the exception. As Aikens et al. (2014) stated in their list of study limitations, they dropped a 12-month follow-up since it is not always feasible to burden busy employees. In another example of the challenge of conducting field-studies in the workplace, many of the studies, particularly single-arm designs, obtained small sample sizes, which call into question the ability of studies to detect real changes over time or if results are due to sampling error. It is noted that effect sizes varied, and that a number of studies did not report on effect sizes.

Many studies applied elements of good practice although there were aspects to their design which could have been improved. One example of this is the van Berkel et al. (2014) study of employees in two research institutes. Their study used an RCT design (although control group type was not reported), and they achieved a large sample size for their ITT analysis of mindfulness, job engagement and a number of mental health outcomes. The large sample size enabled them to conduct further analysis with a good sample size, at 12-months follow-up (six months post-intervention) to examine dosage effect on job engagement. However, the van Berkel et al. (2014) intervention included multiple components (e.g., lunch walking and fruit consumption) which may have made it difficult to attribute changes in outcomes to mindfulness since the mindfulness component was eight weeks in duration. As mentioned previously (see 1.2 for findings of Eberth & Sedlmeier, 2012) multiple component interventions can make it difficult to attribute changes to the mindfulness component. The complexity of the van Berkel et al. (2014) 6-month intervention design might explain why
they were unable to identify any significant differences in job engagement, mindfulness, and the mental health outcomes analysed.

To balance some of the criticisms above, an example of good research which addressed many of the previous criticisms is summarised as follows. Wolever et al. (2012) were interested in assessing the effectiveness of two stress reduction programs (therapeutic yoga-based and mindfulness-based interventions) on employees in a large American insurance company before conducting a larger cost-effectiveness trial. They believed that the provision of two programs might satisfy the needs of differing worksite settings in the company. The Wolever et al. (2012) study used an RCT design with waitlist and active control groups (yoga-based) and achieved a large sample size for their ITT analysis of mindfulness, perceived stress and work productivity.

**Summary.**

Mindfulness, the levels of which can differ between individuals, can be developed with training. Although there are different definitions, mindfulness is commonly understood to mean that one’s attention to internal and external stimuli is in the present, without judgment.

Apart from meditation as a standalone practice, mindfulness can be developed as one of a number of training components in programs such as MBSR. Interventions such as MBSR and MBCT, and their adaptations have been successfully used in a variety of clinical applications. However, in response to the costs, time-commitments and inflexibility of programs like MBSR, other mindfulness-based training programs have been developed, some tailored for specific populations, such as school children, and employees. Most MBIs include mindfulness techniques as part of a multi-component training program, and most programs include face-to-face or group based delivery formats. There are few self-help or digital interventions that are delivered without supplementary guidance from a trainer. The application of customised MBIs in schools has not been rigorously researched, and research with employees in the workplace is in a nascent state. Reviews of past MBI research have identified improvements for future studies: the need for RCT designs, sufficient sample sizes, reporting on treatment fidelity, as well as analysis based on ITT and the use of better outcome measures. This thesis has identified additional improvements for workplace studies: the use of sufficiently long durations for follow-up analysis to ensure that changes in outcomes have enough time to gestate, and, depending on the study aims, the use of active control groups.
Earlier mindfulness research in the workplace investigated dispositional mindfulness, and studies have shown associations with levels of mindfulness and health outcomes such as stress. When studies investigated the impact of MBIs in workplace research, significant improvements in levels of mindfulness and stress were found. However, fewer studies examined the relationship between MBIs and work-specific outcomes such as work-life balance and job engagement.

Although improvements to future research have been identified, not all of the suggestions have been incorporated in this thesis. For example, the use of active controls is not part of this thesis design as this was a pragmatic trial to examine the impact of offering a particular mindfulness app within an organisation. In addition, the selection or development of a suitable active treatment is challenging, and the analysis requires a larger sample size for a medium effect size than was thought feasible at the time of design. However, there are research gaps in mindfulness-based interventions in workplace which are addressed in this thesis and they are presented next.

1.7 Focus of the Current Thesis

It can be challenging to conduct research with employees in the workplace, which may explain why most studies have had small sample sizes and short study durations. However, for organisations to appreciate the benefits of investing in mindfulness training, they need more evidence, back by research, which demonstrates work-specific changes that can occur from offering training, and that the changes can result from the use of low-cost and flexible training programs. To date, there has been only limited research exploring the following: (a) impact of MBIs on work-related outcomes (b) long-term impact of interventions, and (c) use of self-help training interventions (low-cost) without supplementary guidance. The gaps are described as follows:

**Gap 1: impact of MBIs on work-related outcomes**

When this thesis started in 2015, there were few experimental studies of positive workplace outcomes of mindfulness using mindfulness training programmes, and there were calls for greater scrutiny towards the positive work-related outcomes (Miksch, Lindeman, & Varghese, 2015), a call which has been made more recently by Lomas et al. (2017). T. D. Allen et al. (2015) conducted a review of literature on workplace mindfulness-based studies. They concluded that studies examining employee stress showed sufficient evidence of the
effectiveness of MBIs, however more research was required for organisational outcomes of interest such as employee engagement and job performance. Reviews by Jamieson and Tuckey (2017), Eby et al. (in press 2017) and Lomas et al. (2017) drew many of the same conclusions. The review, in this thesis, of literature which includes more recently published research supports the conclusions of earlier reviews. The conclusions are that most published workplace mindfulness-based studies examined health- or well-being- related outcomes and there is a gap in research which examines work-related outcomes.

**Gap 2: long-term analysis of the impact of interventions**

Since the duration of most mindfulness-based interventions was between four and ten weeks and most studies conducted follow-up analyses at post-intervention or shortly thereafter, there is a gap in literature which examines the longer-term impact of mindfulness-based training. In particular, there are few quantitative studies examining the longer-term impact of ‘dosage’ or usage of interventions. In one study (van Berkel et al., 2014) which did conduct a longer-term (12-months) follow-up to examine the dosage effect on job engagement, the 8-weeks mindfulness component was one of a number of components (e.g., lunch walking and fruit consumption) which may have made it difficult to attribute changes in outcomes to mindfulness. Additionally, most qualitative studies in workplace MBI research have conducted qualitative surveys and interviews after brief interventions (four to nine weeks) or shortly after.

**Gap 3: mindfulness-based self-help training with no supplementary guidance**

There are few workplace studies which use mindfulness-based self-help (MBSH) interventions, and even fewer which conduct the intervention without supplementary guidance. The provision of MBSH apps in the workplace provides the flexibility needed for employees to practice mindfulness meditation on-the-spot in their workplace (Hafenbrack, 2017) and to practice meditation outside the workplace.

Having identified the gaps in research literature that will be addressed in this thesis, attention is now focused on the outcomes selected for examination.

**1.8 A Focus on Outcomes**
In addition to work-related outcomes, this thesis examines two outcomes for which there is extensive mindfulness-based intervention literature: (a) mindfulness, and (b) perceived stress. The inclusion of these outcomes reflects past research and may help to explain results in the work-related outcomes which are the focus of this thesis.

Due to the paucity of experimental MBI studies of positive work-related outcomes, an examination of theoretical papers, studies exploring dispositional mindfulness, and reviews of published workplace mindfulness research studies was conducted to identify possible work-related outcomes for investigation. Of the work-related outcomes identified, five outcomes were selected. Four outcomes are positive: (a) work-life balance (perceived satisfaction with the balance of time and energy invested work and personal life); (b) job engagement (willingness to invest energies to perform job); (c) employee organisational citizenship behaviours – individual (willingness to contribute to organisation’s success by helping other employees); (d) curiosity (willingness to explore and embrace the unknown); and one outcome is negative (e) turnover intentions (indication of job dissatisfaction leading to turnover). The outcome job satisfaction was not selected since two dispositional mindfulness studies (Andrews, Kacmar, & Kacmar, 2014; Zivkuska et al., 2016), found that increased mindfulness in employees made them more satisfied with their jobs and, in turn, reduced their turnover intentions. A decision was made to select only one of the two outcomes in order to reduce the number of questions that participants needed to answer at each time point. These outcomes and selected measures are explained further.

**Mindfulness outcome.**

In MBI research, mindfulness has been commonly conceptualised in two ways: (a) a state of consciousness resulting immediately from training (state mindfulness), and (b) a state which is experienced over time with differing frequencies between individuals, often accounted for by dispositional or trait mindfulness measures.

As this thesis is focused on work-related outcome changes which are realised over time, a dispositional measure is needed to indicate the overall change in individuals who are learning mindfulness rather than an assessment of the immediate effect of an MBI on mindfulness, as measured by state mindfulness.

Two commonly used measures of dispositional mindfulness illustrate the different operationalisations of dispositional mindfulness: (a) Five Facet Mindfulness Questionnaire, a
multi-faceted measure (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006a); and (b) the Mindfulness Attention and Awareness Scale, a unidimensional measure (MAAS; Brown & Ryan, 2003). The five facets of FFMQ are: (a) observation of internal and external stimuli, (b) describing internal stimuli, (c) acting with awareness of the present, (d) non-judging of stimuli, and (e) non-reacting to thoughts and feelings. The single dimension of MAAS encompasses awareness and attention to stimuli in the present.

Although measures of mindfulness are well established and have good psychometric properties, Grossman (2011) questioned the validity of self-report measures of mindfulness. Grossman (2011) stated that measures such as MAAS distort the meaning of mindful awareness because individuals are in a state of ordinary awareness when self-reporting. Grossman (2011) stated that MAAS does not represent aspects of mindfulness well. For example, mindfulness is not just attention to moment-to-moment experiences but the intention to do so, and that mindfulness is interdependent with attitudes such as openness and acceptance. Grossman (2011) acknowledged the attempt made in the FFMQ measure to reflect the complexity of mindfulness but expressed reservations about the effectiveness of FFMQ in recognising synergies of aspects which merge into mindfulness. Examining FFMQ mindfulness facets in studies can be illuminating since they appear to operate independently. For example, Bergman, Christopher, and Bowen (2016) found that individual mindfulness facets can account for significant differences in outcomes such as workplace stress. Some of the Grossman (2011) alternative approaches to self-report measures of mindfulness have been accommodated in the current thesis (see Thesis Structure: Studies 2 and 3). However, when using a self-report measure, this thesis will examine mindfulness as a multi-faceted construct using the FFMQ measure. At a sample level in this thesis, facet differences arising from an MBI are of interest (see Chapter 2 - Study 1 and Chapter 3 - Study 2). At participant level, an analysis can be made of how work-related outcomes might be affected by mindfulness facets rather overall mindfulness (see Chapter 5 – Study 4).

**Health-related outcome – perceived stress.**

Individuals experience psychological stress when they perceive that they are not able to adapt to excessive external demands — perceived stress is one indication of the overload (S. Cohen, Janicki-Deverts, & Miller, 2007). Perceived stress is indicative of the stress experienced from events, the coping processing and personality; and measuring perceived
stress can be useful when it is difficult to measure the objective sources of stress (S. Cohen & Williamson, 1988).

MBIs are commonly used by employers to help employees reduce stress (Eatough, 2015). There are many MBI studies in the workplace where perceived stress results have shown significant improvement (Aikens et al., 2014; Allexandre et al., 2016; Christopher et al., 2016; Huang, Li, Huang, & Tang, 2015; Morledge et al., 2013; S. L. Shapiro, Astin, Bishop, & Cordova, 2005; Wolever et al., 2012).

There are occupational specific self-report measures of stress available, for example, the Job Stress Survey (Vagg & Spielberger, 1998), and an occupational stress survey tailored for teachers (C. Taylor et al., 2016); and more general self-report measures of perceived stress, (Perceived Stress Scale; PSS10; S. Cohen & Williamson, 1988). As employee stress is a well-researched subject (Haslam, 2004) and is not the main focus of this thesis, a more general measure of perceived stress is used in this thesis. The perceived stress measure, PSS, is commonly used in research and the short version (PSS10) was selected for use to examine changes in perceived stress which are realised over time.

**Work-related outcomes.**

In their theoretical paper, Glomb et al. (2011) posited potential work-related benefits from mindfulness. They suggested that mindfulness can: (a) improve social relationships (e.g., interpersonal organisational-citizenship-behaviours); (b) increase resiliency in the face of interpersonal- or task-related work challenges and stressors (e.g., reduced avoidance when coping with difficult situations); and (c) improve task performance (e.g., safety) and decision-making (reduced errors). Hyland, Lee, and Mills (2015) suggested that outcomes such as innovation, teamwork, learning, coping with change, turnover, and performance could be explored in future workplace mindfulness research. Work-related outcomes considered for inclusion in this thesis had a potential to benefit the employee, and in many cases, the organisations that might sponsor mindfulness meditation training as part of their well-being programs. Past research on the work-related outcomes may have been related to dispositional mindfulness or MBIs. During this thesis there was no access to supervisors, colleagues or to HR data, so self-report measures were selected to measure each of the five outcomes.

**Work-life balance.**
Work-life balance (WLB) includes the full spectrum of an individual’s personal and work lives. Employees may have multiple demands in their personal lives (e.g., family, school, charity-work, friends, sports, etc.) which can conflict with their work role (Haar, 2013). The individual’s perception of a satisfying balance is a more accurate reflection of balance rather than the number of hours spent in each role (Haar, 2013). For example, individuals may choose to work on a part-time basis to spend more time on their personal lives or spend more time working because they love their job. Employees can benefit from achieving balance between their life and job demands regardless of whether or not they are parents (Haar, 2013). Work-life balance is important for employees regardless of what career stage they are in (Darcy, McCarthy, Hill, & Grady, 2012).

There are benefits to organisations who introduce initiatives which can improve work-life balance. In a review of research on organisational work-life balance practices, Lazar, Osoian, and Ratiu (2010) identified the following most commonly used organisational outcomes: (a) reduced staff turnover, (b) increased retention of valuable employees, (c) employee loyalty, (d) improved productivity, and (e) enhanced organisational image. However, a recent review of intervention research which addressed work-life balance and evaluated human resource policies, made no mention of mindfulness-based interventions (Brough, Drummond, & Biggs, 2018). They noted the scarcity of experimental research articles available for inclusion. Morganson, Rotch, and Christie (2015) suggested that mindfulness training may help individuals to enjoy both personal and work roles more and facilitate an improved work-life balance, particularly if the work role makes high emotional demands. Since dispositional mindfulness has been shown to change with mindfulness training, the results of two studies examining the association between dispositional mindfulness and work-life balance are relevant. In a study using dispositional mindfulness, T. D. Allen and Kiburz (2012) found that working parents with greater levels of mindfulness had higher levels of work-family balance. A second study found that individuals with higher dispositional mindfulness recorded a more balanced work–family life (Leroy et al., 2013). Only one study was found which explored the link between mindfulness-based training and satisfaction with work-life balance after a 3-weeks intervention and at 2-weeks follow-up; the results were significant for a small effect size (Michel et al., 2014). Their study is an indication that the improvements might be sustainable for longer durations.

The Valcour (2007) measure of satisfaction with work-family balance was selected for use in this thesis since it encompasses aspects of personal resources (e.g., time and
energy) to meet the competing demands of job, and personal or family life, and an assessment of the success in balancing the competing demands. As recommended by Valcour (2007), to accommodate employees who do not have family roles, questions refer to “personal or family life”.

**Job engagement.**

Job engagement refers to the willingness of an individual to invest their physical, cognitive and emotional energies to perform their work role (Kahn, 1990; Rich, Lepine, & Crawford, 2010). This three component concept of job engagement was established by Kahn (1990) and has been used to inform the development of a number of three-factor engagement measures: Utrecht Work Engagement Scale long form (UWES; Schaufeli, Salanova, González-romá, & Bakker, 2002) and short form (Schaufeli, Bakker, & Salanova, 2006), and Job Engagement Scale (JES; Rich et al., 2010). Job engagement is an important work-related outcome because its impact on work role performance (Kahn, 1990).

There have been studies where a variety of abbreviated MBSR, instructor-led MBIs have been delivered and the effectiveness in improving engagement in the workplace assessed. Study results have been mixed as four studies illustrate: in one randomised waitlist control (RCT) study, a significant improvement in work engagement was achieved over eight weeks (Klatt, Steinberg, & Duchemin, 2015); in a second RCT study, mindfulness and work engagement significantly improved after training and follow-up (four months), however the improvement in the experimental group was not significant with increased mindfulness practice (Leroy et al., 2013); in a third, RCT study, neither mindfulness nor work engagement significantly improved in post- training, and 12-month follow-up (van Berkel et al., 2014), and in a fourth, RCT study, mindfulness and one of three work engagement sub-scales significantly improved after training and 6-month follow-up (Aikens et al., 2014). As of 2015, no studies were found that explored the link between changes from an internet-based mindfulness-based training programme and job engagement, as defined by Rich et al. (2010). In a meta-analysis search for work-engagement interventions through to May 2015, Knight, Patterson, and Dawson (2017) did not identify any additional mindfulness-based intervention studies other than those studies already mentioned above. However, the link between mindfulness and job engagement was reinforced by a recent study of dispositional mindfulness by Silver et al. (2018) who found a positive association with work engagement.
(using UWES), and a negative association with burnout in a sample of 441 genetic counselors.

Although the UWES job engagement measure is commonly used in research, the JES measure was selected for use in this thesis. UWES was developed with a well-being focus on individual’s burnout whereas the JES measure was developed with a focus on two assessments of job performance: task performance and organisational citizenship behaviour. The wording of the questions in the two measures reflects this difference.

**Organisational-citizenship-behaviour - individual.**

Employee organisational citizenship behaviours (OCBs) are discretionary and they seek to improve the functioning of the organisation (Williams & Anderson, 1991). There are two dimensions which are centred on the target of the behaviour (Smith, Organ, & Near, 1983; Williams & Anderson, 1991). The first behavioural target directly benefits the organisation in general (OCB-organisation; OCBO) and the second target indirectly contributes to the organisation by employees targeting beneficial behaviours towards a specific individual (OCB-individual; OCBI).

Glomb et al. (2011) posited that the combination of awareness and flexible responses resulting from mindfulness is important when considering the importance of mindfulness to OCBI. They stated that studies have shown improvements to interpersonal social connections as a result of mindfulness practice and those study results could be relevant to workplace interpersonal behaviours (OCBIs). Reb, Narayanan, and Ho (2015) found that employee dispositional mindful awareness was significantly and positively associated with employer-rated OCBs. In a PhD thesis which examined the impact of MBIs, Giluk (2010) found a significant but negative relationship with supervisor-rated interpersonal citizenship behaviour (effect size was small for both mindfulness and citizenship behaviour measurements). As of 2015, no other workplace studies were found that explored changes in OCBI resulting from mindfulness training. In response to the link between mindfulness and OCBI made by Glomb et al. (2011), this thesis measures only the OCBI factor of the two factor organisational citizenship behaviour measure developed by K. Lee and Allen (2002).

**Curiosity.**

Curiosity in employees can be an important factor in their job performance (Reio & Callahan, 2004). Although the Western view of curiosity is different from the Eastern
(Buddhist) view, the two perspectives could be considered complementary. In the Buddhist perspective of mindfulness, a curiosity about processes and things frees the mind from the identification with the self to become more objective and clear about the world (Bishop et al., 2004; Brazier, 2013). The most influential Western definition of curiosity unique to humans is epistemic curiosity, a term for the drive for meaning and information in novel situations (Berlyne, 1954). Kashdan, Rose, and Fincham (2004) built on Berlyne’s (1954) theory of human curiosity when they identified two dimensions of curiosity: the motivation to explore novel or unknown situations and gain knowledge, and the willingness to embrace the associated uncertainties. The two dimensions of curiosity align well with the concept of curiosity in mindfulness. Curiosity may help employees to cope with the uncertainties and complexities of the workplace. Curiosity can be important for jobs requiring high demands for learning, and when there is the need for employees to be proactive and adapt to changes in role or organisation (Mussel, 2013). In a workplace study of epistemic curiosity, Mussel (2013) found that curiosity levels significantly predicted supervisor-rated job performance. Harvey, Novicevic, Leonard, and Payne (2007) posited that global managers who are more curious make better decisions in a global context. They suggested that increases in curiosity occur as a result of the greater self-awareness of knowledge gaps made possible with the mindfulness skills of observation, description, acting with awareness and non-judgmental acceptance. This link between a mindfulness awareness of knowledge gaps and curiosity is iterative and curiosity increases with iterations. They suggest that the focussed attention of mindfulness enables managers to avoid the distractions from non-pertinent stimuli when seeking information needed to make decisions.

Some measures of mindfulness include curiosity as a factor. While developing a trait version of the state-mindfulness Toronto Mindfulness Scale (TMS; Lau et al., 2006) measure, Davis, Lau, and Cairns (2009) found that TMS Curiosity was higher for mindfulness meditators compared with non-meditators, however curiosity did not increase as meditation experience increased. Davis et al. (2009) speculated that this could be due to differences in the type of mindfulness meditation that was practiced. They suggested that more research was required and that pre-test and post-test changes in curiosity scores could help to establish if curiosity precedes or is a consequence of mindfulness practice. The lack of clarity in the Davis et al. (2009) result and their research suggestion provides an opportunity in this thesis to examine if the type of meditation training given in an MBI can change the curiosity levels of the individuals who receive the training.
Curiosity, as a facet of the state-mindfulness TMS measure was examined in an RCT study using a university student sample (Cleirigh & Greaney, 2015). There was a non-significant increase in curiosity immediately following a brief lab-based MBI and significant increase after both the MBI and group task activity (Cleirigh & Greaney, 2015). As of 2015, no workplace studies were found that explored changes in curiosity resulting from mindfulness training programs.

Davis et al. (2009) found a large correlation of TMS Curiosity with the Observe facet of the Five-Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006a). However the TMS language is more specifically related to curiosity whereas FFMQ Observe uses terms of notice and paying attention to experiences (Davis et al., 2009). This indicates that the FFMQ Observe facet is an insufficient measure of curiosity and a more specific curiosity measure is needed for this thesis.

Mussel, Spengler, Litman, and Schuler (2012) developed a German work-related scale for curiosity. This scale was rejected for use in this thesis in favour of the Curiosity and Exploration Inventory (CEI-II; Kashdan et al., 2009) measure. During the development of CEI-II correlations between CEI-II and mindfulness FFMQ were examined and CEI-II has been used more extensively in curiosity research.

**Intention to quit.**

Dissatisfaction with one’s job can be an emotional response leading to a cognitive process which may result in an intention to quit (Mobley, Horner, & Hollingsworth, 1978). Maertz Jr and Kmitta (2012) investigated the reasons why employees voluntarily left their previous job. The reasons were wide ranging from the most cited two reasons of (a) wanting better pay, and (b) management problems; to the least cited reasons (c) sexual harassment, and (d) dangerous work conditions. Intention to quit can be an important outcome to track because it can have a significant, direct effect on actual turnover (Griffeth, Hom, & Gaertner, 2000; Mobley et al., 1978).

A significant, negative relationship between employee dispositional mindfulness and turnover intention was found in one study, although the results were insignificant when work engagement was taken into account (Dane & Brummel, 2014). Two more recent studies found that individuals higher in dispositional mindfulness recorded lower turnover intentions (Reb et al., 2017; Schultz, Ryan, Niemiec, Legate, & Williams, 2015). As of 2015, no
workplace studies were found that explored changes in intention to quit resulting from mindfulness training.

There was no access to actual turnover data for participants in this thesis. Kelloway, Gottlieb, and Barham (1999) developed a four-item questionnaire to measure turnover intentions. The five-item Intention to Quit measure developed by Wayne, Shore, and Liden (1997b) was selected for use in this thesis because it included current job seeking actions and a longer-term vision of employment with current employer.

This concludes the descriptions and reasons for selecting the outcome and measure. This chapter now moves on to the summary and the structure of the thesis.

1.9 Summary and Thesis Structure

This thesis explores the impact of a mindfulness-based self-help app on employees in a U.K. university.

How gaps in research will be addressed.

Published literature on the impact of mindfulness-based interventions for employees has a number of gaps, three of which are addressed in this thesis. The gaps, and how they will be addressed in this thesis, are summarised as follows:

*Gap 1: impact of MBIs on work-related outcomes.*

There are few workplace studies which examine the impact of mindfulness-based interventions on work-related outcomes, and even fewer which analyse the impact of an offer of an MBI (ITT studies with an RCT design). This thesis will address this gap by examining five work-related outcomes, and conduct an initial ITT analysis of the impact of the MBI after two months.

*Gap 2: long-term analysis of the impact of interventions.*

There are few workplace studies which examine the longer-term (12 months) impact of MBIs, taking into account the variability of intervention dosage, and few studies which examine the mindfulness experiences of participants over 12 months. This thesis will address this gap by conducting a 12-months follow-up to quantitatively examine dosage impacts on
measured outcomes, and will conduct interviews to ascertain the experiences of participants over the year since they were issued with a six months access subscription to the mindfulness-training app.

**Gap 3: Mindfulness-based self-help training with no supplementary guidance.**

There are few workplace studies which use MBSH interventions, and even fewer which conduct the intervention without supplementary guidance. This thesis will address this gap by offering the Headspace app for six months with no supplementary guidance.

**Summary of aims.**

This thesis uses a multi methods approach with four studies to examine the impact of a self-help, internet-based/mobile-device, mindfulness-based (MBSH) training app called Headspace on university employees in terms of mindfulness, health (perceived stress), and work-related outcomes. The design and aims of each study are described below.

**Thesis structure.**

The thesis comprises of three empirical studies (see in Figure 1.1). The final chapter (Five) is a general discussion with the conclusions of the research.

**Chapter Two - Study 1: A randomised control trial of the impact of a mindfulness-based intervention on workplace outcomes.**

Researchers have argued that more research is required on the effectiveness of MBIs on work-related outcomes (T. D. Allen et al., 2015; Jamieson & Tuckey, 2017). A number of potential work-related benefits and outcomes have been suggested for future research (Glomb et al., 2011; Hyland et al., 2015). Miksch et al. (2015) called for greater scrutiny towards the positive work-related outcomes of mindfulness. The review of literature in this thesis identified that research of work-related outcomes remains a gap.

The aim of this study was to investigate the impact of a workplace offer of mindfulness training via a mobile mindfulness-based self-help (MBSH) app, and to examine changes in mindfulness, health- and work-related outcomes.
The study utilised a randomised waitlist control trial design. Participants were employees in a U.K. university. Participants completed measures of mindfulness, perceived stress, work-life-balance, job engagement, organisational citizenship behaviours-individual, curiosity and intention-to-quit as well as demographic and work characteristics through an online questionnaire completed pre- and post- two-month intervention. The intervention was an MBSH app, Headspace, which was provided without supplementary guidance. Training app usage statistics were provided by Headspace. An ITT analysis was performed, as well as an analysis of two further samples: participants who completed the pre-/post-intervention questionnaires and participants who achieved a minimum level of training.

However, the benefit of continued Headspace usage (i.e., “dosage”) over time remained unanswered in this study. The impact of Headspace dosage over 12 months on Study 1 outcomes is addressed in Study 2.

Chapter Three - Study 2: Longitudinal study of the longer term impact of a mindfulness-based intervention: predictor of outcomes at 12 months follow-up.

Grossman (2011) suggested that mindfulness measures should be viewed as psychological traits that can linked to distinctly different direct measures of mindfulness aspects such as the amount of practice. This study extends this suggestion by exploring the impact of amount of mindfulness training app usage with all outcomes of this thesis.

The aim of this study was to investigate the relationship between the amount of mindfulness training (which could be considered as “dosage”) via an internet/smartphone mindfulness-based self-help (MBSH) app, Headspace, and changes in mindfulness, health- and work-related outcomes over a period of 12 months.

The study utilised a 12-month longitudinal design to examine the extent to which Headspace app usage predicts the outcomes. Participants were employees in a U.K. university. Participants completed measures of mindfulness, perceived stress, work-life-balance, job engagement, organisational citizenship behaviours-individual, curiosity and intention-to-quit through an online questionnaire. Training app usage statistics were provided by Headspace.

So far, the two studies of this thesis used a quantitative method approach to examine participant responses to a set of pre-determined topics of interest. Study 3 examines changes over the 12-months from the perspective of the participants.
Chapter Four - Study 3: Employees’ experiences of a mindfulness-based intervention: A qualitative study at 12 months.

One recommendation to improve the understanding of the mindfulness mechanisms and characteristics associated with MBIs is to conduct qualitative investigations and interviews (Grossman, 2011). In Study 1, a snapshot was taken of how employees perceive their job demands at the beginning of the research. In this study, employees are asked to express their perceptions of workplace issues and job demands, and then they are asked how their mindfulness training may have changed those issues.

The aim of this study was to explore employees’ experiences of learning mindfulness and their perceptions of the impact on their workplace issues.

The study used a qualitative method to explore the experiences of employees in a U.K. university after learning mindfulness techniques via a mobile mindfulness-based self-help (MBSH) app, Headspace. Thematic analysis was used to identify key themes.

Chapter Five - General discussion and conclusions.

Chapter Five provides a general discussion of the major findings of the four studies, their contribution to workplace specific MBI research, and summarises the thesis including its strengths. The limitations of the research are discussed and the implications for future research into mindfulness interventions for the outcomes are highlighted. The chapter ends with the conclusions for the thesis.
Method Flow

The methods deployed in the three studies of this thesis are illustrated in Figure 1.1. In addition, for completeness and illustration, a triangulation of the quantitative and qualitative methods was carried out (see Appendix V).

Figure 1.1 Flow of methods used in this thesis – multi-methods design
CHAPTER TWO

Study 1: A randomised control trial of the impact of a mindfulness-based intervention on workplace outcomes

2.1 Introduction

This is the first of three studies in this multi-methods thesis which addressed a gap in organisational research to explore whether and how workplace outcomes are improved by the offer and the dosage of a mindfulness intervention. It was a quantitative study, using a randomised waitlist control trial (RCT) design to investigate the impact of an offer of a mindfulness-based self-help (MBSH) meditation training intervention, Headspace, on employees in a UK university. The app was provided without supplementary guidance. The study examined participant responses to a set of pre-determined topics of interest: mindfulness, stress and a selection of work-related outcomes. The work-related outcomes included work-life-balance, job engagement, organisational-citizenship-behaviours, curiosity and intention-to-quit. Data were analysed by intention-to-treat (ITT) for two samples: Full ITT (missing values for T2 post-intervention are imputed) and Completers (only those who completed T2 questionnaires), then analysed for the effect of finishing a minimum number of sessions in the intervention for the Practitioners sample (T2 Completer sample with participants in the intervention arm who used ten sessions of the Headspace Foundation Level-1). The evaluation timeline was two months.

Workplace wellbeing programs.

Employers invest in wellbeing programs for their employees. A global survey of companies (Buck, 2016) stated that, in 2016, the top three priorities of survey respondents for wellbeing program objectives in all regions included: improving productivity (59%), improving employee engagement (56%), and attracting and retaining employees (54%), with stress reduction reducing in importance between 2012 and 2016. Wellbeing programs can encompass many components, examples include: physical ill health prevention (e.g., flu vaccinations), career wellbeing (e.g., mentoring, flexible working), and mental health-prevention (e.g., stress management counselling) and promotion (e.g., psychological flourishing through meditation). The focus of this study is the provision of mindfulness-
based meditation training that employers can offer, potentially as part of their wellbeing programs.

**Development of mindfulness.**

Mindfulness can be defined as non-judgmental awareness, changing from moment-to-moment, and it is developed by present moment attention which is open, non-judgmental and non-reactive (Kabat-Zinn, 2015). Implicit in this definition is that individuals can develop mindfulness through practice. The development of mindfulness can be achieved through meditation; it is not limited to one technique and meditation has been shown to elevate mindfulness levels with continuous, current practice (Bergomi et al., 2015). In research with non-clinical populations, the effect of pure meditation practice is associated with levels of mindfulness, whereas the effect of programs such as mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1982) and its variants, incorporate mindfulness meditation as one part of the training and they appear to have the greatest impact on psychological wellbeing (Eberth & Sedlmeier, 2012). This suggests that research outcomes of studies using programs such as MBSR may not be solely attributed to mindfulness meditation.

**Mindfulness training in workplace.**

A considerable body of work-related research has been conducted on the effect of mindfulness-based training on health and wellbeing (i.e., negative) outcomes such as anxiety, stress, rumination, sleep, and in most of the research there has been a statistically significant benefit of mindfulness training for these negative outcomes (T. D. Allen et al., 2015; Jamieson & Tuckey, 2017; Querstret, Cropley, & Fife-Schaw, 2016). However, it is clear from the top three objectives in the 2016 global wellbeing program survey that companies’ interests extend beyond the reduction of negative outcomes. There has been a growth in research which examines the impact of workplace mindfulness-based training on negative outcomes such as stress, and positive work-related outcomes such as job satisfaction and engagement, safety, and work productivity (Aikens et al., 2014; Brady, Connor, Burgermeister, & Hanson, 2012; Roeser et al., 2013; Wolever et al., 2012) but more research is needed on the effect on targeted work-related outcomes. Five work-related outcomes: work-life-balance, job engagement, organisational citizenship behaviour-individual, curiosity and intention-to-quit, have been selected for examination in this study; some of which align with the stated top three objectives of global wellbeing programs.
Focus on work-related outcomes.

Research suggests that mindfulness can increase curiosity (Brazier, 2013; Carlson, 2013). An open, non-defensive attitude when reacting to events is part of being curious (Kashdan et al., 2009). Research shows that job performance can be predicted by the curiosity of employees at work (Mussel, 2013; Reio & Callahan, 2004). Job performance is not directly examined in this study but given the association between curiosity and job performance, it has been selected as a work-related outcome for this study.

Individuals’ willingness to engage at work is influenced by how they cope with their work and personal lives, and stress can be a factor in this (Kahn, 1990); although more recent research indicates that a balance of work and personal lives is less of an influence on engagement than other factors such as an organisation’s effective change management and employees’ belief in the organisation’s mission and values (Parkes & Langford, 2008). A recent review of work-life-balance research suggests that there are benefits to organisations (e.g., turnover, job performance) when employees are satisfactorily engaged in their work and their personal lives and when there is low conflict between those two social roles (Sirgy & Lee, 2018). Employee intention to quit is a significant predictor of turnover (Steel & Ovalle, 1984). Therefore, work-life-balance and intention-to-quit are work-related outcomes selected for this study.

Research suggests that employees with higher levels of engagement contribute more to their organisations through task performance and organisational-citizenship-behaviours (Rich et al., 2010). Individuals can engage in their job by investing their physical, emotional and cognitive energies, and they can experience psychological meaningfulness in their jobs when they feel that they are getting a return on their investment (Kahn, 1990). Therefore, job engagement is included as a work-related outcome for this study.

Positive interpersonal interactions with work colleagues contribute to psychological meaningfulness (Kahn, 1990). Citizenship behaviour can be classed into two types: altruistic, help which is targeted to individuals, and generalised compliance, actions performed for the benefit of the system (Smith et al., 1983; Williams & Anderson, 1991). In the workplace, organisational citizenship behaviours targeted towards individuals have been shown to be associated with job affect, what the employee feels at work (K. Lee & Allen, 2002). The importance of organisational citizenship behaviours (OCB) for employers can be seen in the significant reduction in the turnover intentions of the recipients of interpersonal citizenship
behaviours (Regts & Molleman, 2013). In a meta-analysis, organisational-citizenship-behaviours were found to have a statistically significant negative relationship with turnover intentions (Podsakoff, Blume, Whiting, & Podsakoff, 2009). Organisational-citizenship-behaviour towards individuals (OCBI) has therefore been included as a work-related outcome for this study.

A suitable mindfulness-based training intervention.

The selection of an appropriate mindfulness-based intervention (MBI) is particularly important since participation in company funded wellbeing programs can be low. Low participation is partially explained by individual employee factors such as time and work pressures as well as access to resources (Spence, 2015). This indicates the need for workplace research studies to use mindfulness training interventions which are suited to the multiple demands on employee time. Additionally, it is important from the employer perspective, for workplace research to use training interventions which can be delivered cost-effectively, and for research to analyse the impact that the offer will have on employees, rather than analysing just the functionality, or the engagement satisfaction, and the facilitators and barriers of an intervention. For examples of intervention functionality and engagement analysis see a qualitative study of engagement by Carolan and de Visser (2018), and a functionality meta-analysis by Blázquez Martín et al. (2018).

Mindfulness training varies in content, duration and delivery method. Some companies have used formal, 8-week mindfulness training programs developed for clinical use which are costly to deliver for example, MBSR (Kabat-Zinn, 1982), and mindfulness-based cognitive therapy (MBCT; Segal et al., 2002). Many organisations have provided customised, briefer versions of these interventions which have been equally effective in reducing stress (Virgili, 2015). Although these interventions are effective, providing instructor-led mindfulness workshops in organisations can be expensive (Hales, Kroes, Chen, & Kang, 2012). Many of these customised interventions have reduced the time demands on participants however the training can still present issues for employees. In one study that used an 8-week multi-component MBI, employees found the lack of practice space an issue and employees thought that the intervention was too time-consuming which for some individuals led to feelings of guilt about what could have been accomplished instead (Hugh-Jones et al., 2018). Another study used a 4-week multi-component MBI which encouraged the development of self-care (Slatyer et al., 2018). The study participants liked the
flexibility of selecting a skill which was best suited to their situations however some felt the sessions were too lengthy. Additionally, there were mixed feelings expressed about the group sessions where some were encouraged through their shared experiences but for many, the group sessions with colleagues were uncomfortable.

Recent research indicates that online and smartphone delivered mindfulness training can be an effective alternative to the more traditional group or multi-component mindfulness interventions for employees (Morrison Wylde et al., 2017). Online or smartphone delivery interventions can be more cost-effective and can provide employees with the ability to self-manage their skills development (i.e., self-help) compared with other MBI options. However, digital mindfulness-based self-help (MBSH) interventions may not fully address concerns of employees. Banerjee et al. (2017) found that some health-care staff using their MBSH intervention (comprising eight 30-minute online sessions and videos) found the practices too long or too intense so they disengaged. Therefore, when selecting or developing a digital MBSH, the employees’ perspectives about session length and content complexity must be considered. Additionally, there are risks (physical, psychosocial, privacy and financial) associated with digital technology that are just beginning to be understood (Torous & Roberts, 2018). The provision of an intervention which is a trusted brand may address some risks (e.g., intervention content, data security, technology). Also, a trusted brand can encourage employee use of the digital intervention (Todkill & Powell, 2013). Headspace, an online and smartphone app, was selected as the MBSH for this study. Headspace mindfulness meditations are delivered by a former Buddhist monk. It is very popular and at the time of writing, it had over 20 million downloads globally. Using the Mobile Application Rating Scale (MARS), Headspace is the highest average scoring mindfulness app in a recent review of 23 high-quality mindfulness apps (Mani et al., 2015).

**Research aims.**

This study examined if the availability or offer of a mindfulness-based intervention to employees can increase their level of mindfulness, decrease perceived stress and improve five work-related outcomes: work-life-balance, job engagement, organisational citizenship behaviour-individual, curiosity and intention-to-quit over a two month period. The intervention was a self-help mindfulness-based training app for internet-based/mobile-devices, called Headspace.
Hypotheses.

Provision of the mindfulness app will result in increased levels of mindfulness. Therefore, in comparison to participants in the waitlist control group, participants who are offered the intervention (Headspace) will report…

…significantly higher levels of mindfulness (H1)

Provision of the mindfulness app will result in improvements in health-related outcomes (perceived-stress). Therefore, in comparison to participants in the waitlist control group, participants who are offered the intervention (Headspace) will report…

…significantly lower levels of perceived stress (H2)

Provision of the mindfulness app will result in improved work-related outcomes (work-life balance, job engagement, organisational-citizenship-behaviour-individual, curiosity, and intention-to-quit). Therefore, in comparison to participants in the waitlist control group, participants who are offered the intervention (Headspace) will report…

…significantly improved levels of work-related outcomes (H3)

2.2 Method

Design.

This, the first of four studies in the thesis, was a randomised waitlist control trial (RCT) to assess the impact of offering a mindfulness-based intervention to employees. It involved comparing two groups: one was given availability to the Headspace app at the start of the study (intervention group: INT); the other group was only given availability to the app after completion of the study (wait list control: WLC).

Participants.

Participants were recruited from the University of Surrey in the United Kingdom. Participants were included if they were: males or females over the age 17 and they were contracted to work for at least three days (21.6 hours) per week at the University. Individuals were excluded if they were currently under the supervision of a mental health professional for psychiatric conditions, they had previous experience of using Headspace or if they were not
available to complete the first two months of the research thesis (Study 1). The method of recruitment (published URL links to an internet-based screening survey for completion) demonstrated the individuals’ ability to understand and use an on-line survey.

**Sample size.**

Of the studies included in the literature review of Jamieson and Tuckey (2017), studies which used randomised control trial designs reported small, medium and large effect sizes for self-reported measures (e.g., mindfulness, perceived stress, work engagement and work-life balance). Given this range of effect sizes, the current study was powered to detect a medium effect size ($d = .50$) and to detect differences at a significance level of 5%, with a power of 80%. G*Power 3.1.92 (Faul, Erdfelder, Lang, & Buchner, 2007) was used for the calculation. This resulted in a target minimum sample size of 128 (64 participants per group) at post-intervention (2-months). Post-intervention attrition rates vary widely (0% to 56%) for MBI studies using employees (Michel et al., 2014; Virgili, 2015). Attrition for this study was estimated at 50% at post-intervention and a margin for over-recruitment was applied (target of 284 participants at baseline).

A total of 278 individuals used the published URL and 107 dropped out at the introductory webpage (before the screening questions). Of the remaining 171 potential participants, 21 did not meet the eligibility criteria (18 due to prior Headspace use, two due to medical conditions, one due to Headspace use and medical conditions), others dropped out at consent or while completing the first questionnaire. One hundred twenty-five participants completed the questionnaire (Time [T]1 baseline) and were randomised into one of two groups (Intervention [INT] and Wait-list Control [WLC]). At post-intervention (T2), there were a total of 101 participants (45 INT; 56 WLC). This represents a retention rate of 76% and 88% from the 62 (INT) and 63 (WLC) recruited at baseline. Refer to Figure 2.1 for the participant flow from screening to follow-up.
**Procedure.**

The intervention, staff communications and measurement questionnaires were accessed online. University of Surrey’s survey management software, Qualtrics ([https://www.qualtrics.com/](https://www.qualtrics.com/)), was used by the researcher to administer the consent forms, all questionnaires and reminder emails and to collect participant consent, questionnaire data and to randomise participants to RCT groups. Participants’ consent within Qualtrics (Qualtrics, 2005) was given for Studies 1, 2, and 3 of the thesis. Qualtrics questionnaires were accessible in either internet-based or mobile format. The University’s technical team provided a platform for the Information Sheet PDF to be downloaded by participants on request.
Recruitment, screening, incentives and randomisation.

At pre-intervention, Time 1 (T1), the University of Surrey’s approved mass email (NetNews) and intranet (SurreyNet) employee communication channels were used to advertise for participants. Recruitment posters, flyers and e-board messages were displayed on campus (Appendix A). To attract participants, the offer of a free 12-month subscription to Headspace (value of £60) was highlighted in all recruitment literature. All communication channels displayed recruitment links to a customised Qualtrics webpage which summarised the key points about the research, presented the information sheet and contained a screening questionnaire and consent forms (Appendix B). The information sheet informed individuals that mindfulness, stress and work outcomes were the subject of the research. They were informed that they would be randomly assigned to one of two groups, mindfulness and wait-listed control. Following consent, the T1 questionnaire was presented for completion (Appendices C and D). Questions were presented in a fixed order and forced response. On completion of the questionnaire, the Qualtrics randomiser (Qualtrics, 2005) was used to equally allocate participants to one of two groups, Intervention (INT) and Wait-listed Control (WLC). The between-group design had two conditions: INT (Headspace mindfulness training intervention group) and WLC (control group whose Headspace mindfulness training was delayed by two months). Qualtrics (Qualtrics, 2005) was used to assign Headspace subscription enrolment codes to participants in the INT group. After completing the questionnaire, participants were presented with an end of survey screen and an email containing the same information. To increase participation and retention, a six-month extension of the Headspace subscription was offered if participants completed study 1 (RCT) and study 2 (12-month follow-up) of this thesis. Additionally, participants were offered a personalised report of their changes at the end of the 12-month follow-up. Following ethical approval, recruitment was conducted over three months.

Post-intervention.

At post-intervention, Time 2 (T2; two months after T1 questionnaire completion), participants were emailed (Appendix E) directly using Qualtrics (Qualtrics, 2005) with the email addresses supplied by the participants at T1. The emails contained a link to the T2 Qualtrics-based questionnaire. At the beginning of the questionnaire, two forced response questions were presented. Participants were asked if, at the end of the 12 month research period, they might be interested in receiving a report on the changes in their outcomes and if
they might be interested in extending their subscription to Headspace by six months (Appendix F). Outcome measurement questions were presented in the same fixed order and forced response as at T1 (Appendix D). At the end of the questionnaire, INT participants were asked a forced-response question about their non-Headspace mindfulness practice before being presented with optional response questions about their Headspace usage experience (Appendix G). On completion of the questionnaire, Qualtrics was used to assign Headspace subscription enrolment codes to participants in the WLC group. Participants in both INT and WLC groups were presented with an end of survey screen regarding continued participation (Study 2) and a debriefing list of contacts (Appendix H).

An email asking for drop-out information was sent, via Qualtrics, to all participants who did not respond to email reminders to complete the questionnaire in T1 and T2 (Appendix I).

**Intervention.**

Headspace® was selected as the mindfulness-based self-help (MBSH) training application (app) for this study. Headspace is a commercially available (£60/$72 for a one year individual subscription) internet-based/smartphone (audio) application with global downloads in excess of 20 million. A commercially available app was used as the intervention to reduce the risk of using an untried digital application. Mani et al. (2015) conducted a review of 23 mindfulness-based apps meeting the inclusion criteria from a total of 560 apps available in English via iTunes and Google Apps Marketplace. Although the review did not assess the apps’ efficacy in developing mindfulness, it did evaluate the apps’ quality and features (e.g., visuals, engagement, functionality, and information quality). Headspace had the highest average score of all apps. Other high scoring apps were: Smiling Mind, iMindfulness and Mindfulness Daily. Officially launched in 2010, Headspace provides guided meditations delivered by Andy Puddicombe, a former Buddhist monk (Puddicombe, 2011). Headspace was the chosen app based on the combination of: (a) the high rating in the Mani et al. (2015) review; (b) training sessions focus on mindfulness concepts so the intervention would not be potentially confounded by other non-mindfulness components; (c) the involvement of a trained Buddhist monk in the app’s development and delivery which could potentially provide the efficacious development of mindfulness; and (d) the possible brand recognition factor in potential participants due to the wide-spread use in the general population.
Headspace training reinforces the concept of mindfulness — where individuals pay attention to and accept experiences as transitory — for the benefit of the individual and for those around them. This involves the decentering or experiential processing. Practicing decentering (a way of being aware of internal experiences from a third-person perspective to create a mental distance from self) is part of mindfulness training (Bernstein et al., 2015). Headspace uses audio, video, animations and exercises which incorporate opportunities for breath awareness, body scans, focus, and motivation and intentions. Headspace consists of 30 foundation sessions, 10 to 20 minutes each, and the sessions are available for individuals to use at their convenience (typically taken over 45 days). To retain participants in this study, the default foundations (1, 2, and 3) session duration was ten minutes. On completion of the first foundation level (which is freely available to the public), the remaining two foundation levels and other, optional mindfulness series are available on the web-site (related to health, relationships, and performance). All sessions can be repeated. No minimum target number of sessions was set for completion in this study. There are up to four emails sent to inactive subscribers during the first 15 days after enrolment and three emails sent to congratulate subscribers on achieving milestones within the first ten days. Additionally, there is a comprehensive set of Question & Answers (FAQs) to support the individual, a personal progress report summarising usage, and a buddy system (to communicate with other Headspace users). The app was provided without supplementary guidance.

**Measures.**

The measures were used to collect data for assessment in Studies 1 and 2 (Appendices C and D). Unless specified, all questions were forced response.

Participants completed measures of personal, occupational and mindfulness practice characteristics.

**Participant Characteristics.**

Participants were asked their age, sex, education (1 = No formal qualifications, 2 = GCSEs/O-Levels/NVQ/Equivalent, 3 = A-Levels/Equivalent, 4 = Undergraduate degree, 5 = Postgraduate degree, 0= Other), and marital status (married or cohabitating; 1 = Yes, 2 = No, 0 = Prefer not to answer).
**Occupational Characteristics.**

Participants were asked their current occupation (24 occupational categories), occupational location (1 = On-site, 2 = On-site and remote, 3 = Remote) and work type (1 = part time [contracted for 3 work days (\(<=21.6\) hours) per week – minimum accepted in screening], 2 = full time [contracted for 4-5 work days (>\(21.6\) hours) per week]). In addition, they were asked questions about the demands of their job and their work hour preferences.

Different types of job demands may impact work outcomes such as job performance, engagement and turnover intention (Albrecht, 2015). Although energy intensive, challenge demands can motivate and generate positive emotions in the workplace. Hindrance demands can generate negative emotions and emotion-focused coping reactions. Albrecht (2015) created a 2 factor job demands measure (challenge and hindrance demands) with three subscales in each. The current study used one subscale from each factor: information processing, a challenge subscale, (\(\alpha= .83\); rated on a 7-point scale (1=strongly disagree, 7=strongly agree) and emotional demands, a hindrance subscale, (\(\alpha= .81\); rated on a 5-point scale (1=not at all, 5=to a great extent). Item examples include: “My job requires that I juggle multiple tasks or activities at a time.” (challenge demand) and “To what extent do you have to deal with clients or colleagues who do not treat you with appropriate respect and politeness?” (hindrance demand).

A valuable resource in effectively managing multiple job demands and in satisfaction with work-life balance is a preference for working longer hours (Valcour, 2007). To assess different preferences in hours worked, two control variables from the Valcour (2007) study were used in our study (work hours and ideal work hours). In line with references, participants were asked two questions, the first about typical hours worked per week and the second about their ideal number of work hours per week. If there was no difference in the answers, then participants were satisfied with their working hours. A difference indicated that a participant was not satisfied, preferring to work either more or fewer hours.

**Meditation practices and intervention experiences.**

In a recent systematic literature review of mindfulness interventions in the workplace, Jamieson and Tuckey (2017) stated that studies could be improved by providing information about participant satisfaction with interventions and the amount of time spent on non-
intervention mindfulness practices. In response, questions were developed for this study to assess two perspectives of practice: Headspace, and non-Headspace, plus participants’ satisfaction with the Headspace intervention (Appendix G). Questions were developed for use in Studies 1 and 2.

Questions about meditation practice in Study 1 were asked of all participants at T1 and of only the INT group at T2.

At T1, there were four questions regarding the amount of non-Headspace meditation practice experienced during the previous two years. Each question was rated on a 5-point scale (1= None at all, 5 = A great deal). Each question began with: “In the last two years, how much experience have you had with some form of well-being practice?” The four mindfulness experience question topics are: formal mindfulness/Vipassana meditation, Physical relaxation [e.g., yoga, Tai Chi], Mental relaxation [e.g., transcendental meditation], and Other.

At T2, there was one question regarding the amount of recent non-Headspace mindfulness practice undertaken. The question was “In the last two months, how much time have you spent practicing mindfulness techniques beyond using the Headspace sessions?” the response being on a 5-point scale (1= Not at all, 5 = A lot/a great deal). To provide an accurate record of participant’s Headspace usage, data were collected by Headspace (date, time and duration of completed sessions and the communication platform [iOS, Android, Desktop]).

Intervention satisfaction questions (Appendix G) were developed for completion by participants in the INT group at T2. The first two questions were forced response. The first item is: “How likely are you to continue using Headspace over the next 10 months” and was rated on a 7-point scale (1=extremely likely, 7=extremely unlikely). The second item was “Would you share your thoughts about Headspace by answering a few questions?” (1= Yes, 0 = No). If the answer was ‘Yes’, the remaining questions were optional response. If the answer to the first satisfaction question (continued use of Headspace) is ‘unlikely’ then the participant is asked “Please explain why you are unlikely to use Headspace” (free-format text answer). Participants are asked to rate their satisfaction with aspects of the Headspace app by responding to 8-items on a 5-point scale (1=very dissatisfied, 5=very satisfied). An example item is: “How satisfied are you with the [Buddy network] of the Headspace offering?” Next, a list of five common exercises performed in the Headspace training
sessions (breathing, motivation and intention, body scan, attention, focus) is displayed for ranking in order of the most to least beneficial experienced during training. The final item is: “You listed [highest ranking exercise] as the most beneficial exercise. Why?” (free-format text answer).

**Outcome measures.**

**Mindfulness.**

To measure mindfulness, the Five Facet Mindfulness Questionnaire - Short Form (FFMQ-SF; Bohlmeijer, ten Klooster, Fledderus, Veehof, & Baer, 2011a; Bohlmeijer, ten Klooster, Fledderus, Veehof, & Baer, 2011b) was selected. FFMQ-SF consists of 24-items and originates from the 39-item Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006a). The items are rated on a 5-point scale (1=never or very rarely true, 5=very often or always true). An example item is “I find it difficult to stay focused on what’s happening in the present.” FFMQ-SF measures the same five mindfulness facets as FFMQ: observing internal and external stimuli in the present-moment (observe;4 items, Cronbach’s alpha $\alpha = .78$); describing experiences with words (describe; 5 items, $\alpha = .91$); acting with awareness instead of automatically responding while attention is focused elsewhere (actaware; 5 items, $\alpha = .86$); nonjudgment, of experiences (nonjudge; 5 items, $\alpha = .86$) and non-reactivity of internal experiences (non-reactivity; 5 items, $\alpha = .73$) showing an adequate to good internal consistency, similar to the FFMQ. Four of the five facets (excluding acting with awareness) of FFMQ have been shown to be significantly correlated with meditation experience (Baer et al., 2008). The FFMQ-SF was used in a recent study of dental patients (Tellez, Kinner, Heimberg, Lim, & Ismail, 2015) with Cronbach’s alphas ranging from .60 (observe) to .81 (actaware) and was used in another study (Trompetter, Bohlmeijer, Veehof, & Schreurs, 2014) of participants with regular or daily pain complaints ($\alpha = .82$ for the overall total). For this study the combined total score and five facets were included as dependent variables.

**Perceived stress.**

Stress was measured using the Perceived Stress Scale 10 (PSS10; S. Cohen & Williamson, 1988) which consists of 10-items adapted from the Global Measure of Perceived Stress (PSS; S. Cohen et al., 1983). It is often used in mindfulness research for both clinical and non-clinical participants (Dobkin & Zhao, 2011; Wolever et al., 2012). It is used to measure how stressful an individual appraises situations in their life. An example item is: “In
the last month, how often have you felt that you were on top of things?” (reverse-scored). A five-point Likert scale from 0 (never) to 4 (very often) is used. In a computed total score, greater perceived stress is the higher value of a score ranging from 0 (best) to 40 (worst). S. Cohen and Williamson (1988) found a mean score for PSS10 of 13.02, SD = 6.35 in a cross-section of 2,355 American adults. Previous studies have reported Cronbach’s alphas ranging from .72 to .85 (Nielsen, et al., 2016) and a recent study by Cavanagh et al. (2013) reported Cronbach’s alpha = 0.91 for the total score.

Work-life balance satisfaction.

Work-life balance satisfaction was measured using a measurement developed by (Valcour, 2007). It consists of 5-items rating satisfaction levels on a 5-point scale (1=very dissatisfied, 5=very satisfied). An item example is: “your ability to balance the needs of your job with those of your personal or family life.” The factor showed good internal consistency in a sample of call centre employees from a large US telecommunications (α = .93). It has been used in another study (Grawitch, Maloney, Barber, & Mooshegian, 2013) showing good internal consistency (α = .94).

Job engagement.

Job engagement was measured using the Job Engagement Scale (JES; Rich et al., 2010) which consists of 18-items on a 5-point scale (1=strongly disagree, 5=strongly agree). There are three engagement factors: physical (6 items; α = .89), emotional (6 items; α = .64) and cognitive (6 items; α = .90) and the total showed good internal consistency (α = .95). Individuals with higher scores in each factor and in the combined total have higher levels of engagement. Example items include: “I try my hardest to perform well on my job” (physical), “I feel positive about my job” (emotional), and “At work, I pay a lot of attention to my job” (cognitive). A previous study (Shuck, Zigarmi, & Owen, 2015) found good internal consistency for the three factors: physical (α = .94), emotional (α = .96) and cognitive (α = .96), and for the combined total (α = .97). In this study, individuals were asked to rate their University of Surrey job specifically, and the combined total score and three factors were included as dependent variables in analysis.

Organisational citizenship behaviour – individual.

K. Lee and Allen (2002) created a two factor organisational citizenship behaviours (OCB) measure consisting of behaviour toward individuals (OCBI; α = .83) and behaviour
toward organisation (OCBO; $\alpha = .88$); each factor consists of 8-items on a 7-point scale (1=never, 7=always). The 8-items from the OCBI factor were used in this study. OCBI indicates a willingness to contribute to organisation’s success by helping other employees. An item example includes: “Show genuine concern and courtesy toward co-workers, even under the most trying business or personal situations.”

Curiosity.

This study used the Curiosity and Exploration Inventory-II (CEI-II; Kashdan et al., 2009), a 10-item measurement adapted from the original CEI 36-item measurement of trait curiosity (Kashdan et al., 2004). CEI-II (total, $\alpha= .83$ to .86) has two subscales: Stretching (5-items; $\alpha= .79$ to .80), motivation to seek out knowledge and experience; and Embracing (5-items; $\alpha= .76$ to .79), embracing novelties, complexities or uncertainties in everyday life. CEI-II is not domain-specific so it is suited to a wide variety of situations. The combined total score and subscales were used since the embracing subscale had a high correlation with mindful awareness in a study by Kashdan et al. (2009).

Intention to quit.

Intention to quit was measured using the Intention to Quit measurement (Wayne, Shore, & Liden, 1997a; Wayne et al., 1997b) which consists of 5-items on a 7-point scale (1=strongly disagree, 7=strongly agree) and has shown good internal consistency ($\alpha = .89$). An item example includes: “As soon as I can find a better job, I’ll leave my company.”

End of research participation preferences and drop-out feedback.

To increase participant retention levels over the 12-months multi-method research period and to aid study planning, participants were reminded at T2 of the ‘end of project offers’ and asked for an early indication of their interest levels (1= Yes, 0 = No). The offers were a free 6-month extension of the Headspace subscription and a personalised report of changes in mindfulness outcomes over 12 months from receipt of the Headspace enrolment subscription code.

In their review of mindfulness and workplace studies, Jamieson and Tuckey (2017) stated that in addition to attrition rates, studies need to better understand the intervention engagement of participants. At T1 and T2 of this study, participants who provided consent but did not complete a questionnaire were asked optional response questions. The first question was “Are you interested in continuing your participation in this study?” (1= Yes, 0 =
No). If the answer was no, the participant was asked a second question. “Although you do not have to give a reason for withdrawing from this research project, I would be interested to know why. If you are happy to share why you are dropping out, please provide your response below.” (free format text answer).

**Ethical approval.**

Documentation for the studies in this multi-methods research thesis was submitted to the University of Surrey Ethics Committee as one protocol document. The studies received favourable ethical opinion (Appendix J; Reference: UEC/2016/040/FHMS).

The ethical concerns applied to all studies of this thesis. The primary ethical issue was the collection and storage of data. Participants’ university email addresses were collected in Study 1 to provide a direct communications channel between the participant and researcher, and between participant and Headspace for the duration of the studies in the research thesis. This information was kept separately from the demographics and outcomes data from completed questionnaires and was deleted at the end of Study 3.

The consent form informed the participant that data relating to them was anonymized and kept confidential in accordance with the Data Protection Act 1998. It also contained a consent clause provided by Headspace to allow them to provide the researcher with the participant’s Headspace usage data. This explanatory information was contained in the Information Sheet. The data received from participants and Headspace (anonymized usage data for each Headspace subscription code) was anonymized and kept strictly confidential. This was achieved by removing identifiable information and replacing it with anonymous participant identifiers. All information gathered during this research study was stored securely in anonymized form at the University of Surrey.

None of the anonymized data was made available to the University or Headspace when reporting on results. Results were presented at an aggregated level protected individuals’ identity.

Participation in all studies was not expected to cause participants any psychological or physical harm. A debrief page at the end of each questionnaire provided the contact details for the University of Surrey Centre for Wellbeing and MIND as a precaution; in addition to the contact details of the researcher and supervisors. Participants were informed that they
were able to withdraw from the research at any time without giving a reason, although data from a completed questionnaire would be retained for analysis.

**Statistical analysis.**

**Data sources.**

Data were collected via the University of Surrey’s Qualtrics survey software (Qualtrics, 2005). Data files were downloaded and analysed using SPSS version 23 (IBM SPSS, 2014). Participant characteristics (personal, occupational and meditation practice) measures were forced response and collected at T1. Included as a participant characteristic was baseline perceived stress level. The PSS10 is not a diagnostic measurement and there is no official cut-off level available so the characteristic of participant T1 stress level was calculated by adapting a methodology used by Caesar (2016). This methodology was based on the S. Cohen and Williamson (1988) study of psychometric and descriptive data of U.S. adults. For each participant, their T1 Perceived Stress Score was compared with an average for their age group. If their score was less than .01 of the age mean, then their stress level was low; if the difference between their score and the average for their age was between .01 and 11.9, then their stress level was moderate; and any difference 12 and over was high stress.

At T2, data relating to the experience of using Headspace were optionally provided by the INT group only. Intervention usage data were provided by Headspace at T2. All outcome measures were forced entry so completed T1 and T2 questionnaires had no missing data.

**Sample datasets.**

Analysis was conducted using datasets termed the “Full ITT sample” (for Intention to Treat; ITT with T2 missing values imputed) and two subsamples: “T2 Completers”; and “Practitioners”. Intention-to-Treat or analysis-as-randomised is an analysis based on the intervention participants are assigned to rather than whether and to what extent they undertook the intervention. This gives an estimate of the effect of providing the intervention, regardless of uptake or adherence. Trial methodology experts and other professional organisations recommend ITT analysis when conducting an RCT study as a means of balancing the randomised intervention and control groups with the aim of reducing selection bias and confounding (Alshurafa et al., 2012). For the ITT analysis, data from T1 baseline...
were imputed into T2 (2-months post-baseline), using the “last observation carried forward” (LOCF) method, for those participants who dropped out prior to T2. The T2 Completers sample included all participants who completed both T1 and T2 questionnaires whether or not they undertook the intervention. Again, this produces an estimate of providing the intervention but only among those who completed the T2 questionnaire. The Practitioners sample was a subsample of the Completers sample but included only those INT participants who completed at least the Headspace Foundation Level-1 course (10 sessions). This therefore gives an estimate of the effect of actually undertaking a certain level of the intervention. Completion of the 10 introductory sessions of Headspace Foundation Level-1 was chosen because it is freely available to the public.

**Analytic approach.**

Prior to commencing the analysis, the participant characteristics were described by arm and then compared between the two arms of the study using chi-squared tests to check for differences at baseline. Following this, the characteristics of those in the two reduced datasets (completers and practitioners) were compared with those not included using t-tests to assess whether the participant characteristics of these datasets were different.

The reliability of the measures was assessed using Cronbach’s alpha. How closely the distribution of the data approximated a Normal distribution was examined by producing histograms and calculating z-scores for skew and kurtosis.

**Main analysis: Comparison between INT and WLC groups.**

For the Full ITT sample and the two subsamples of T2 Completers and Practitioners, the following analysis steps were undertaken to compare mindfulness, perceived stress and work-related outcomes (work-life balance, job engagement, organisational-citizenship behaviour, curiosity and intention-to-quit) between the INT and WLC groups. After calculating descriptive statistics, t-tests were conducted as a first step to examine the difference between the two arms.

The impact of the intervention on each outcome, controlling for T1 values, was assessed by fitting Analysis of Covariance models (ANCOVA’s) using the General Linear Model (GLM) procedure in SPSS. For each ANCOVA analysis, the T1 outcome score was entered as a covariate in the model.
The homogeneity of variance assumption was tested using Levene’s F test and if this indicated statistically significant heterogeneity, a Hartley $F_{\text{MAX}}$ test was conducted. Field (2013) suggests that conducting a Hartley’s $F_{\text{MAX}}$ test may be more appropriate when adopting a .05 level of significance and that a variance ratio below an $F_{\text{MAX}}$ value of 2 is acceptable for groups of 30 to 60. Homogeneity of variance was assumed in these cases. For ANOVA models to be valid the residuals need to be approximately Normally distributed. Histograms were produced to examine the distribution of standardised residuals.

In addition to examining the statistical significance of the difference between the two arms, standardised effect sizes were calculated. The recommended standardised effect size for the difference between two means is Cohen’s $d$ — the magnitude of the difference between the two groups divided by the standard error of the difference. Cohen’s (1988) guidelines suggest that Cohen’s $d$ values of .2, .5, and .8 indicate small, medium, and large effect sizes respectively, although he cautioned against over-reliance on such rules of thumb.

By adopting the ITT analytical approach, the treatment effect will be conservative (Alshurafa et al., 2012).

2.3 Results

Sample obtained.

The Full ITT sample obtained (i.e. 125; 62 INT; 63 WLC) was 98% of the aim for the sample size (i.e. 128). At T2, the T2 Completer sub-sample was 101 (45 INT; 56 WLC) and the Practitioner sub-sample was 87 (31 INT; 56 WLC).

Participant characteristics.

First, the participant characteristics for the Full ITT sample and the two sub-samples are presented. Next, the characteristics of INT and WLC groups are compared, and then the characteristics of those who dropped out are examined and compared with the remaining participants.

Participant characteristics for the Full ITT sample and the T2 Completer and Practitioner sub-samples.

Data for the demographics and work characteristics were taken at T1 (baseline) only.
Table 2.1 shows descriptive statistics for participant and organisational characteristics in the ITT, T2 Completers and Practitioners samples.

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<td></td>
</tr>
<tr>
<td>Not satisfied (excessive or too few hours)</td>
<td>87*</td>
<td>69.6</td>
<td>71</td>
</tr>
<tr>
<td>Satisfied</td>
<td>38</td>
<td>30.4</td>
<td>30</td>
</tr>
<tr>
<td>Job Demands***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Challenge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None to little experienced</td>
<td>18</td>
<td>14.4</td>
<td>14</td>
</tr>
<tr>
<td>Moderate to high experienced</td>
<td>107</td>
<td>85.6</td>
<td>87</td>
</tr>
<tr>
<td>Hindrance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never to sometimes experienced</td>
<td>66</td>
<td>52.8</td>
<td>51</td>
</tr>
<tr>
<td>Fairly to very often experienced</td>
<td>59</td>
<td>47.2</td>
<td>50</td>
</tr>
</tbody>
</table>

* Of the n = 87 people in Full ITT sample who were not satisfied with their hours, n = 83 believed their hours were excessive

** Stress Levels are based on the participant T1 Perceived Stress scores and categorised by the average level for their age

*** Job Demands can be challenging and motivational (e.g., using high-level cognitive skills when processing information) or a hindrance and demotivating (e.g., emotionally demanding)
Of the total eligible University of Surrey employees \( N = 2761 \) at the time of the study, 47% were males and 53% were females. The proportion of males and females in the three dataset samples showed a greater percentage of female participants (70-72%) compared with the total employee profiles. Greater proportions of participants in the three samples were cohabitating, possessed a university degree, with moderate levels of stress, and were performing a non-research or non-teaching job role. Most participants were not satisfied with their working hours and further analysis indicated that, of the participants who were dissatisfied with working hours, most believed they were working too many hours per week (of the 87 people who were dissatisfied \( n = 83 \), 95% believed they were working too many hours). Although a large proportion of participants found their jobs a positive challenge, the participants were almost equally split when judging the level of emotional hindrances that they faced in their roles. Cronbach’s alphas were .84 for both aspects of job demands: challenge and hindrance.

**Comparison of participant characteristics between INT and WLC groups at baseline \((T1)\).**

Description of T1 participant characteristics and past meditation practice are shown in Tables 2.2 and 2.3 for the Full ITT sample. Chi-squared tests showed that there were no significant differences between the INT and WLC groups at baseline. Therefore, it was concluded that randomisation was successful. Most participants had very little meditation experience.
Table 2.2  
*T1 Full ITT Participant and Organisational Characteristics (N = 125*)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>INT</th>
<th></th>
<th>WLC</th>
<th></th>
<th>x² (df=1)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>62</td>
<td>66.1</td>
<td>63</td>
<td>73</td>
<td>0.403</td>
<td>.441</td>
</tr>
<tr>
<td>Female</td>
<td>41</td>
<td>66.1</td>
<td>46</td>
<td>73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>21</td>
<td>33.9</td>
<td>17</td>
<td>27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.197</td>
<td>.722</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;= 39</td>
<td>31</td>
<td>50</td>
<td>34</td>
<td>54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40+</td>
<td>31</td>
<td>50</td>
<td>29</td>
<td>46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cohabitation</td>
<td>0.209</td>
<td>.691</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Cohabitating</td>
<td>18</td>
<td>29</td>
<td>16</td>
<td>25.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cohabitating</td>
<td>44</td>
<td>71</td>
<td>47</td>
<td>74.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education Level</td>
<td>1.285</td>
<td>.283</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No university degree</td>
<td>16</td>
<td>25.8</td>
<td>11</td>
<td>17.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University degree</td>
<td>21</td>
<td>74.2</td>
<td>20</td>
<td>82.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress Levels*</td>
<td>1.077</td>
<td>.584</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>6</td>
<td>9.7</td>
<td>10</td>
<td>15.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>33</td>
<td>53.2</td>
<td>31</td>
<td>49.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>23</td>
<td>37.1</td>
<td>22</td>
<td>34.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td>0.104</td>
<td>.848</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic and Research</td>
<td>19</td>
<td>30.6</td>
<td>21</td>
<td>33.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campus Backoffice and Support</td>
<td>43</td>
<td>69.4</td>
<td>42</td>
<td>66.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work location</td>
<td>0.453</td>
<td>.540</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-site</td>
<td>45</td>
<td>72.6</td>
<td>49</td>
<td>77.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some remote work</td>
<td>17</td>
<td>24.2</td>
<td>14</td>
<td>22.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with number of hours worked</td>
<td>1.227</td>
<td>.332</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not satisfied (excessive and too few)</td>
<td>46</td>
<td>74.2</td>
<td>41</td>
<td>65.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfied</td>
<td>16</td>
<td>25.8</td>
<td>22</td>
<td>34.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job Demands**</td>
<td>1.115</td>
<td>.319</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Challenge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None to little experienced</td>
<td>11</td>
<td>17.7</td>
<td>7</td>
<td>11.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate to high experienced</td>
<td>51</td>
<td>82.3</td>
<td>56</td>
<td>88.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hindrance</td>
<td>0.387</td>
<td>.593</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never to sometimes experienced</td>
<td>31</td>
<td>50</td>
<td>35</td>
<td>55.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fairly to very often experienced</td>
<td>31</td>
<td>50</td>
<td>28</td>
<td>44.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

INT = mindfulness intervention group; WLC = waitlist control group

* Stress Levels are based on the participant T1 Perceived Stress scores and categorised by the average level for their age

** Job Demands can be challenging and motivational (e.g., using high-level cognitive skills when processing information) or a hindrance and demotivating (e.g., emotionally demanding)
Intervention group drop-outs.

Seventeen participants (27%) of the INT group (62) in the Full ITT sample dropped out by T2. Three dropped out during the T2 questionnaire completion and one filed email reminders in separate email folder and forgot to complete the questionnaire in time to be included for analysis. The remaining 13 participants were sent an email requesting their reasons for dropping out but did not respond. To assess for differences between drop-outs (17) and completers (45), the baseline scores for total mindfulness, health-related outcome (perceived-stress) and work-related outcome variables (work-life balance, total job engagement, organisational behaviour, total curiosity and intention-to-quit) were compared using an independent-samples t-test. Results showed significant differences at T1 between drop-outs and T2 completers for total mindfulness, (drop-outs M = 67.47, SD = 13.34 and T2 completers M = 74.27, SD = 11.10; t(62) = -2.034, p = .046) and total job engagement, (drop-outs M = 63.00, SD = 14.48 and T2 completers M = 72.18, SD = 9.54; t(62) = -2.911, p = .005). There were no significant differences for the remaining variables.

Table 2.3
*T1 Full ITT* Participant Meditation Practice Characteristics (N = 125)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>INT n</th>
<th>%</th>
<th>WLC n</th>
<th>%</th>
<th>x² (df=1)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal Mindfulness or Meditation</td>
<td>62</td>
<td>91.9</td>
<td>63</td>
<td>96.8</td>
<td>1.413</td>
<td>.273</td>
</tr>
<tr>
<td>Little or None</td>
<td>57</td>
<td>91.9</td>
<td>61</td>
<td>96.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>5</td>
<td>8.1</td>
<td>2</td>
<td>3.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical relaxation</td>
<td>53</td>
<td>85.5</td>
<td>58</td>
<td>92.1</td>
<td>1.360</td>
<td>.271</td>
</tr>
<tr>
<td>Little or None</td>
<td>53</td>
<td>85.5</td>
<td>58</td>
<td>92.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>9</td>
<td>14.5</td>
<td>5</td>
<td>7.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mental relaxation</td>
<td>60</td>
<td>96.8</td>
<td>63</td>
<td>100</td>
<td>2.065</td>
<td>.244</td>
</tr>
<tr>
<td>Little or None</td>
<td>60</td>
<td>96.8</td>
<td>63</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>2</td>
<td>3.2</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>58</td>
<td>93.5</td>
<td>62</td>
<td>98.4</td>
<td>1.925</td>
<td>.207</td>
</tr>
<tr>
<td>Little or None</td>
<td>58</td>
<td>93.5</td>
<td>62</td>
<td>98.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>4</td>
<td>6.5</td>
<td>1</td>
<td>1.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

INT = mindfulness intervention group; WLC = waitlist control group.
Description of outcome measures.

Reliability of scales was examined by calculating Cronbach’s alpha and data were examined for skewness and kurtosis by calculating z-scores. Results for baseline data for the Full ITT dataset are shown in Table 2.4.

The measures showed good reliability with Cronbach’s alphas of around .80. Skewness and kurtosis for job engagement variables indicated some deviation from Normality (+/-1.96); however, the z-scores for all remaining variables suggested an approximately Normal distribution of data. Histograms of the distribution of data are shown in Appendix K and show approximately Normal distributions indicating no serious concerns about the assumption of Normality for ANCOVA to be conducted.

Table 2.4
Baseline (T1) Minimum-Maximum Score; distribution; Cronbach's alpha for mindfulness, health-related and work-related outcomes - Full ITT sample

<table>
<thead>
<tr>
<th>Study variables</th>
<th>Minimum Possible Sample</th>
<th>Maximum Possible Sample</th>
<th>Distribution Mean (SD)</th>
<th>Skew Z-score</th>
<th>Kurtosis Z-score</th>
<th>Cronbach's alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mindfulness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observe (FFMQ-Observe)</td>
<td>4</td>
<td>4</td>
<td>40</td>
<td>20</td>
<td>12.34 (3.66)</td>
<td>0.29</td>
</tr>
<tr>
<td>Describing (FFMQ-Describe)</td>
<td>5</td>
<td>10</td>
<td>40</td>
<td>20</td>
<td>15.18 (2.04)</td>
<td>-1.09</td>
</tr>
<tr>
<td>Acting with awareness (FFMQ-ActAware)</td>
<td>5</td>
<td>8</td>
<td>40</td>
<td>25</td>
<td>15.50 (4.18)</td>
<td>0.25</td>
</tr>
<tr>
<td>Nonjudgment (FFMQ-Nonjudging)</td>
<td>5</td>
<td>5</td>
<td>40</td>
<td>25</td>
<td>15.55 (4.81)</td>
<td>-0.94</td>
</tr>
<tr>
<td>Nonreactivity (FFMQ-Nonreact)</td>
<td>5</td>
<td>6</td>
<td>35</td>
<td>23</td>
<td>13.44 (3.90)</td>
<td>1.03</td>
</tr>
<tr>
<td>Mindfulness (FFMQ-Total)</td>
<td>39</td>
<td>42</td>
<td>195</td>
<td>103</td>
<td>72.02 (11.73)</td>
<td>0.44</td>
</tr>
<tr>
<td>Health related outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived stress (PSS10-Total)</td>
<td>0</td>
<td>3</td>
<td>40</td>
<td>36</td>
<td>21.60 (7.00)</td>
<td>-0.99</td>
</tr>
<tr>
<td>Work related outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work-life balance (WLB-Total)</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>25</td>
<td>15.78 (4.49)</td>
<td>-1.41</td>
</tr>
<tr>
<td>Job engagement - Physical (JES-Physical)</td>
<td>6</td>
<td>10</td>
<td>30</td>
<td>30</td>
<td>24.42 (4.09)</td>
<td>-2.98</td>
</tr>
<tr>
<td>Job engagement -Emotional (JES-Emotional)</td>
<td>6</td>
<td>8</td>
<td>30</td>
<td>30</td>
<td>22.48 (4.68)</td>
<td>-2.61</td>
</tr>
<tr>
<td>Job engagement -Cognitive (JES-Cognitive)</td>
<td>6</td>
<td>8</td>
<td>30</td>
<td>30</td>
<td>23.79 (4.17)</td>
<td>-4.58</td>
</tr>
<tr>
<td>Job engagement (JES-Total)</td>
<td>18</td>
<td>35</td>
<td>90</td>
<td>90</td>
<td>70.70 (11.32)</td>
<td>-2.69</td>
</tr>
<tr>
<td>Organisational behaviour individual (OCBI-Total)</td>
<td>8</td>
<td>20</td>
<td>56</td>
<td>56</td>
<td>39.77 (7.45)</td>
<td>0.14</td>
</tr>
<tr>
<td>Curiosity - Explore (CES-Stretch)</td>
<td>5</td>
<td>6</td>
<td>25</td>
<td>25</td>
<td>17.54 (4.90)</td>
<td>-1.92</td>
</tr>
<tr>
<td>Curiosity - Embrace unknown (CES-Embrace)</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>23</td>
<td>13.81 (4.19)</td>
<td>0.53</td>
</tr>
<tr>
<td>Curiosity (CES-Total)</td>
<td>10</td>
<td>11</td>
<td>50</td>
<td>48</td>
<td>31.35 (7.84)</td>
<td>-0.84</td>
</tr>
<tr>
<td>Intention to quit (Quit-Total)</td>
<td>5</td>
<td>5</td>
<td>35</td>
<td>35</td>
<td>14.10 (7.46)</td>
<td>3.90</td>
</tr>
</tbody>
</table>

N = 125
Comparison at baseline.

First, independent-samples t-tests were used to compare baseline mean scores between the INT and WLC arms for the three samples. Tables 2.5, 2.6, and 2.7 show that there were no significant differences between the INT and WLC arms at baseline (T1) for any variable: mindfulness, health-related or work-related outcomes.

T2 comparison of INT and WLC arms post intervention: Full ITT sample.

Independent-samples t-tests were used to compare post-intervention (T2) mean scores between the INT and WLC arms (Table 2.5). The results were mixed. There were significant differences for some aspects of mindfulness (total; acting with awareness, and non-reactivity facets). There were no statistical differences for perceived-stress, the work-related outcomes and the three facets of mindfulness (observe, describing and nonjudgment).

The INT and WLC groups were then compared at T2 controlling for group differences at T1, using the T1 outcome score as a covariate. The results of the ANCOVA are shown in Table 2.5. The assumptions of analysis were met (see Appendix L for histograms of standardised residuals). The intention-to-treat analysis showed that making the intervention available significantly increased several aspects of mindfulness (total; acting with awareness, and non-reactivity facets), which provided partial support for hypothesis H1. A significant decrease was found for perceived-stress, supporting hypothesis H2. Effect sizes were medium with the exception of the mindfulness-describe facet which was small. The impact on work-related outcomes was not significant, showing no support for hypothesis H3.
Table 2.5
Baseline (T1) and post-intervention (T2) unadjusted group means (SD), T1 and T2 t-test comparisons of means, and T2 ANCOVA for mindfulness, health-related and work-related outcomes - Full ITT

<table>
<thead>
<tr>
<th>Study variables</th>
<th>INT</th>
<th>WLC</th>
<th>Independent-samples ( t )-tests (two-tailed)</th>
<th>One-way ANCOVA - T1 covariant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline (T1)</td>
<td>Post-interv (T2)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Mindfulness</td>
<td>Baseline (T1)</td>
<td>Post-interv (T2)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Observe (FFMQ-Observe)</td>
<td>12.87 (3.84)</td>
<td>13.89 (3.85)</td>
<td>11.83 (3.42)</td>
<td>12.46 (3.77)</td>
</tr>
<tr>
<td>Describing (FFMQ-Describe)</td>
<td>14.90 (2.08)</td>
<td>15.00 (1.88)</td>
<td>15.44 (1.99)</td>
<td>15.33 (1.65)</td>
</tr>
<tr>
<td>Acting with awareness (FFMQ-ActAware)</td>
<td>15.73 (4.29)</td>
<td>17.23 (3.51)</td>
<td>15.29 (4.09)</td>
<td>15.54 (4.04)</td>
</tr>
<tr>
<td>Nonjudgment (FFMQ-NonJudging)</td>
<td>15.21 (4.96)</td>
<td>15.85 (4.77)</td>
<td>15.89 (4.68)</td>
<td>15.54 (4.84)</td>
</tr>
<tr>
<td>Nonreactivity (FFMQ-Nonreact)</td>
<td>13.69 (4.11)</td>
<td>14.73 (3.94)</td>
<td>13.19 (3.69)</td>
<td>13.29 (4.32)</td>
</tr>
<tr>
<td>Mindfulness (FFMQ-Total)</td>
<td>72.40 (12.04)</td>
<td>76.69 (12.48)</td>
<td>71.63 (11.50)</td>
<td>72.16 (12.59)</td>
</tr>
<tr>
<td>Health related outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived stress (PSS10-Total)</td>
<td>22.00 (6.85)</td>
<td>19.13 (6.68)</td>
<td>21.21 (7.20)</td>
<td>20.44 (7.33)</td>
</tr>
<tr>
<td>Work related outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work-life balance (WLB-Total)</td>
<td>15.76 (4.44)</td>
<td>16.39 (4.42)</td>
<td>15.79 (4.57)</td>
<td>15.44 (5.49)</td>
</tr>
<tr>
<td>Job engagement - Physical (JES-Physical)</td>
<td>24.24 (4.27)</td>
<td>24.27 (4.21)</td>
<td>24.6 (3.92)</td>
<td>24.33 (4.45)</td>
</tr>
<tr>
<td>Job engagement - Emotional (JES-Emotional)</td>
<td>21.71 (4.92)</td>
<td>22.18 (4.86)</td>
<td>23.24 (4.34)</td>
<td>22.84 (4.99)</td>
</tr>
<tr>
<td>Intention to quit (Quit-Total)</td>
<td>14.81 (7.47)</td>
<td>14.95 (7.94)</td>
<td>13.41 (7.44)</td>
<td>15.35 (8.87)</td>
</tr>
</tbody>
</table>

\( (N = 125); \ INT = \text{mindfulness intervention group} (n = 62); \ WLC = \text{waitlist control group} (n = 63); \ Post-interv = \text{post-intervention} \)
T2 comparison of INT and WLC arms post intervention: T2 Completers sample.

In the T2 Completers sample, only those participants in the Full ITT sample who completed the T1 and T2 questionnaires were included so results are based on actual T2 scores for the INT and WLC group participants.

Independent-samples t-tests were used to compare post-intervention (T2) mean scores between the INT and WLC groups. The results were mixed. There were significant differences for some aspects of mindfulness (total; observe and non-reactivity facets); and the health-related outcome (perceived-stress). There were no statistical differences for the work-related outcomes and three facets of mindfulness (describing, acting with awareness, and nonjudgment).

The INT and WLC groups were then compared at T2 controlling for group differences at T1, using the T1 outcome score as a covariate. The results of the ANCOVA are shown in Table 2.6. The analysis of the impact of the intervention availability for completers showed that making the intervention available significantly increased several aspects of mindfulness (total; acting with awareness, nonjudgment, and non-reactivity facets) and it significantly decreased perceived-stress. Effect sizes were medium. The impact on work-related outcomes was not significant.

The analysis for the T2 Completers sample showed the effect of the availability of the Headspace intervention in those for whom completed T1 and T2 data was available. However, participants in the INT group may not have finished the ten Headspace Foundation Level-1 sessions. To obtain a more accurate assessment of the effect of practicing the intervention rather than the impact of the availability of the intervention, a final sample set, Practitioners was analysed.
<table>
<thead>
<tr>
<th>Study variables</th>
<th>INT Baseline (T1) Post-interv (T2) Mean (SD)</th>
<th>WLC Baseline (T1) Post-interv (T2) Mean (SD)</th>
<th>Independent-samples t-tests (two-tailed)</th>
<th>One-way ANCOVA - T1 covariant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>t (99) p</td>
<td>F (1,98) p Cohen's d B lower upper</td>
</tr>
<tr>
<td>Mindfulness</td>
<td></td>
<td></td>
<td>t (99) p</td>
<td>F (1,98) p Cohen's d B lower upper</td>
</tr>
<tr>
<td>Observe (FFMQ-Observe)</td>
<td>13.22 (4.10) 14.56 (3.94) 11.80 (3.79)</td>
<td>12.52 (3.79) 15.00 .060 2.64 .010</td>
<td>3.210 .076 0.37 0.99 -0.11 2.09</td>
<td></td>
</tr>
<tr>
<td>Describing (FFMQ-Describe)</td>
<td>15.13 (1.98) 15.27 (1.83) 15.43 (1.97)</td>
<td>15.30 (1.57) 13.96 .07 2.46 .060</td>
<td>0.241 .624 0.10 0.13 -0.39 0.64</td>
<td></td>
</tr>
<tr>
<td>Acting with awareness (FFMQ-ActAware)</td>
<td>15.60 (4.38) 17.40 (3.31) 15.25 (4.18)</td>
<td>15.54 (4.13) 13.46 .07 2.46 .060</td>
<td>8.041 .006 0.58 1.67 0.50 2.83</td>
<td></td>
</tr>
<tr>
<td>Nonjudgment (FFMQ-NonJudging)</td>
<td>16.07 (4.80) 16.98 (4.30) 15.86 (4.73)</td>
<td>15.46 (4.91) 13.46 .07 2.46 .060</td>
<td>5.473 .021 0.47 1.35 0.21 2.50</td>
<td></td>
</tr>
<tr>
<td>Nonreactivity (FFMQ-Nonreact)</td>
<td>14.24 (4.02) 15.51 (3.67) 13.11 (3.63)</td>
<td>13.21 (4.34) 13.46 .07 2.46 .060</td>
<td>10.964 .001 0.67 5.55 2.22 8.87</td>
<td></td>
</tr>
<tr>
<td>Mindfulness (FFMQ-Total)</td>
<td>74.27 (11.10) 79.71 (10.91) 71.45 (11.20)</td>
<td>72.04 (12.46) 12.63 .210 3.25 .002</td>
<td>6.245 .014 0.51 1.42 0.29 2.54</td>
<td></td>
</tr>
<tr>
<td>Health related outcome</td>
<td></td>
<td></td>
<td></td>
<td>6.541 .012 -0.52 -2.63 -4.67 -0.59</td>
</tr>
<tr>
<td>Perceived stress (PSS10-Total)</td>
<td>21.24 (6.51) 17.85 (6.15) 21.56 (7.14)</td>
<td>20.69 (7.33) 13.96 .07 2.46 .060</td>
<td>2.349 .129 0.31 1.11 -0.33 2.56</td>
<td></td>
</tr>
<tr>
<td>Work related outcomes</td>
<td></td>
<td></td>
<td></td>
<td>0.715 .400 0.17 0.51 -0.69 1.71</td>
</tr>
<tr>
<td>Work-life balance (WLB-Total)</td>
<td>15.27 (4.49) 16.13 (4.46) 15.98 (4.41)</td>
<td>15.59 (5.48) 13.96 .07 2.46 .060</td>
<td>1.324 .253 0.23 0.76 -0.55 2.06</td>
<td></td>
</tr>
<tr>
<td>Job engagement - Physical (JES-Physical)</td>
<td>25.24 (3.41) 25.22 (3.23) 24.43 (3.97)</td>
<td>24.13 (4.55) 13.96 .07 2.46 .060</td>
<td>0.027 .871 0.03 0.11 -1.17 1.38</td>
<td></td>
</tr>
<tr>
<td>Job engagement - Emotional (JES-Emotional)</td>
<td>22.31 (4.35) 22.76 (4.41) 23.04 (4.50)</td>
<td>22.59 (5.20) 13.96 .07 2.46 .060</td>
<td>0.501 .481 0.14 1.12 -2.02 4.26</td>
<td></td>
</tr>
<tr>
<td>Job engagement - Cognitive (JES-Cognitive)</td>
<td>24.62 (3.19) 24.62 (3.06) 23.55 (4.20)</td>
<td>23.91 (4.32) 13.96 .07 2.46 .060</td>
<td>0.024 .878 0.03 0.16 -1.91 2.24</td>
<td></td>
</tr>
<tr>
<td>Job engagement (JES-Total)</td>
<td>72.18 (9.54) 72.60 (8.88) 71.02 (11.04)</td>
<td>70.62 (12.40) 13.96 .07 2.46 .060</td>
<td>0.195 .659 0.09 0.20 -0.71 1.12</td>
<td></td>
</tr>
<tr>
<td>Organisational behaviour individual (OCBI-Total)</td>
<td>40.38 (8.00) 40.78 (6.90) 39.30 (7.14)</td>
<td>39.80 (8.30) 13.96 .07 2.46 .060</td>
<td>1.074 .303 0.21 0.55 -0.50 1.60</td>
<td></td>
</tr>
<tr>
<td>Curiosity - Explore (CES-Stretch)</td>
<td>17.67 (3.97) 17.51 (3.64) 17.73 (3.87)</td>
<td>17.36 (3.78) 13.96 .07 2.46 .060</td>
<td>1.074 .303 0.21 0.55 -0.50 1.60</td>
<td></td>
</tr>
<tr>
<td>Curiosity - Embrace unknown (CES-Embrace)</td>
<td>13.71 (4.07) 14.36 (4.02) 13.95 (4.06)</td>
<td>14.00 (4.42) 13.96 .07 2.46 .060</td>
<td>1.074 .303 0.21 0.55 -0.50 1.60</td>
<td></td>
</tr>
<tr>
<td>Curiosity (CES-Total)</td>
<td>31.38 (7.52) 31.87 (7.27) 31.68 (7.52)</td>
<td>31.36 (7.77) 13.96 .07 2.46 .060</td>
<td>1.074 .303 0.21 0.55 -0.50 1.60</td>
<td></td>
</tr>
<tr>
<td>Intention to quit (Quit-Total)</td>
<td>14.96 (7.15) 15.16 (7.82) 13.30 (7.14)</td>
<td>15.48 (8.78) 13.96 .07 2.46 .060</td>
<td>1.074 .303 0.21 0.55 -0.50 1.60</td>
<td></td>
</tr>
</tbody>
</table>

(N = 101); INT = mindfulness intervention group (n = 45); WLC = waitlist control group (n = 56); Post-interv = post-intervention
T2 comparison of INT and WLC arms post intervention: Practitioners sample.

The Practitioner sample is a subset of the T2 Completers sample. It restricts the participants in the INT group to those who finished, at least, the ten Headspace Foundation Level-1 sessions and includes all T2 Completer WLC participants.

Independent-samples t-tests were used to compare post-intervention (T2) mean scores between the INT and WLC groups. The results were mixed. There were significant differences for some aspects of mindfulness (total; observe, acting with awareness and non-reactivity facets); and the health-related outcome (perceived-stress). There were no statistical differences for the work-related outcomes and the two facets of mindfulness (describing and nonjudgment).

The INT and WLC groups were then compared at T2 controlling for group differences at T1, using the T1 outcome score as a covariate. The results of the ANCOVA are shown in Table 2.7. The analysis of the effect of the intervention on the practitioners showed that making the intervention available significantly increased several aspects of mindfulness (total; acting with awareness, nonjudgment, and non-reactivity facets), it significantly decreased perceived-stress and it significantly increased work-life-balance, and the emotional facet of job engagement. Effect sizes were medium.
Table 2.7
Baseline (T1) and post-intervention (T2) unadjusted group means (SD), T1 and T2 t-test comparisons of means, and T2 ANCOVA for mindfulness, health-related and work-related outcomes - Practitioners

<table>
<thead>
<tr>
<th>Study variables</th>
<th>INT</th>
<th>WLC</th>
<th>Independent-samples t -tests (two-tailed)</th>
<th>One-way ANCOVA - T1 covariant</th>
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</thead>
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<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>T1 (85)</td>
<td>Post-interv (T2) (85)</td>
</tr>
<tr>
<td>Mindfulness</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observe (FFMQ-Observe)</td>
<td>13.06 (4.12)</td>
<td>14.45 (3.70)</td>
<td>11.80 (3.40)</td>
<td>12.52 (3.79)</td>
</tr>
<tr>
<td>Describing (FFMQ-Describe)</td>
<td>15.26 (2.00)</td>
<td>15.48 (1.71)</td>
<td>15.43 (1.97)</td>
<td>15.30 (1.57)</td>
</tr>
<tr>
<td>Acting with awareness (FFMQ-ActAware)</td>
<td>15.39 (4.60)</td>
<td>17.35 (3.46)</td>
<td>15.25 (4.18)</td>
<td>15.54 (4.13)</td>
</tr>
<tr>
<td>Nonjudgment (FFMQ-NonJudging)</td>
<td>15.48 (5.24)</td>
<td>17.16 (4.41)</td>
<td>15.43 (1.97)</td>
<td>15.30 (1.57)</td>
</tr>
<tr>
<td>Nonreactivity (FFMQ-Nonreact)</td>
<td>14.71 (4.34)</td>
<td>15.94 (4.04)</td>
<td>13.11 (3.63)</td>
<td>13.21 (4.34)</td>
</tr>
<tr>
<td>Mindfulness (FFMQ-Total)</td>
<td>73.90 (11.67)</td>
<td>80.39 (10.92)</td>
<td>71.45 (11.20)</td>
<td>72.04 (12.46)</td>
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<tr>
<td>Health related outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived stress (PSS10-Total)</td>
<td>21.69 (7.24)</td>
<td>17.63 (6.66)</td>
<td>21.56 (7.14)</td>
<td>20.69 (7.33)</td>
</tr>
<tr>
<td>Work related outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work-life balance (WLB-Total)</td>
<td>15.32 (4.39)</td>
<td>16.74 (4.38)</td>
<td>15.98 (4.41)</td>
<td>15.59 (5.48)</td>
</tr>
<tr>
<td>Job engagement - Physical (JES-Physical)</td>
<td>24.87 (3.56)</td>
<td>24.97 (3.34)</td>
<td>24.43 (3.97)</td>
<td>24.13 (4.55)</td>
</tr>
<tr>
<td>Job engagement - Emotional (JES-Emotional)</td>
<td>21.61 (4.62)</td>
<td>22.90 (4.40)</td>
<td>23.04 (4.50)</td>
<td>22.59 (5.19)</td>
</tr>
<tr>
<td>Job engagement - Cognitive (JES-Cognitive)</td>
<td>24.32 (3.18)</td>
<td>24.35 (3.06)</td>
<td>23.55 (4.20)</td>
<td>23.91 (4.32)</td>
</tr>
<tr>
<td>Job engagement -JES (Total)</td>
<td>70.81 (9.85)</td>
<td>72.23 (9.23)</td>
<td>71.02 (11.04)</td>
<td>70.62 (12.40)</td>
</tr>
<tr>
<td>Organisational behaviour individual (OCBI-Total)</td>
<td>39.48 (8.38)</td>
<td>40.48 (7.35)</td>
<td>39.30 (7.14)</td>
<td>39.80 (8.30)</td>
</tr>
<tr>
<td>Curiosity - Explore (CES-Stretch)</td>
<td>17.84 (4.20)</td>
<td>17.94 (3.95)</td>
<td>17.73 (3.87)</td>
<td>17.36 (3.78)</td>
</tr>
<tr>
<td>Curiosity - Embrace unknown (CES-Embrace)</td>
<td>13.84 (4.20)</td>
<td>14.87 (4.31)</td>
<td>13.95 (4.06)</td>
<td>14.00 (4.42)</td>
</tr>
<tr>
<td>Curiosity (CES-Total)</td>
<td>31.68 (7.82)</td>
<td>32.81 (7.88)</td>
<td>31.68 (7.52)</td>
<td>31.36 (7.77)</td>
</tr>
<tr>
<td>Intention to quit (Quit-Total)</td>
<td>15.16 (7.02)</td>
<td>14.74 (7.20)</td>
<td>13.30 (7.14)</td>
<td>15.48 (8.78)</td>
</tr>
</tbody>
</table>

(N = 87); INT = mindfulness intervention group (n = 31); WLC = waitlist control group (n = 56); Post-interv = post-intervention
Summary.

The intention-to-treat results using participants in the Full ITT sample were mixed. Hypothesis 1 was partially supported with showing significant improvements in total mindfulness and two of five facets. The improvements in remaining facets were not significant. Hypothesis 2 was supported with significant improvements in perceived stress. Hypothesis 3 was not supported by significant improvements in work-related outcomes. However, differences were more obvious with increased participation in the study as shown when examining changes in participants who completed the post-intervention questionnaire, and for those who completed the questionnaire and Foundation Level-1 of Headspace. With increased participation, there were greater improvements in mindfulness and perceived stress and improvements in work-life balance and the emotional energies of job engagement.

2.4 Discussion

The purpose of this study was to assess the impact of providing a mindfulness-based intervention (Headspace, a self-help, internet/smartphone app) to employees in a workplace. The effects on mindfulness, health-related (perceived stress) and work-related outcomes (work-life balance, job engagement, organisational-citizenship-behaviour-individual, curiosity, and intention-to-quit) were examined.

Results of the Full ITT, T2 Completers and Practitioners datasets were analysed to determine the effect of the offer of Headspace on the Full ITT sample, and with reduced power, the T2 Completers sample. The effectiveness of a minimum use of the ten Headspace sessions in Foundational Level-1 was examined using the Practitioners sample. Next, a summary of results for each sample is presented and then the effect on the outcomes in the Full ITT, T2 Completers and Practitioners samples is discussed in greater detail.

Summary of results: Full ITT, T2 Completers and Practitioners sample datasets.

Results of the intention-to-treat (ITT) analysis showed that, for participants in the Full ITT sample \((N = 125)\) who were offered the mindfulness intervention, total mindfulness \((d = 0.50, p = .006)\) and two of the five mindfulness facets significantly increased. Specifically, participants offered the intervention reported significantly higher levels of acting with awareness \((d = 0.51, p = .005)\) and non-reactivity mindfulness facets \((d = 0.39, p = .031)\).
Therefore, hypothesis 1 was partially supported. The health-related outcome, perceived stress ($d = -0.39, p = .034$), significantly decreased when compared with participants who were not offered the intervention, therefore, hypothesis 2 was supported. Results of the work-related outcomes were not significant, providing no support for hypothesis 3.

Eighty-one percent ($N = 45$) of the participants in the Full ITT sample completed the T2 questionnaire. The retention rate was 73% and 89% for the intervention and wait-list-control groups respectively. Power decreased in the T2 Completers sub-sample due to a lower number of participants compared with the Full ITT sample. The results of the analysis of differences in the T2 Completers sample between participants those offered the mindfulness intervention and those who were waitlisted showed significant increases in mindfulness levels (total; three of five facets: acting with awareness, non-judging, and non-react), a significant decrease in the level of the health-related outcome, perceived stress and no significant differences in work-related outcomes. Significant mindfulness and health-related outcome results for the T2 Completers sample replicated outcomes of the Full ITT sample with the exception of the T2 Completers’ significant additional mindfulness nonjudgment, facet. Additionally, the effect sizes increased for the T2 Completers sample.

The Practitioners sample ($N = 87$) also showed some significantly improved outcomes. Fifty percent ($n = 31$) of the participants assigned to the intervention group completed the ten Headspace Foundation Level-1 sessions which is also freely available to the public. Power decreased in the Practitioner sample due to the low number of participants. The results of an analysis of differences between practitioners and the waitlist-control showed significant increases in mindfulness levels (total ($d = 0.77, p = .001$); three of five facets: acting with awareness ($d = 0.57, p = .012$), non-judging ($d = 0.70, p = .002$) and non-react ($d = 0.50, p = .031$)), a significant decrease in the level of the health-related outcome, perceived stress ($d = -0.55, p = .008$) and increases in two work-related outcomes, work-life-balance ($d = 0.46, p = .044$) and the emotional facet of job engagement ($d = 0.46, p = .045$). Significant mindfulness and health-related outcome results for the Practitioners sample replicated outcomes of the Full ITT sample with the exception of the Practitioners’ significant additional mindfulness nonjudgment, facet. Additionally, the effect sizes increased in range (i.e., medium to large) for the Practitioners sample. The work-related outcomes for the Practitioners differed from the Full ITT sample ITT analysis for work-life-balance and the emotional facet of job engagement, with a difference approaching significance for a reduced intention-to-quit ($d = -0.40, p = .078$).
This summary of results for the three samples showed that the impact of offering the Headspace app significantly increases mindfulness and improves perceived stress and that the impact is greater with more participant involvement in the study and with a minimum usage of Headspace. The results varied by outcome therefore the results from the Full ITT, T2 Completers and Practitioners datasets are discussed next, with the results of each outcome category presented along with comparisons to previous research.

**Mindfulness outcomes.**

The mindfulness outcomes for the Full ITT sample of this study support the intention-to-treat (ITT) results in the Aikens et al. (2014) and Malarkey et al. (2013) workplace RCT studies. The Aikens et al. (2014) study \((N = 89)\) showed partially significant higher results for mindfulness (four of five FFMQ facets were significant, with nonjudgment the exception) using a 7-week, combined scheduled virtual class meetings and on-line training intervention. Differences in the significant mindfulness facets reported in the Aikens et al. (2014) and the current studies might be attributed to differences in the intervention content and structure or sample population (American chemical company). The Malarkey et al. (2013) study with a sample of university staff \((N = 186)\) showed significant post-intervention results for total mindfulness using the measure Toronto Mindfulness Scale (TMS; Lau et al., 2006) using an 8-week intervention consisting of combined weekly classroom and daily formal practice via CD’s to compare with an active control group providing educational lectures on lifestyle.

The significant increase in total mindfulness in the current study contrasts with the ITT results of a more recent workplace RCT study \((N = 52)\) where there was no significant differences in the increase in mindfulness after an 8-week online only mindfulness-based intervention (Allexandre et al., 2016). Differences between the Allexandre et al. (2016) and current studies might be attributed to differences in the intervention content, mindfulness measure (FFMQ-SF versus MAAS; Brown & Ryan, 2003), percentage of participants who completed the intervention or sample population (American call centre employees).

The mindfulness outcomes for the T2 Completers sample of this study are similar to the intervention effect results (at 8-weeks, post-intervention) in two workplace RCT studies (Cohen-Katz et al., 2005; Flook et al., 2013). The Cohen-Katz et al. (2005) study of 25 American nurses used an MBSR intervention and the RCT workplace study showed a significant positive result for total mindfulness (MAAS). Flook et al. (2013) had a small sample \((N = 18)\) of American teachers in their RCT workplace study which used an MBSR
based mindfulness intervention. Flook et al. (2013) only reported on effect size of differences in mindfulness facets (FFMQ) between groups, however they found increases in mindfulness facets with a medium effect size for the non-reactivity facet and small effect sizes for the remaining facets.

The current study T2 Completers results do not support the results of one workplace RCT study of 35 American marines (Haase et al., 2016). The study used an 8-week mindfulness-based intervention (based on MBSR and customised by a former U.S. Army officer). For self-report questionnaire completions the number of participants dropped due to scheduling conflicts with job training, and the study results showed no significant difference in total mindfulness (FFMQ) at post-intervention between the intervention group (n = 11) and control group (n = 9), and mindfulness marginally decreased in the intervention group at post-intervention. The differences in intervention content, in the sample population characteristics and size (participants who completed the questionnaires; n = 20; low power) might explain the contradictory results of the studies.

The mindfulness outcomes for the Practitioner sample of this study support the intervention effect results (at 8-weeks, post-intervention) in three workplace RCT studies (Amutio, Martínez-Taboada, Hermosilla, & Delgado, 2014; Atkins, Hassed, & Fogliati, 2015; Roeser et al., 2013). The Amutio et al. (2014) study of 42 Spanish physicians showed partially significant results for mindfulness (total and four of five facets: observing, describing, nonjudgment, and non-reactivity) using an MBSR intervention. There were significant differences in total mindfulness (FFMQ) at post-intervention in the Atkins et al. (2015) study of 110 Australian university employees which compared the results of an MBSR-based intervention with leadership and career development programmes, all 8-week interventions. There were significant differences, with large effect size, in total mindfulness (FFMQ) in the Roeser et al. (2013) study of 113 American and Canadian public school teachers which compared a wait-list group with intervention group participants who completed 75% of a multi-component group and individual activities mindfulness-based intervention. Although the sample size and methods adopted in the three cited studies differ, it is reasonable to compare their results with the current study since they are all RCT workplace studies which used the FFMQ mindfulness measure for post-intervention scores taken at 8-weeks from baseline. Additionally, the positive mindfulness outcomes for the Practitioner sample of this study partially support the effect results of a 4-week, class-based mindfulness intervention in a workplace RCT study with 80 Columbian healthcare
professionals (Manotas et al., 2014). They found significant, positive post-intervention differences, with small effect sizes, in mindfulness (total and observe and nonjudgment, facets; FFMQ). Although the interventions and sample population of the two studies were different, both studies used the five facets of FFMQ and showed the same result for total mindfulness, describe, and nonjudgment facets.

Interestingly, Morrison Wylde et al. (2017) recently conducted a two-arm study with American novice nurses ($N = 95$) which compared the mindfulness (FFMQ) results of a group who completed Headspace Foundation Level-1 with a group who completed a 4-week version of the MBSR program. Morrison Wylde et al. (2017) found that the Headspace group had significantly more mindfulness acting with awareness skills than the other intervention group. The higher non-reactivity skills of the Headspace group approached significance. The non-significant differences for the remaining mindfulness facets might be attributed to differences in the amount of mindfulness practice due to the greater accessibility of the Headspace meditation app sessions. Although the current study method is not directly comparable, the intervention group in the practitioner sample completed the Foundation Level-1 and there were significant differences in acting with awareness and non-reactivity, with medium to large effect sizes. This lends partial support to the Morrison Wylde et al. (2017) results.

**Health-related outcome – perceived stress.**

The significantly improved (decreased) health-related outcome (perceived stress) for the Full ITT sample in this study supports the intention-to-treat (ITT) results in the Aikens et al. (2014) and Allexandre et al. (2016) studies, and in a third study by Huang et al. (2015) which was conducted using a sample of 144 Taiwanese factory employees following an 8-week MBSR based intervention. The three studies showed significantly lower levels of perceived stress (PSS) at post-intervention with small to medium effect sizes. Additionally, the results support the findings of Wolever et al. (2012) who conducted an intervention study with 239 employees of an American insurance company to analyse (ITT) the differences between yoga-based and mindfulness-based 12-week stress management interventions and a control group. At post-intervention, the mindfulness group had significantly lower perceived stress (PSS) compared with the control group, although the difference was not significant between the two intervention groups.
The ITT results of the three studies and current study differ from the ITT results for perceived stress (PSS) of three other RCT workplace studies. Although perceived stress decreased in the intervention group, no significant differences (small effect size) in stress were reported in one study of 74 American physicians using a 9-months mindfulness-based intervention and measuring perceived stress at 3-, 6- and 9-months during the intervention period (West et al., 2014). The different results might be explained by the longer intervention duration and intervention content compared with the other studies. In another study, Duchemin, Steinberg, Marks, Vanover, and Klatt (2015) conducted an 8-week, multi-component group and individual activities mindfulness-based intervention with a smaller sample (N = 32) of medical centre employees. Duchemin et al. (2015) found no significant change each group and no significant differences in stress between groups at baseline and post-intervention. The intervention duration for both the current and Duchemin et al. (2015) studies were two months so there was sufficient time for a change in perceived stress in the Duchemin et al. (2015) intervention group. Apart from differences in the intervention content of the studies, the smaller sample size of the Duchemin et al. (2015) study might explain the different results compared with the current study. Additionally, Duchemin et al. (2015) suggested that some items of PSS measure are environmental aspects that are out of a person’s control and unlikely to change, and other items are related to over-reactivity. Their analysis of PSS scores for the PSS items related to over-reactivity showed a non-significant decrease with no change in the remaining PSS items. However, the current study and some of the other cited studies have shown significantly lower levels of perceived stress using the same measure (PSS10) so it is unlikely that the measure would explain the difference in results. The Malarkey et al. (2013) study with a sample of university staff (N = 186) showed no significant post-intervention differences, at two months, between the intervention and active control group. Malarkey et al. (2013) suggested that the non-significant results of the secondary outcome, perceived stress, might be attributed to a wording change in the PSS10 questionnaire asking for perceived change in the last week rather than past month. The measurement wording or different intervention content and delivery might be plausible explanations for the difference between their study and the current study since the population and intervention durations were similar.

The significant differences in the improved (decreased) health-related outcome (perceived stress) for the T2 Completers sample in this analysis supports the 8-weeks, MBSR intervention effect results in the S. L. Shapiro et al. (2005) workplace RCT study. They
found significant post-intervention differences in reduced perceived stress (PSS) in their sample of 28 American healthcare workers. However, the current study T2 Completers results do not support the results of one workplace RCT study of 45 American healthcare workers (Moody et al., 2013) which used an 8-week mindfulness-based intervention (based on MBSR). Moody et al. (2013) found an increase in perceived stress in both groups pre- and post-intervention, and no significant difference between groups at post-intervention. The differences in intervention content and sample size might explain the contradictory results of the studies, although it is interesting that the intervention design and sample population (suggesting possible low power) of the two cited studies are similar. Moody et al. (2013) suggested that the lack of significant results might be attributed to the significantly higher stress and burn out levels of their sample compared with S. L. Shapiro et al. (2005). The stress levels (PSS scores of approximately 30) in the Moody et al. (2013) study were higher than those of this study so their speculation may apply in this case.

The significant differences in the improved (decreased) health-related outcome (perceived stress) for the Practitioner sample in this analysis supports the 4-weeks, class-based mindfulness intervention effect results in the Manotas et al. (2014) workplace RCT study. They found significant post-intervention differences (medium effect size) in reduced perceived stress (PSS) in the sample of 76 Columbian healthcare workers. The Practitioner sample in this study supports two other RCT workplace studies. Klatt et al. (2017) used an 8-week, multi-component group and individual activities mindfulness-based intervention, Mindfulness in Motion (MIM). In the Klatt et al. (2017) study, the control group showed no change but the intervention group showed significantly lower levels of perceived stress, with large effect size, in the sample of 57 bank employees in Denmark. Another RCT workplace study (Klatt et al., 2009), using an abbreviated MBSR 6-week intervention, found that the control group showed no change but the intervention group showed significantly lower levels of perceived stress, with effect size of $d = 0.73$, in the sample of 48 employees in a mid-western American university.

The results of the two studies and current study Practitioner results differed with the results (at 3-weeks, post-intervention) of an RCT workplace study using a six group sessions mindfulness-based intervention with a sample ($N = 43$) of American public school teachers (Ancona & Mendelson, 2014). Although there was a decrease in perceived stress scores for the intervention group, there were no significant post-intervention differences between the two groups, with a moderate effect size and no adjustment for covariates. Apart from
differences in intervention content and duration, the differences in sample demographics and size, and the lack of adjustment for covariates in the Ancona and Mendelson (2014) study might explain the difference in results significance between this and the current studies.

**Work-related outcomes.**

A review of workplace mindfulness research called for more research, using cost-effective mindfulness training offered by a workplace, to assess positive workplace outcomes rather than focusing on health- and well-being related outcomes (Jamieson & Tuckey, 2017). However, for the Full ITT sample, the current study found no significant improvements in work-related outcomes (work-life balance, job engagement, organisational-citizenship behaviour, curiosity and intention-to-quit) resulting from the offer of an internet/mobile mindfulness-based app. When comparing the current study Full ITT sample results with other studies, there were few workplace MBI studies using ITT analysis of work-related outcomes. Of the work-related outcomes analysed in the current study, only ITT studies measuring job engagement were found. For the Practitioners sample, the study found significant improvements in two work-related outcomes, work-life balance and the emotional facet of job engagement, resulting from the completion of, at least, the ten sessions of Headspace Foundation Level-1. RCT studies examining outcomes such as work-life-balance, job engagement and organisational-citizenship-behaviour were found to compare with the Practitioner sample results of this study.

**Work-life balance.**

This study’s analysis of the differences between the two arms of the Practitioners sample provides an insight into the pre-/post- intervention effect on work-life balance for participants who completed Headspace Foundation Level-1. The current study used a work-life-balance satisfaction measurement (Valcour, 2007) which incorporates both a cognitive appraisal of balancing work-life demands and an assessment of the emotions or feelings resulting from the appraisal. The significant positive outcome of the current study suggest that completing Headspace Foundation Level-1 can lead to an improvement in an individual’s cognitive and emotional assessment of work-life-balance. The results support the findings of the Michel et al. (2014) RCT study of 246 employees from a cross-section of German companies. Michel et al. (2014) analysed differences between intervention group participants who achieved a minimum level of compliance and a waitlist control group. The Michel et al. (2014) results showed, compared with the control group, a significant increase (small effect
size) in satisfaction with work-life-balance resulting from a 3-week online, mindfulness training intervention containing downloadable instructions, audio files and daily tasks, and this improvement was maintained for up to two weeks. Although the interventions and sample population size and characteristics differed, both studies used the Valcour (2007) measure.

**Job engagement.**

The lack of significant positive job engagement outcomes between the two arms of the Full ITT sample of this study lend support the intention-to-treat (ITT) results in a workplace RCT study of 231 research institute employees using a 6-month multi-component (group and online training) MBI (van Berkel et al., 2014) and the 9-month MBI study of 74 American physicians (West et al., 2014). van Berkel et al. (2014) and West et al. (2014) found no significant differences in post-intervention job engagement. Although there were non-significant increases in engagement in all three studies, there were differences in methods. van Berkel et al. (2014) used a different measure of engagement, the Utrecht Work Engagement Scale (see Schaufeli et al., 2002, for employee version), a different mindfulness intervention, and post-intervention was at six rather than the two months for the current study. The West et al. (2014) bi-weekly discussion group intervention duration was nine rather than two months, it was a different intervention (bi-weekly meetings) and used a different measure of engagement which incorporated items measuring empowerment and meaning at work (Empowerment at work scale; Spreitzer, 1995).

The ITT results for the job engagement outcomes of this study contradict the intention-to-treat (ITT) results for the employee sample (N = 89) in the Aikens et al. (2014) study which found significant increases in physical, emotional and cognitive components of vigor (Shirom Vigor Scale; Shirom, 2003). The smaller sample size (low power), and the use of a different measurement may explain the contrasting study results however vigor, as used by Aikens et al. (2014) to measure work engagement, has similar categories of engagement energies to the measure used in the current study.

This study’s ITT analysis indicates that offering Headspace does not make a statistically significant impact on the work-related outcomes measured. This could be due to a number of factors: the duration of the intervention period (2 months), the intervention contents and delivery method, or that Headspace was offered as part of a research study rather than an active wellbeing promotion so participants may have responded to the offer
differently. The results for the Practitioner sample examine whether or not there was a significant effect on job engagement for participants who completed Headspace Foundation Level-1.

There was a significantly improved emotional factor of job engagement in the analysis of differences between the two arms of the Practitioners sample in this study. This result partially supports the significant intervention effect results of two workplace studies (Klatt et al., 2015; Leroy et al., 2013) and differs in significance for the results of two workplace studies (Atkins et al., 2015; Klatt et al., 2017). A description of the four studies is followed by a possible explanation of the difference between the current and comparison studies results.

Leroy et al. (2013) conducted an RCT study which used an 8-week MBSR-based intervention on a cross-section of employees attending a mindfulness training programme provided in-company ($N = 76$). They found significant differences between the intervention and waitlist control groups post-training intervention for total job engagement, using a three-component, 17-item, job engagement measure (UWES; Schaufeli et al., 2002).

Two RCT studies which used the 8-week MIM mixed-methods mindfulness-based intervention have different results in job engagement group differences (Klatt et al., 2017; Klatt et al., 2015). Both studies used the same job engagement measure (UWES-9; Schaufeli et al., 2006). In the Klatt et al. (2015) study using American Intensive-Care-Unit employees, there was a significant post-intervention improvement of total job engagement in the intervention group ($n = 34$) but not for the waitlist control group. The Klatt et al. (2015) study did not state the sample size. In the Klatt et al. (2017) study, there was no significant difference, with a small effect size, in change of total job engagement between the intervention ($n = 27$) and waitlist control group ($n = 30$) of Danish bank employees. Improvement in job engagement for the intervention group was small and non-significant. Klatt et al. (2017) noted the possible influence of different work environments and stressors between the two sample populations but offered no explanations on why the job engagement outcomes were so different between the two studies. Although substantial, the differences in total job engagement (UWES) at pre-intervention were sustained at post-intervention, and were not significant in the Atkins et al. (2015) study of Australian university employees ($N = 110$). The study compared the results of an MBSR-based intervention with two active control groups, all 8-week interventions. The job engagement measures (UWES and
UWES-9) used in the four comparison studies measure total engagement compared with the three-facet and total measure (Job Engagement Scale; JES) used in this study. So, although there were improvements in engagement for the current and cited studies, the current study results only show significant improvement in the emotional energies of engagement which would not have been visible if analysing only total engagement.

**Organisational-citizenship-behaviour.**

The differences in the organisational-citizenship-behaviour-individual outcome between the intervention and control groups of the Practitioners sample of this study were small (in a positive direction) and non-significant. This partially supports the findings of Giluk (2010) who conducted a workplace intervention study with university employees using one of two mindfulness-based interventions (MBSR and MSCT) and a control group to assess the impact on person-focused interpersonal citizenship behaviour (ICB; Settoon & Mossholder, 2002) as rated by supervisors. Giluk (2010) found a non-significant, negative difference between the post-intervention scores of the intervention group (n=20) compared with control group (n= 34) with small effect size. Different methods were used in the two studies. The interventions were different and Giluk (2010) did not randomly assign participants to groups, and used supervisor assessments whereas the current study used an RCT design, and self-reported ratings. However, both studies indicated that mindfulness-based interventions do not improve interpersonal organisational-citizenship-behaviours. Giluk (2010) suggested that improvements organisational behaviours may take longer to establish since participants may be concentrating on learning rather than applying mindfulness lessons.

**Curiosity.**

The differences in curiosity between the intervention and control groups of all three samples in this study were small (in the expected positive direction) and non-significant. Individuals’ level of general curiosity should increase from mindfulness training. When developing the curiosity measure (CEI-II) used in this study, there was a strong correlation between the mindfulness observation facet (being open and attentive to internal and external stimuli; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006b) and the curiosity embracing facet of CEI-II. The lack of a significant increase in mindfulness observation facet in this study may explain the non-significant increase in the curiosity embracing facet. No
workplace RCT studies examining mindfulness-based intervention impact on general curiosity were found for comparison.

**Intention-to-quit.**

The differences in the intention-to-quit between the intervention and control groups of all three samples in this study were small (in the expected negative direction) and non-significant. A difference approaching significance for a reduced intention-to-quit in the Practitioner sample was noted. Since there were significant positive differences of total mindfulness in this study, there was a reasonable expectation that the reduction in intention-to-quit would be significant. This expectation is set by five non-intervention studies (Andrews et al., 2014; Dane & Brummel, 2014; Reb et al., 2017; Zivnuska et al., 2016).

Dane and Brummel (2014) examined the relationship between dispositional mindfulness (a modified MAAS measure) and turnover intention (turnover intent; Kelloway et al., 1999) in a study with 102 American chain restaurant servers. They found that mindfulness trait mindfulness could significantly predict a lower (negative) turnover intention however the relationship became insignificant once work engagement was taken into account. In another dispositional mindfulness study (Andrews et al., 2014), using a cross-sectional sample of 280 American employees, found that workplace mindfulness had a significant negative relationship with turnover intention; Andrews et al. (2014) cited the use of intention to turnover in the Michigan Organizational Assessment Questionnaire in Cammann, Fishman, Jenkins, and Klesh (1983). A study (Zivnuska et al., 2016) which developed and validated a new workplace mindfulness measurement using a cross-section of 503 employees recruited over the Internet, found a significant, indirect association of mindfulness with the intention to turnover (turnover intent; Kelloway et al., 1999). Zivnuska et al. (2016) found that job satisfaction significantly mediated the effect of mindfulness on intention to turnover. A more recent study (Study 1; Reb et al., 2017) of 251 Indian employees in an American company’s call centre examined the relationship between dispositional mindfulness (MAAS) and intention to quit (Wayne et al., 1997a, 1997b). Reb et al. (2017) found that mindfulness had a significant negative association with the intention to quit and that this was partially mediated through emotional exhaustion. In the second of two studies, Reb et al. (2017) used a cross-section of 286 supervisor-subordinate dyads in four Indian cities and repeated the survey used in the first study. In the second study, emotional exhaustion fully mediated the significant
association of mindfulness and the intention to quit. The Reb et al. (2017) studies used the same intention to quit measure as the current study.

As there were mediating factors (work engagement, job satisfaction, and emotional exhaustion) in the three of the cited studies, this suggests that there are other influencing factors in the relationship between mindfulness and turnover intentions. The different mediating factors of the studies demonstrate that influential work- and health-related factors in the relationship are worthwhile topics of future research. The cited studies had significant associations between mindfulness and turnover intention prior to examining mediating factors so the results of the current study are unexpected. The influence of other factors may explain the lack of significant results in the current study.

No workplace mindfulness-based intervention RCT studies examining the impact on intention to quit were found for comparison.

**Summary.**

The current study addressed a gap workplace research by examining the impact of the offer and take-up of mindfulness-based training on a variety of work-related outcomes in addition to health outcomes such as stress/strain that are typically the most common focus of workplace studies (T. D. Allen et al., 2015; Eby et al., in press 2017; Jamieson & Tuckey, 2017).

The current study results showed mindfulness improvements consistent with other studies, although the significance of change at FFMQ facet level varied between studies. This variability of significant results at facet level may be an indication of the concerns expressed by Jamieson and Tuckey (2017) about the integrity of mindfulness-based interventions. Interventions which have been developed as variants of established and well-researched programs such as MBSR (commonly used in workplace studies) and MBCT may not be effective. Lomas et al. (2017) recommend that MBIs delivered by instructors (e.g., in classroom or supplementary guidance) should be accredited mindfulness practitioners to deliver training skilfully and safely.

The current study results showed perceived stress improvements consistent with other studies, although the significance and effect sizes varied. The non-significant change in studies by Duchemin et al. (2015) and Moody et al. (2013) differed from the other studies,
possibly due to the small sample sizes (low power making the detection of real change difficult or the results may have been due to sampling error).

There were few RCT studies to compare with the work-related outcome results of the sample datasets (Full ITT, T2 Completers, and Practitioners) of the current study. Practitioner sample results for work-life balance supported the Michel et al. (2014) study. Cited studies used total rather than multi-factor job engagement measures to compare with the current study Practitioner sample. This may have masked the emotional factor improvement found in the current study. Differences between the ITT job engagement results of the current study and Aikens et al. (2014) are possibly due to the small sample size and lower power of the cited study. Non-significant improvement of organisational-citizenship behaviour in the current study practitioner sample was partially consistent with the Giluk (2010) study which reported a non-significant negative result. The differences were possibly due to the different methods used in the studies.

Interestingly, the use of mindfulness-based self-help (MBSH) apps with no supplementary guidance was only used in three cited studies: studies examining mindfulness (Allexandre et al., 2016; Morrison Wylde et al., 2017), perceived stress (Allexandre et al., 2016) and work-life balance (Michel et al., 2014). A recent review of 67 studies using MBIs for employees found only 6% of the studies used online modules to deliver training (Eby et al., in press 2017). This illustrates the gap in research using MBSH app only interventions which the current study addresses.

**Strengths, limitations and future research.**

The ultimate aim of the approach taken in this study was to contribute to the decision-making processes of organisations who might be considering the addition of mindfulness-based meditation training in their wellbeing programs. In wellbeing programs, the cost of running group-based courses is a consideration, as well as the low employee participation due to factors which include time and work pressures and access to resources. There is a gap in research which uses flexible, low-cost training interventions. A strength of the study was the selection of an online and smartphone self-help mindfulness-based app with no supplementary guidance because the intervention addressed cost concerns, time constraints and accessibility concerns. Additionally, the selection of Headspace as the app, provided content quality, and it has high brand recognition and MARS ratings which provide a basis for participants’ trust.
Another strength of the study was the design: a waitlisted control, RCT with an evaluation timeline of two months. Retention in the control group was high (89%) despite participants being waitlisted for the intervention. The offer of a 12-months Headspace subscription at the end of two months may have been sufficient incentive to complete the two month questionnaire. Some studies cited in the current study used two interventions (i.e., active controls) in their methods (Wolever et al., 2012), and depending on the purpose of proposed future research, the inclusion of an active control may be worthwhile. For example, if mindfulness-based training is one of many options being considered for an organisation’s wellbeing program, then a comparison of interventions with an active control group would be a useful method to adopt. Active interventions could be selected on the basis of providing: (a) digital apps which are based on alternative therapies such as cognitive behavioural interventions (CBI) to improve work-related stress (Carolan, Harris, Greenwood, & Cavanagh, 2017), or (b) a supervised exercise programme. Both types of interventions have moderate evidence of supporting employee health and well-being (Chetty, 2015). Or if an organisation wishes to offer mindfulness-based training but is unsure of suitable options for their organisation, then active interventions could be selected on the basis of providing: (a) an alternative delivery method of mindfulness such as MBSR which includes group training sessions, (b) an alternative MBSH app; for a meta-analysis of MBSH for stress see Jayawardene, Lohrmann, Erbe, and Torabi (2017); or select one of the Mani et al. (2015) review’s high scoring mindfulness apps available in iTunes and Google Apps: Smiling Mind, iMindfulness and Mindfulness Daily), or (c) a mindfulness training app with supplementary coaching (for a meta-analysis comparing mental-health results of guided versus unguided online MBIs see Spijkerman et al. (2016). The Eby et al. (in press 2017) qualitative review of MBIs for employees stated that there are few guidelines for identifying suitable content for use in active control groups when researching interventions such as mindfulness training.

The earlier examples of active interventions (see above) illustrate the need for the research question to be clear before identifying the type of alternative intervention, and the feasibility of obtaining sample sizes providing sufficient power in future workplace studies needs to be considered. As this study was a pragmatic trial to examine the impact of offering a particular mindfulness app within an organisation, the lack of a comparison intervention is not considered a limitation in this study.

One limitation is that the study outcomes were measured by self-reports. Although self-reports may be considered flawed as measures of constructs (Chan, 2008), construct
validity evidence for all outcome measures was provided in the form of citing scale development and supplementary corroborative evidence, and the scales were assessed for reliability, and multi-factor results were reported. Self-reports can be subject to social desirability bias (Chan, 2008) however the work-related outcomes were not shared with participants so there was no indication of how to respond to questions. Furthermore, intervention group participants were encouraged to complete questionnaires irrespective of their use of Headspace, so there was a limited indication that the study was interested in how effective the intervention was at improving participants’ mindfulness levels. An objective measure, Headspace usage was employed to provide more valid data than self-reported app usage. However, other non-self-report measures were not used. The size of the population recruitment pool, the multiplicity of job roles represented in the study sample and limitations in sourcing external information about employees precluded the use of external (HR, manager, peer) ratings of performance and behaviours. However, past research has employed self-report measures so their use in this study helped comparison analysis of research results.

The sample in this study was limited to a single university in the South of England, although participants represented a variety of job roles within the academic, back-office and support functions. Therefore, results of this study may only be confidently generalised to similar populations.

By conducting an ITT analysis, the results of this study will inform organisations, in similar populations, of the effectiveness of offering Headspace. ITT analysis in RCT studies is also a recognised approach to reduce selection bias and confounding (Alshurafa et al., 2012). Furthermore, results of the analysis of post-intervention changes in the Practitioner sample showed that, when people complete the freely available basic Level-1 sessions of Headspace, improvements in work-related outcomes such as work-life-balance and job engagement are possible, although the benefits of continued Headspace usage (i.e., dosage) over time remains unanswered. The impact of Headspace dosage over 12 months is addressed in Study 2.

Bias may have occurred in the creation of the ITT sample. In applying the “last observation carried forward” (LOCF) method of imputing the missing T2 data, T1 scores were copied to the T2 scores. Since the drop-out rate was 19% (T2 Completers sample) and 27% (Practitioners sample), it is not possible to know how this impacted the variability and effect sizes although it seems most likely that it would have reduced both. The inclusion of
two separate subsamples, T2 Completers and Practitioners suggest that the drop-out rate did not compromise the reported results. The similarity of results between the Full ITT and T2 Completers samples suggest that the lack of variability had a limited influence on the Full ITT dataset results.

**Conclusion.**

The purpose of the current study was to explore the impact of offering a self-help mindfulness-based training, online/smartphone app, Headspace, to employees by examining changes in mindfulness, perceived stress, work-life-balance, job engagement, organisational-citizenship-behaviour, curiosity, and intention to quit. The study showed that, as a result of the offer of Headspace®, mindfulness increased and perceived stress decreased, however none of the work-related outcomes changed significantly. However, the post-intervention results showed progressively greater improvements when there were higher levels of participation in the study. In the two samples: the T2 Completers (those who continued to participate for the full two months of the study) and Practitioners (eliminating intervention group participants in the Completers sample who did not practice Headspace for a minimum of the ten sessions of Foundation Level-1), results showed improvements in more facets of mindfulness and greater reductions in perceived stress. Additionally, results showed improvements in work-life-balance and emotional energies of job engagement for the Practitioner sample. Overall, these results show that the offer, without supplementary guidance, of mindfulness-based self-help apps such as Headspace, can have positive impact on employees in a brief period. Future research on the impact on the outcomes from the amount of Headspace usage is recommended.
CHAPTER THREE

Study 2: Longitudinal study of the longer term impact of a mindfulness-based intervention: predictor of outcomes at 12 months follow-up

3.1 Introduction

This is the second of three studies in this multi-methods thesis which addressed a gap in organisational research to explore whether and how workplace outcomes are improved by the offer (Study 1) and the dosage of a mindfulness intervention over 12-months (Study 2). This study used a mindfulness-based self-help (MBSH) meditation training intervention, Headspace. It was a quantitative study, using a longitudinal repeated-measures design, to investigate the extent to which the amount of Headspace app usage by employees in a UK university predicts a set of outcomes on pre-determined topics of interest. The study examined participant responses to: mindfulness, perceived stress and a selection of work-related outcomes. The work-related outcomes included work-life-balance, job engagement, organisational-citizenship-behaviour, curiosity and intention-to-quit. Data for all participants who completed the T3 questionnaire were analysed using linear regression models with the amount of Headspace app usage as the predictor. The evaluation timeline was twelve months.

Background.

This study investigated the effect of the amount of Headspace usage (which could be considered as “dosage”) on mindfulness, perceived stress and work-related outcomes over 12 months. Studies investigating the impact of mindfulness-based intervention dosage on these outcomes are limited.

Zeng, Chio, Oei, Leung, and Liu (2017) conducted a systematic review of studies investigating the dosage impact of meditation-based interventions on a wide range of outcomes (e.g., behavioural tasks, physiological indicators, brain activation, self-reports of mindfulness, depression and anxiety). Some of the studies included home-only meditation, and others included both in-class and home meditation practice. Zeng et al. (2017) concluded that studies investigating dosage on outcome variables are limited since they found that of the studies selected (51), only 39% reported an association between meditation practice amount.
and outcome variables, and that 26% of studies recorded the amount of practice but did not examine associations with outcomes. Additionally, they noted that findings were contradictory for mindfulness and other outcome measures such as depression.

In another recent review, Parsons, Crane, Parsons, Fjorback, and Kuyken (2017) investigated the impact of formal homework mindfulness practice in 49 studies which used one of two 8-week intervention programs: mindfulness-based cognitive therapy (MBCT; Segal et al., 2002) and mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1996). Formal homework practice is an integral part of the MBCT and MBSR interventions. In the Parsons et al. (2017) review, most of the studies were of clinical participant populations (41), the frequency of practice was self-reported retrospectively. Most outcomes were psychological measures such as depression and stress, and some outcomes were physical measures. In 28 of the studies, the impact of practice on outcomes was small but significant with no difference in results between the clinical and non-clinical participant groups.

The current study used Headspace, a mindfulness-based meditation app, as the intervention. Headspace provides app usage data to accurately record each participant’s use of the app. This study was an opportunity to contribute to the literature on mindfulness meditation-based intervention dosage impacts, based on the Headspace usage data rather than self-reports, and for an extended period of 12-months. Examples of studies examining mindfulness, perceived stress and work-related outcomes will be presented before highlighting some of the challenges associated with collecting reliable dosage data.

**Mindfulness practice and mindfulness outcomes.**

Mindfulness is defined as non-judgmental awareness, changing from moment-to-moment, and it is developed by present moment attention which is open, non-judgmental and non-reactive (Kabat-Zinn, 2015). Implicit in this definition is that it can be developed through practice. Studies have investigated how mindfulness levels are impacted by the amount of mindfulness meditation practice, the amount of formal mindfulness home-based exercises (homework) included within mindfulness-based interventions, and the amount of informal/ad hoc practice that supplements intervention training. Results of studies have been mixed. To support the suggestion that mindfulness can be developed through practice, examples of observational studies which examined meditation “dosage” will be presented before looking at dosage studies which were part of mindfulness-based interventions.
In an observational study of meditation practice, Bergomi et al. (2015) compared meditators with non-meditators in a general population, cross-sectional sample of adults and found that meditators had higher levels of mindfulness (German version of Comprehensive Inventory of Mindfulness Experiences; CHIME; as cited in Bergomi et al., 2015), and that associations with mindfulness subscales differed with self-reported practice frequency and session duration. For example, practice frequency had significant associations with mindfulness total and all subscales, and although session duration had significant associations with some subscales, it was not associated with inner and outer awareness. A recent study of the impact of self-reported meditation practice on mindfulness facets (Five Factor Mindfulness Questionnaire; FFMQ; Baer et al., 2008) reported that all facets significantly increased with practice frequency in an adult cross-sectional sample (Franquesa et al., 2017). The impact of self-reported meditation practice on the FFMQ facets of mindfulness in another recent study reported that the different forms of meditation that are used in mindfulness-based interventions, combined with differences in practice frequency and session duration have an impact on different facets in an adult cross-sectional sample (Cebolla et al., 2017). Taken together, the research studies suggest that mindfulness increases with meditation practice however there are several factors affecting the association.

Studies of mindfulness-based intervention home-based practice reveal mixed results. In an adult sample participating in an 8-week mindfulness-based stress reduction (MBSR) program, three FFMQ mindfulness facets (Observe, Act with awareness and Non-react) significantly increased with formal homework mindfulness (excluding yoga) practice whereas informal/ad hoc practice at home showed no significant increase in mindfulness (Carmody & Baer, 2008). Ribeiro, Atchley, and Oken (2018) conducted a study which provided homework practice material on an iPod Touch. They found that the amount of homework practice in the 6-week one-on-one mindfulness-based meditation intervention had a significantly positive impact on total mindfulness (MAAS; Brown & Ryan, 2003).

There was a significant improvement in total mindfulness (FFMQ) in a study of the amount of homework practice in a sample of adults in the U.S. military who participated in an 8-week customised MBSR intervention (Stanley, Schaldach, Kiyonaga, & Jha, 2011). The differences in the results of the studies might be explained by the different interventions and mindfulness measures. Additionally, two studies (Carmody & Baer, 2008; Stanley et al., 2011) used self-report practice logs whereas the Ribeiro et al. (2018) study electronically recorded practice.
Mindfulness intervention practice and perceived stress outcome.

Studies of “dosage” that were part of mindfulness-based intervention programs (e.g., home-based practice) reveal consistent results for impact on perceived stress. There was no significant improvement in post-intervention perceived stress (PSS) in the Stanley et al. (2011) study of the amount of formal home-based (homework) practice. In the Carmody and Baer (2008) intervention study, both self-reported formal (dosage) and informal mindfulness practice at home (excluding yoga) showed no significant decrease in perceived stress (PSS) although the decrease became significant with the inclusion of formal yoga practice. The impact of formal mindfulness homework practice (dosage) on perceived stress (PSS) was not significant in the Ribeiro et al. (2018) study. The studies used the same measure of stress but different mindfulness-based interventions and methods of practice recording.

One recent study, with 219 adults recruited on-line from a global participant pool, examined the impact of the automatically recorded usage of an on-line mindfulness-based app over one month (Bailey et al., 2018). The app sessions are of similar duration (10 minutes) to Headspace, the mindfulness-based training app used in the current study. Bailey et al. (2018) found that usage significantly predicted improved positive affect but none of the other measured outcomes (e.g., perceived stress). Results of the Bailey et al. (2018) app dosage study, and of the intervention studies investigating home-based practice dosage indicated that perceived stress is not significantly impacted by dosage over six to eight weeks. However, perceived stress might be reduced over the longer period (12 months) of the current study.

Mindfulness intervention practice and work-related outcomes.

Both clinical and non-clinical populations can benefit from a decrease in perceived stress. However, work-related outcomes focus on the consequences of interventions for working adults, a narrower population.

In a review of 40 mindfulness-based intervention workplace studies published between 2003 and 2015, Jamieson and Tuckey (2017) found 22 studies investigated health or wellbeing outcomes only and 18 studies investigated organisational related outcomes such as job satisfaction, job engagement, work behaviour, compassion, absenteeism, safety, and job performance (18 studies). Few of the studies reviewed examined the impact of “dosage”. Jamieson and Tuckey (2017) recommended that future mindfulness-based research should
conduct compliance checks, particularly for self-help interventions and improve reporting of session attendance and amount of practice in interventions as well as practice continuity post-intervention. The review is indicative of the paucity of mindfulness-based intervention dosage research on work-related outcomes in the workplace.

One observational study examined the effects of self-reported meditation dosage (categorised) on self-reported measures of work engagement, job performance, and job satisfaction. The population-based, cross-sectional study (Shiba, Nishimoto, Sugimoto, & Ishikawa, 2015) of 1,470 adults in business found that the frequency of weekly meditation practice significantly predicted small increases in the three work-related outcomes.

There have been conflicting results in studies of workplace mindfulness-based intervention dosages on work engagement. Some studies (Leroy et al., 2013; van Berkel et al., 2014) reported no increase and one study (Aikens et al., 2014) reported an increase at facet (sub-factor) level.

The limited number of studies reviewed above is a reflection of the gap in mindfulness-based intervention dosage research on work-related outcomes.

**Challenges in recording practice.**

While the focus of the current study was the impact of the Headspace app usage, it is worthwhile considering the complexity of collecting accurate dosage data in intervention research.

As other researchers have found (Bailey et al., 2018; Ribeiro et al., 2018), investigations of dose-response effects of mindfulness-based interventions on behavioural and physiological outcomes is limited. This is particularly true of workplace studies and can be partially explained by the challenges inherent in dosage research. Additionally, although studies may collect usage data, the research focus of some studies has been to assess the design of the intervention rather than the effect on specific outcomes (Plaza García et al., 2017).

There are many challenges in obtaining reliable records of mindfulness practice. One of the issues is establishing what practice is being measured. This can also influence how the data is tracked. For class-based or online modes of delivery, attendance can be measured and is often referred to as intervention adherence or compliance (e.g., a percentage of sessions completed). One meta-analysis of mindfulness-based online intervention studies
found a variation of 35% to 92% in reported adherence rates which made it impossible to study the significance of dosage with the well-being outcomes being measured (Spijkerman et al., 2016). For interventions which combine class-based work and homework, the dosage of the formal homework component is often recorded via self-reported daily or weekly logs (Carmody & Baer, 2008) or self-reporting via text messaging on completion of homework (Wolf et al., 2016) and less frequently via automated recording (Ribeiro et al., 2018). Incomplete self-reporting of homework can sometimes lead to researchers making assumptions about practice to derive dosage results (Carmody & Baer, 2008; Crane et al., 2014). Dosage measures of self-help, internet-based interventions vary depending on the design of the application. Some self-help studies rely on self-reported practice logs (Allexandre et al., 2016) and others track actual use (Bailey et al., 2018). Informal mindfulness practice, where participants apply their learning to situations encountered at home or at work, can only be measured by self-reports (Carmody & Baer, 2008).

As noted in the Cebolla et al. (2017) study of the impact on mindfulness, the result can differ depending on the components within the intervention.

Other aspects of practice such as practice amount, frequency, session duration and quality may influence results. Goldberg, Del Re, Hoyt, and Davis (2014) found that, at post-intervention (8-weeks), the amount of time spent per day and practice quality were significant predictors of their psychological outcomes; however at 5-months follow-up only practice quality significantly predicted outcomes. The change in results over an extended period of time raises another issue: dosage period.

Most studies gathered data for the duration of the intervention only, which is six to eight weeks for the many studies. Since few studies examined post-intervention practice, the dosage period assessed was brief. This may be an insufficient period to fully develop and apply some of the mindfulness techniques and it might be insufficient for some outcomes to fully manifest. A longer dosage period may also highlight the likely usage patterns of self-help interventions.

In their identification of issues in mindfulness research, Davidson and Kaszniak (2015) identified the measurement of continuing practice post-intervention as an important consideration. They acknowledged the difficulty in obtaining reliable practice data and suggested that automatically recorded tracking of practice might overcome the issues associated with self-reporting. Concern over reliability of self-reports of practice is
exemplified in a clinical study by Morgan, Graham, Hayes-Skelton, Orsillo, and Roemer (2014). They found that post-intervention informal mindfulness practice over nine to twelve months was significantly related to their psychological outcomes but formal practice was not. However, accounts of practice were retrospectively recorded at the end of each follow-up period which calls into question the basis of the dosage results.

**Rationale.**

The afore-mentioned studies point to gaps in mindfulness-based intervention research literature that the current study sought to address.

There are a limited number of studies investigating the impact of the recorded amount of mindfulness-based intervention practice (dosage) on work-related outcomes in particular. This study examined the impact, in a population of university employees, of usage on mindfulness, perceived stress and five work-related outcomes: work-life-balance, job engagement, organisational citizenship behaviour-individual, curiosity and intention-to-quit.

Most studies have a pre-/post-intervention period of between six to eight weeks and the dosage evaluation timeline is a similar duration. This study had a longer evaluation period of 12 months. The longer duration provided a greater opportunity to fully develop mindfulness techniques, and provided the opportunity to find more revealing results for outcomes which might take longer to manifest. Although there was a possibility that most practice for individuals takes place in the first few months and the effects could have worn off by the end of the 12 months period. An evaluation timeline of 12 months was possible in this study since the intervention was a mindfulness-based self-help app and the frequency of use was in the control of the participant.

Many mindfulness-based interventions combine different modes of delivery (e.g., class-based and individual formal homework), which makes it difficult to examine the impact of intervention dosage with any accuracy. Interventions which only use app-based mindfulness training can make it technologically possible for automated recording of intervention practice and provide accurate data on participant’s intervention dosage. The intervention in this study was the Headspace app and the organisation, Headspace, provided data on participant app usage.
The dosage examined in this study was limited to Headspace app usage, the focus of this study, and excluded additional mindfulness practice since it was difficult to achieve a similarly accurate record of the informal/ad-hoc practice for the study duration of 12 months.

**Research aims.**

This study examined the extent to which Headspace, a mindfulness-based meditation training app, usage over a 12 month period predicts employee increases in levels of mindfulness, decreases in perceived stress and improvements in five work-related outcomes: work-life-balance, job engagement, organisational citizenship behaviour-individual, curiosity and intention-to-quit.

**Hypothesis.**

A higher amount of Headspace mindfulness practice (up to 12 months after offer of Headspace enrolment) will predict:

- a) Greater improvements in mindfulness measures
- b) Greater reduction in perceived stress
- c) Greater increases in work-related measures (work-life balance satisfaction, job engagement, organisational citizenship behaviour, curiosity)
- d) Greater reduction in intention to quit

**3.2 Method**

**Design.**

This, the second study in the thesis, was a longitudinal repeated-measures design conducted over 12 months to examine the extent to which the amount of Headspace mindfulness training app usage by employees predicts changes in mindfulness, perceived stress and work-related outcomes. A longitudinal design is relevant in mindfulness research since mindfulness is a skill which evolves through continuous practice (Kabat-Zinn, 1996). The amount of informal mindfulness practiced during the 12 month period is difficult to measure whereas the amount of Headspace app usage is measurable and supplied by Headspace. The predictor variable was the amount of Headspace mindfulness training app usage in hours.
Participants.

Participants were recruited from the University of Surrey in Study 1 of this research thesis. Participants were included if they were: males or females over the age 17 and they were contracted to work for at least three days (21.6 hours) per week at the University. Individuals were excluded if they were currently under the supervision of a mental health professional for psychiatric conditions, they had previous experience of using Headspace or if they were not available to complete the first two months of the research period (Study 1). All participants (from Study 1 intervention [INT] and wait-list control [WLC] groups) who were offered enrolment in Headspace were invited to participate in this study.

Sample size.

Few studies reported on effect sizes for “dosage” results. A power to detect a medium effect size was therefore chosen for this study. A minimum sample size of 55 at 12 months was estimated to be necessary to detect a medium effect size in a regression model (i.e., $f^2=0.15$) at a significance level of 5%, with a power of 80%. G*Power 3.1.92 (Faul et al., 2007) was used for the calculation. The sample size of 55 represented a retention rate of 54% of all participants ($N = 101$) as at Baseline (T1/T2). This study’s target retention rate was optimistic; a recent internet-based MBI study experienced 19% retention for intervention group (only) at 12 months follow-up (Allexandre et al., 2016).

At Baseline, there were a total of 101 participants. Of the 101 participants who were contacted, eight participants left employment by T3 and 26 dropped out (no explanation provided). There were 67 participants who completed the baseline (T1 or T2) and T3 questionnaires (post 12 months from baseline). Of the 67 participants, seven participants claimed they used Headspace in the last 10 months but did not use the Headspace subscription code allocated via this study therefore no Headspace usage data were available. The seven participants were dropped from the analysis, leaving a total of 60 participants including participants ($n = 8$) who stated they had not used Headspace and for whom no Headspace usage data was available. This represents a retention rate of 59% of participants who qualified for inclusion in this study. Refer to Figure 3.1 for the participant flow from baseline (T1,T2) to T3 analysis.
Figure 3.1 Participant flow

Procedure.

The intervention, staff communications and measurement questionnaires were accessed online.

University of Surrey provided the survey management software, Qualtrics (https://www.qualtrics.com/), which was used by the researcher to administer all questionnaires and reminder emails, and to collect data and assign Headspace subscription enrolment codes. Participants’ consent was obtained using Qualtrics. Qualtrics questionnaires were accessible in either internet-based or mobile format.
There were two assessments, baseline and 12 months follow-up. Baseline data was from a pooled sample of Study 1 participants: T1 (INT group) and T2 (WLC group). Follow-up data was collected at T3 (12 months after baseline). The participant recruitment procedure is detailed in Chapter Two - Study 1, Section 2.2 Procedure, supported by Appendices A and B. Participants were screened for eligibility in Study 1. The Information Sheet was supplied to participants in Study 1. Consent for this Study was given in Study 1.

Participants were initially recruited through mass communication channels such as posters, and then participants were contacted directly via emails to their supplied email address for the follow-up data collection (Appendix M). Participants received reminder emails. Emails contained a link to the study’s questionnaire website. Data collected consisted of participants’ willingness to be interviewed about their experience of practicing mindfulness (for Study 3), the completed questionnaires, and Headspace usage data. Due to the low risk nature of this intervention (Headspace) and the duration of the mindfulness training, no separate debriefing sheet was issued. Instead, an end of survey/debriefing contact list screen was shown after the T3 questionnaire completion. An email asking for information about the reasons for research participant drop-out was sent to participants who did not respond to the email reminders (Appendix I).

If participants requested the information in their questionnaire responses, they were provided with their change in personal outcomes over the 12 months at the end of data analysis (Appendix N).

**Intervention.**

Headspace® was selected as the mindfulness-based self-help (MBSH) training application (app) for this study. Founded by Puddicombe (2011) and officially launched in 2010, Headspace is a commercially available (£60/$72 for a one year individual subscription) internet-based/off-line mobile-device (audio) application. Headspace uses audio, video, animations and exercises which incorporate opportunities for breath awareness, body scans, focus, and motivation and intentions. Headspace consists of foundation sessions, 10 to 20 minutes each, and the sessions are available for individuals to use at their convenience. Individuals have the option to complete the sessions in any order: the first foundation level, the remaining foundation levels and other mindfulness series (e.g., health, relationships, and performance); all sessions are available on the web-site. All sessions can be repeated and the
default duration for most sessions is 10 minutes. The app was provided without supplementary guidance. Further details of the intervention are in Chapter Two, Study 1.

**Measures.**

The baseline measures data collected in T1 (INT group) and T2 (WLC group) were used (see Chapter Two - Study 1, Section 2.4 Measures for details not provided here). All demographic, occupation and outcome questions were forced response. Mindfulness practice questions were forced response.

**Participant characteristics.**

Participants completed measures of personal, occupational and mindfulness practice characteristics in Study 1.

Data for participant characteristic were collected in Study 1, T1 (see Chapter Two - Study 1, Section 2.2 for details not provided here). The variables include: age, sex, education, and marital status.

**Occupational characteristics.**

Data for occupational characteristics were collected in Study 1, T1 (see Chapter Two - Study 1, Section 2.2 for details not provided here). The variables include: occupational category and location, job demands, and work hours with hours preference.

**Mindfulness practices and intervention experiences.**

**Mindfulness training and practice.**

Data for mindfulness training and practice variables were collected in T3. Headspace provided data on the Headspace usage of all participants who enrolled in Headspace using the subscription code provided in the study. Participants were asked if they had practiced mindfulness (non-Headspace usage) during the last two months (scores ranging from 1 (not at all) to 5 (a great deal)).

**Intervention satisfaction.**

Satisfaction questions (Appendix O) were developed for use with INT participants in Study 1 (T2) and for completion by all participants in Study 2 (T3). Items are forced response unless specifically stated. In the first question, participants rated their satisfaction
with aspects of the Headspace app by responding to 8-items on a 5-point scale (1=very dissatisfied, 5=very satisfied). An example item is: “How satisfied are you with the [Buddy network] of the Headspace offering?” The second question is: “Would you recommend Headspace to your work colleagues” (Yes, Maybe, No). If the answer is ‘No’, then the participant is asked to explain (optional response, free-format text). The third question lists five common exercises performed in the Headspace training sessions (breathing, motivation and intention, body scan, attention, focus) to be ranked in order of the most to least beneficial experienced during training. The final item is: “You listed [highest ranking exercise] as the most beneficial exercise. Why?” The answer is free-format text.

**Outcome measures.**

All outcome measures were included in Studies 1 and 2 of the research thesis (see Chapter Two: Study 1, Section 2.2 for details not provided here; Appendix D).

**Mindfulness.**

To measure mindfulness, the Five Facet Mindfulness Questionnaire - Short Form was selected (FFMQ-SF; Bohlmeijer et al., 2011a; Bohlmeijer et al., 2011b). FFMQ-SF consists of 24-items and measures five mindfulness facets: observe (4 items, Cronbach’s alpha $\alpha = .78$), describe (5 items, $\alpha = .91$), actaware (5 items, $\alpha = .86$), nonjudge (5 items, $\alpha = .86$) and nonreact (5 items, $\alpha = .73$), showing an adequate to good internal consistency. The combined total score and subscales were used.

**Perceived stress.**

Stress was measured using the Perceived Stress Scale 10 (PSS10; S. Cohen & Williamson, 1988) which consists of 10-items to measure how stressful an individual appraises situations in their life. A five-point Likert scale from 0 (never) to 4 (very often) is used. The computed total score (unidimensional model) was used, where the greater perceived stress is the higher value of a score ranging from 0 (best) to 40 (worst). A recent study by (Cavanagh et al., 2013) reported Cronbach’s alpha = 0.91 with a medium effect size (d=0.62).

**Work-life balance satisfaction.**

Work-life balance satisfaction was measured using a measurement developed by Valcour (2007). It consists of 5-items rating satisfaction levels on a 5-point scale (1=very
dissatisfied, 5=very satisfied). It has been used in a study (Grawitch et al., 2013) showing good internal consistency ($\alpha=.94$).

*Job engagement.*

Job engagement was measured using the Job Engagement Scale (JES; Rich et al., 2010) which consists of 18-items on a 5-point scale (1=strongly disagree, 5=strongly agree). There are three engagement factors: physical (6 items; $\alpha=.89$), emotional (6 items; $\alpha=.64$) and cognitive (6 items; $\alpha=.90$) and the total showed good internal consistency ($\alpha=.95$). Individuals with higher scores in each factor and in the combined total have higher levels of engagement. The combined total score and subscales were used.

*Organisational citizenship behaviour – individual.*

K. Lee and Allen (2002) created a two factor organisational citizenship behaviours (OCB) measure consisting of behaviour toward individuals (OCBI; $\alpha=.83$) and behaviour toward organisation (OCBO; $\alpha=.88$); each factor consists of 8-items on a 7-point scale (1=never, 7=always). The 8-items from the OCBI factor were used.

*Curiosity.*

Curiosity was measured using the Curiosity and Exploration Inventory-II (CEI-II; Kashdan et al., 2009), a 10-item measurement. CEI-II (total, $\alpha=.83$ to .86) has two subscales: Stretching (5-items; $\alpha=.79$ to .80), assessing the motivation to seeking out knowledge and experience; and Embracing (5-items; $\alpha=.76$ to .79), assessing the embracing of novelties, complexities or uncertainties in everyday life. The combined total score and subscales were used.

*Intention to quit.*

Intention to quit was measured using the Intention to quit measurement (Wayne et al., 1997a, 1997b) which consists of 5-items on a 7-point scale (1=strongly disagree, 7=strongly agree) and has shown good internal consistency ($\alpha=.89$).

*Attrition - drop-out feedback.*

At T3 of this study, participants who did not complete a T3 questionnaire were asked two optional response questions “Are you interested in continuing your participation in this study?” (Yes, No). If the answer was no, the participant was asked to provide a reason (free-format text answer). There were no responses.
Ethical approval.

Documentation for the studies in this multi-methods research thesis was submitted to the University of Surrey Ethics Committee as one protocol document. The studies received favourable ethical opinion (Appendix J; Reference: UEC/2016/040/FHMS). Refer to detailed information in Chapter Two - Study 1, Section 2.2 Ethical Approval. The primary concern was the collection of data, and the anonymization and storage of confidential data. Participants’ university email addresses collected in Study 1 were deleted at the end of Study 3. Participation in the studies was not expected to cause participants any psychological or physical harm.

Statistical analysis.

Questionnaire data was downloaded from the University of Surrey’s Qualtrics survey software and analysed using SPSS version 23 (IBM SPSS, 2014). Participant characteristics (personal, occupational and mindfulness practice), all outcomes measures and all Headspace experience measures were forced response so completed questionnaires had no missing data.

Prior to commencing the analysis, the change in outcomes (mindfulness, perceived stress, work-life balance, job engagement, organisational behaviour, curiosity and intention to quit) was calculated by subtracting baseline (T1, T2) scores from T3 scores. Negative scores indicated increased improvement for perceived stress and intention to quit; positive scores indicated increased improvement for all other outcome measurements. Headspace usage units (minutes) were converted to hours by dividing minutes by 60. Participant characteristics were described and a histogram was produced to examine the distribution of Headspace usage.

Simple linear regression models were fitted with the predictor being the amount of Headspace usage (in hours) and each of the following dependent variables: the change over time of mindfulness, perceived stress, work-life balance satisfaction, job engagement, organisational-citizenship-behaviour, curiosity, and intention to quit. Unstandardized residuals were examined to assess whether the assumption of Normality was met and $t$-statistics were used to examine the statistical significance of the predictor in the model. For standardised effect size, $R^2$ was examined and categorised using the following cut-off values suggested by Cohen (1988): trivial $< .01$, small $\geq .01$ and $< .09$, medium $\geq .09$ and $< .25$, and large $\geq .25$. In order to examine whether assumption for the regression models were met,
histograms of residuals and P-P plots were produced to examine Normality of distribution. Scatterplots were produced to examine linearity and heterogeneity of variance. Cook’s distances were produced to check for cases having an undue influence on the model. In case there were doubts about whether assumptions were met, bootstrapping (95% bias-corrected CIs) with 1,000 samples was also conducted. Similarity of results of the significance of the $t$-statistics and bootstrapping findings would indicate robustness of the results. Lastly, a paired samples t-test was conducted to examine differences between the T3 and Baseline means for each outcome.

3.3 Results

**Sample obtained.**

The sample obtained (i.e. 60) exceeded the aim for the sample size (i.e. 55).

**Participant characteristics.**

Participant characteristics are described in Table 3.1
Table 3.1
Participant Characteristics (N = 60)

<table>
<thead>
<tr>
<th>Characteristic*</th>
<th>no.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>39</td>
<td>65%</td>
</tr>
<tr>
<td>Male</td>
<td>21</td>
<td>35%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;= 39</td>
<td>32</td>
<td>53%</td>
</tr>
<tr>
<td>40+</td>
<td>28</td>
<td>47%</td>
</tr>
<tr>
<td><strong>Cohabitation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Cohabitating</td>
<td>16</td>
<td>27%</td>
</tr>
<tr>
<td>Cohabitating</td>
<td>44</td>
<td>73%</td>
</tr>
<tr>
<td><strong>Education Level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No university degree</td>
<td>14</td>
<td>23%</td>
</tr>
<tr>
<td>University degree</td>
<td>46</td>
<td>77%</td>
</tr>
<tr>
<td><strong>Stress Levels</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>6</td>
<td>10%</td>
</tr>
<tr>
<td>Moderate</td>
<td>33</td>
<td>53%</td>
</tr>
<tr>
<td>High</td>
<td>23</td>
<td>37%</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic and Research</td>
<td>19</td>
<td>32%</td>
</tr>
<tr>
<td>Campus Backoffice and Support</td>
<td>41</td>
<td>68%</td>
</tr>
<tr>
<td><strong>Satisfaction with number of hours worked</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not satisfied (excessive and too few)</td>
<td>41</td>
<td>68%</td>
</tr>
<tr>
<td>Satisfied</td>
<td>19</td>
<td>32%</td>
</tr>
<tr>
<td><strong>Mindfulness Practice in last two months</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>28</td>
<td>47%</td>
</tr>
<tr>
<td>'A little' to 'moderate amount'</td>
<td>27</td>
<td>45%</td>
</tr>
<tr>
<td>'A lot' to 'a great deal of'</td>
<td>5</td>
<td>8%</td>
</tr>
</tbody>
</table>

* data on participant characteristics was supplied by participants at T1

** Stress Levels are based on the participant T1 Perceived Stress scores and categorised by the average level for their age

*** data on mindfulness practice was supplied by participants at T3
Headspace usage at T3.

Distribution of Headspace usage (Figure 3.2) showed the majority of participants had less than ten hours usage with a few participants (5) using Headspace over 30 hours. Of the sample, 13% of participants (8) did not access Headspace which is substantially less than a recent workplace study (Allexandre et al., 2016) where 50% of participants in a 1-year follow-up had not used the online mindfulness app offered. Headspace sessions focus on different topics (see Appendix P for list of session topics used by participants) and participants varied in the number of topics they used (Table 3.2).

![Headspace usage distribution](image)

**Figure 3.2** Participant Headspace usage in hours ($N = 60$)

<table>
<thead>
<tr>
<th>Number of topics</th>
<th>no.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>&lt;= 10</td>
<td>45</td>
<td>75</td>
</tr>
<tr>
<td>11+</td>
<td>7</td>
<td>12</td>
</tr>
</tbody>
</table>

**Table 3.2**

*Different Headspace topics used by participants ($N = 60$)*

Headspace usage: predictor of mindfulness, health and work-related outcomes.

Results of the model are presented in Table 3.3.
Table 3.3
Regression results to explore Headspace usage (in hours) as predictor of changes in mindfulness, health and work-related outcomes (N = 60)

<table>
<thead>
<tr>
<th>Study variables</th>
<th>B</th>
<th>se</th>
<th>t(58)</th>
<th>p</th>
<th>R²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in mindfulness *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observe (FFMQ-Observe)</td>
<td>0.030</td>
<td>0.04</td>
<td>0.78</td>
<td>.437</td>
<td>1%</td>
<td>.325</td>
</tr>
<tr>
<td>Describing (FFMQ-Describe)</td>
<td>0.046</td>
<td>0.03</td>
<td>1.4</td>
<td>.168</td>
<td>3%</td>
<td>.034</td>
</tr>
<tr>
<td>Acting with awareness (FFMQ-ActAware)</td>
<td>-0.002</td>
<td>0.04</td>
<td>-0.04</td>
<td>.968</td>
<td>0%</td>
<td>.961</td>
</tr>
<tr>
<td>Nonjudgment (FFMQ-NonJudging)</td>
<td>0.064</td>
<td>0.04</td>
<td>1.67</td>
<td>.100</td>
<td>5%</td>
<td>.148</td>
</tr>
<tr>
<td>Nonreactivity (FFMQ-Nonreact)</td>
<td>0.038</td>
<td>0.04</td>
<td>0.96</td>
<td>.343</td>
<td>2%</td>
<td>.392</td>
</tr>
<tr>
<td>Mindfulness (FFMQ-Total)</td>
<td>0.177</td>
<td>0.12</td>
<td>1.44</td>
<td>.157</td>
<td>3%</td>
<td>.234</td>
</tr>
<tr>
<td>Change in health outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived stress (PSS10-Total)</td>
<td>-0.119</td>
<td>0.07</td>
<td>-1.71</td>
<td>.092</td>
<td>5%</td>
<td>.169</td>
</tr>
<tr>
<td>Change in work-related outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work-life balance (WLB-Total)</td>
<td>0.070</td>
<td>0.03</td>
<td>2.28</td>
<td>.026</td>
<td>8%</td>
<td>.014</td>
</tr>
<tr>
<td>Job engagement - Physical (JES-Physical)</td>
<td>-0.017</td>
<td>0.04</td>
<td>-0.45</td>
<td>.654</td>
<td>0%</td>
<td>.460</td>
</tr>
<tr>
<td>Job engagement - Emotional (JES-Emotional)</td>
<td>0.099</td>
<td>0.05</td>
<td>2.12</td>
<td>.038</td>
<td>7%</td>
<td>.034</td>
</tr>
<tr>
<td>Job engagement - Cognitive (JES-Cognitive)</td>
<td>0.026</td>
<td>0.04</td>
<td>0.7</td>
<td>.489</td>
<td>1%</td>
<td>.344</td>
</tr>
<tr>
<td>Job engagement (JES-Total)</td>
<td>0.107</td>
<td>0.10</td>
<td>1.06</td>
<td>.292</td>
<td>2%</td>
<td>.137</td>
</tr>
<tr>
<td>Organisational behaviour individual (OCBI-Total)</td>
<td>0.012</td>
<td>0.05</td>
<td>0.25</td>
<td>.807</td>
<td>0%</td>
<td>.782</td>
</tr>
<tr>
<td>Curiosity - Explore (CES-Stretch)</td>
<td>-0.004</td>
<td>0.03</td>
<td>-0.15</td>
<td>.883</td>
<td>0%</td>
<td>.854</td>
</tr>
<tr>
<td>Curiosity - Embrace unknown (CES-Embrace)</td>
<td>0.040</td>
<td>0.02</td>
<td>1.71</td>
<td>.093</td>
<td>5%</td>
<td>.072</td>
</tr>
<tr>
<td>Curiosity (CES-Total)</td>
<td>0.036</td>
<td>0.05</td>
<td>0.78</td>
<td>.436</td>
<td>1%</td>
<td>.328</td>
</tr>
<tr>
<td>Intention to quit (Quit-Total)</td>
<td>0.031</td>
<td>0.07</td>
<td>0.46</td>
<td>.647</td>
<td>0%</td>
<td>.519</td>
</tr>
</tbody>
</table>

* bootstrap based on 1000 samples

* A positive B indicates that the increase in the measure is greater with increased headspace usage. A negative B means that the positive changes (ie increases) are less with increased headspace usage.  ᵇ A positive B indicates that the decrease increases with increased headspace usage. A negative B means that the decrease decreases with increased Headspace usage.
Cook’s distance values were under 1 for all points, indicating that there were no particularly influential points for any of the models (Appendix Q). An examination of histograms and normal probability plots showed approximately Normal distributions for the dependent variables (Appendix R).

**Mindfulness.**

As usage of Headspace increased, there was no significant evidence of an increase in mindfulness measures. Most coefficients were in the hypothesized direction (positive), Acting with awareness being the exception. Very little variability was explained by Headspace usage, with trivial to small effect sizes by Cohen’s (1988) cut-offs: trivial < .01, small ≥ .01 and < .09. An examination of scatterplots (Appendix R3, R6, R9, R12, R15, and R18) indicated approximate linearity and that there appeared to be some heteroscedasticity, with a decreasing variance as Headspace usage levels increased. Therefore bootstrap results were consulted. These gave broadly similar results except that the positive slope for Describing on the mindfulness scale became significant (p = .034).

**Health outcome – perceived stress.**

As usage of Headspace increased, there was no significant evidence of a decrease in the health-related measure, perceived stress; the coefficient was not in the hypothesized direction (negative). Little variability was explained, with a small effect size (R² = .05).

**Work-related outcomes.**

Results for the work-related outcomes were mixed.

As usage of Headspace increased, there was significant evidence of an increase in Work-life-balance, with the coefficient in the hypothesized direction (positive). However, little variability was explained, with a small effect size (R² = .08).

As usage of Headspace increased, there was mixed evidence of an increase in Job-engagement. There was significant evidence of an increase in Emotional engagement; the remaining engagement measures were not significant. Most coefficients were in the hypothesized direction (positive), Physical engagement the exception. Very little variability was explained, with trivial to small effect sizes by cut-offs: trivial < .01, small ≥ .01 and < .09. An examination of scatterplots (Appendix R27, R30, R33, R36) indicated there
appeared to be some heteroscedasticity, with a decreasing variance as Headspace usage levels increased. Therefore bootstrap results were consulted. These gave broadly similar results.

As usage of Headspace increased, there was no significant evidence of an increase in organisational (citizenship) behaviour, although the coefficient was in the hypothesized direction (positive). Very little variability was explained, with a trivial effect size ($R^2 = .00$).

As usage of Headspace increased, there was no significant evidence of an increase in Curiosity. Most coefficients were in the hypothesized direction (positive), Curiosity - Explore the exception. Very little variability was explained, with trivial to small effect sizes by cut-offs: trivial $< .01$, small $\geq .01$ and $< .09$.

As usage of Headspace increased, there was no significant evidence of a decrease in the Intention to quit, and the coefficient was in the hypothesized direction (positive). Very little variability was explained, with a trivial effect size ($R^2 = .00$). An examination of the scatterplot (Appendix R51) indicated there appeared to be some heteroscedasticity, with a decreasing variance as Headspace usage levels increased. Therefore bootstrap results were consulted. These gave broadly similar results.

**Summary.**

In summary, the hypothesis for work-related outcomes was partially supported. Small improvements in satisfaction with work-life balance and with emotional job-engagement were significantly predicted with increased Headspace usage. There were no significant results for the remaining outcomes. Finally, changes in the means from Baseline to T3 for each outcome were examined by conducting a paired sample t-test. The results are presented in Table 3.4. With the exception of Intention to Quit which showed a non-significant increase over 12 months, changes in all outcomes were in the expected direction. The results showed significant increases in total mindfulness and all facets, with effect sizes ranging between small to large. There was a significant improvement in perceived stress with a medium effect size. There were significant improvements, with effect sizes ranging from small to medium, for a number of work-related outcomes: work-life balance, organisational citizenship behaviour, total curiosity and both curiosity facets.
Table 3.4
Descriptives showing possible scores; baseline, T3 and change means; and paired t-test results for mindfulness, health and work-related outcomes (N = 60*)

<table>
<thead>
<tr>
<th>Study variables</th>
<th>Possible score</th>
<th>Baseline**</th>
<th>T3</th>
<th>Baseline - T3 Change</th>
<th>Baseline - T3</th>
<th>t(58) ***</th>
<th>p</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
<td>Maximum</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mindfulness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observe (FFMQ-Observe)</td>
<td>4</td>
<td>40</td>
<td>13.00 (3.77)</td>
<td>14.85 (3.60)</td>
<td>1.85 (3.95)</td>
<td>-3.63</td>
<td>.001</td>
<td>0.47</td>
</tr>
<tr>
<td>Describing (FFMQ-Describe)</td>
<td>5</td>
<td>40</td>
<td>15.20 (2.41)</td>
<td>18.12 (4.13)</td>
<td>2.92 (3.45)</td>
<td>-6.56</td>
<td>.000</td>
<td>0.85</td>
</tr>
<tr>
<td>Acting with awareness (FFMQ-ActAware)</td>
<td>5</td>
<td>40</td>
<td>15.93 (4.44)</td>
<td>18.17 (4.28)</td>
<td>2.23 (4.47)</td>
<td>-3.87</td>
<td>.000</td>
<td>0.50</td>
</tr>
<tr>
<td>Nonjudgment (FFMQ-NonJudging)</td>
<td>5</td>
<td>40</td>
<td>16.02 (5.00)</td>
<td>17.83 (4.20)</td>
<td>1.82 (4.04)</td>
<td>-3.48</td>
<td>.001</td>
<td>0.45</td>
</tr>
<tr>
<td>Nonreactivity (FFMQ-Nonreact)</td>
<td>5</td>
<td>35</td>
<td>14.45 (4.20)</td>
<td>15.90 (4.12)</td>
<td>1.45 (4.14)</td>
<td>-2.72</td>
<td>.009</td>
<td>0.35</td>
</tr>
<tr>
<td>Mindfulness (FFMQ-Total)</td>
<td>39</td>
<td>195</td>
<td>74.60 (12.45)</td>
<td>84.87 (13.89)</td>
<td>10.27 (12.87)</td>
<td>-6.18</td>
<td>.000</td>
<td>0.80</td>
</tr>
<tr>
<td>Health outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived stress (PSS10-Total)</td>
<td>0</td>
<td>40</td>
<td>19.95 (7.41)</td>
<td>16.12 (7.02)</td>
<td>-3.83 (7.35)</td>
<td>4.04</td>
<td>.000</td>
<td>0.52</td>
</tr>
<tr>
<td>Work-related outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work-life balance (WLB-Total)</td>
<td>5</td>
<td>25</td>
<td>15.87 (4.99)</td>
<td>17.52 (5.15)</td>
<td>1.65 (3.28)</td>
<td>-3.89</td>
<td>.000</td>
<td>0.50</td>
</tr>
<tr>
<td>Job engagement - Physical (JES-Physical)</td>
<td>6</td>
<td>30</td>
<td>24.57 (4.17)</td>
<td>24.92 (3.91)</td>
<td>0.35 (3.84)</td>
<td>-0.71</td>
<td>.482</td>
<td>0.09</td>
</tr>
<tr>
<td>Job engagement -Emotional (JES-Emotional)</td>
<td>6</td>
<td>30</td>
<td>22.50 (4.26)</td>
<td>23.08 (4.53)</td>
<td>0.58 (4.93)</td>
<td>-0.92</td>
<td>.364</td>
<td>0.12</td>
</tr>
<tr>
<td>Job engagement -Cognitive (JES-Cognitive)</td>
<td>6</td>
<td>30</td>
<td>24.18 (3.62)</td>
<td>24.20 (3.62)</td>
<td>0.02 (3.79)</td>
<td>-0.03</td>
<td>.973</td>
<td>0.00</td>
</tr>
<tr>
<td>Job engagement (JES-Total)</td>
<td>18</td>
<td>90</td>
<td>71.25 (10.25)</td>
<td>72.20 (11.23)</td>
<td>0.95 (10.43)</td>
<td>-0.71</td>
<td>.483</td>
<td>0.09</td>
</tr>
<tr>
<td>Organisational behaviour individual (OCBI-Total)</td>
<td>8</td>
<td>56</td>
<td>39.98 (7.03)</td>
<td>40.25 (6.88)</td>
<td>1.27 (4.90)</td>
<td>-2.00</td>
<td>.050</td>
<td>0.26</td>
</tr>
<tr>
<td>Curiosity - Explore (CES-Stretch)</td>
<td>5</td>
<td>25</td>
<td>17.13 (4.09)</td>
<td>18.07 (3.92)</td>
<td>0.93 (2.91)</td>
<td>-2.48</td>
<td>.016</td>
<td>0.32</td>
</tr>
<tr>
<td>Curiosity - Embrace unknown (CES-Embrace)</td>
<td>5</td>
<td>25</td>
<td>13.35 (4.15)</td>
<td>13.93 (4.38)</td>
<td>0.58 (2.47)</td>
<td>-1.83</td>
<td>.072</td>
<td>0.24</td>
</tr>
<tr>
<td>Curiosity (CES-Total)</td>
<td>10</td>
<td>50</td>
<td>30.48 (7.70)</td>
<td>32.00 (7.86)</td>
<td>1.52 (4.71)</td>
<td>-2.49</td>
<td>.016</td>
<td>0.32</td>
</tr>
<tr>
<td>Intention to quit (Quit-Total)</td>
<td>5</td>
<td>35</td>
<td>14.52 (7.03)</td>
<td>15.83 (8.29)</td>
<td>1.32 (6.94)</td>
<td>-1.47</td>
<td>.147</td>
<td>0.19</td>
</tr>
</tbody>
</table>

* The sample combined participants from the Study 1 intervention (INT) and waitlist control (WLC) groups

** Baseline is T1 for Study 1 sourced INT participants and T2 for WLC participants

*** A negative t indicates that the T3 outcome means is greater than the T1 baseline. A positive t indicates that the T3 outcome means is less than the T1 baseline.
3.4 Discussion

The purpose of this study was to determine if the amount of Headspace mindfulness practice over 12 months by employees can predict improvements in mindfulness, perceived stress and workplace outcomes (work-life balance, job engagement, organisational-citizenship behaviour, curiosity and intention to quit). Histograms showed a wide variety of Headspace usage over the 12 month period. Results of the simple regression analysis showed that increased Headspace usage significantly predicted small improvements in some of the workplace related outcomes: satisfaction with work-life balance and emotional job-engagement but the regression explained a small percentage of variation (R² = 8% and R² = 7%, respectively). Therefore, the hypothesis was partially supported.

Mindfulness.

Although RCT studies (Jayawardene et al., 2017) and Study 1 in this thesis found significant post-intervention effects on mindfulness from online mindfulness-based interventions, this was not reflected in associations with amount of usage.

In the current study, the amount of Headspace usage did not predict significant changes in mindfulness over 12 months. H1a which predicted greater improvements in mindfulness measures was not supported. All regression coefficients were positive, apart from acting with awareness, but not significantly different from zero and effect sizes were very small.

Four studies examining the amount of mindfulness-based intervention usage can be compared with the results of the current study. Two studies used a mindfulness app and two studies used primarily group-based interventions.

The first study used a mindfulness-based training app and self-reports of the amount of training compliance. The Allexandre et al. (2016) workplace study gathered data on 27 participants’ weekly practice of exercises as recommended in their 8-weeks online mindfulness meditation program and conducted regression analysis of the impact of average weekly exercise practice on mindfulness in an 8-weeks follow-up. They found significant, moderately small increased changes in mindfulness (MAAS, Mindfulness Attention Awareness Scale) as a result of mindfulness practice. However, this differs in significance from the findings of the current study. Their study was based on self-reports, used a single-
factor measure of mindfulness which is focused on attention and awareness in the present, and was conducted over a shorter period of time. The second study (Bennike et al., 2017) was conducted with 54 university employees, and it used the Headspace app over a 4-week period and participants’ app usage data provided by Headspace. Bennike et al. (2017) found that mindfulness (MAAS) increased significantly with greater use of Headspace. This study differs in significance from the current study findings however there were differences in the Headspace usage duration and mindfulness measure.

Two studies, using mindfulness-based interventions which were primarily guided weekly meetings, examined the impact on mindfulness of the amount of time spent in non-group, informal exercises. The first two workplace studies used self-reports (Leroy et al., 2013; Stanley et al., 2011) and another study used software to track online meditation usage (Ribeiro et al., 2018). Leroy et al. (2013) conducted an 8-week MBSR intervention (68 participants in a workplace) and the results showed a significant impact of self-reported informal meditation practice on increases in mindfulness (MAAS) at 2-months post-intervention but not at 4-months follow-up. Stanley et al. (2011) conducted an 8-weeks mindfulness intervention combining weekly meetings, workshop and audio guided meditations on CDs lasting between 10 and 30 minutes. They found that the amount of time spent complying with non-group exercises predicted a significant increased change in total mindfulness (FFMQ) but none of the mindfulness facets at post-intervention. The Ribeiro et al. (2018) 6-weeks intervention was a combination of guided weekly group meetings and online-audio guided meditations lasting between 4 and 30 minutes. They examined recorded actual usage, by 53 adults, of online mindfulness exercises and found that it did not significantly predict the increased change in mindfulness (MAAS) at post-intervention.

The different findings of these studies are primarily differences in significance. This might be due to the difference in interventions (group only vs combined group and individual work), analysis points (post-intervention and follow-up), usage data collection (self-reporting vs actual), the sample population (employees vs general public) or the mindfulness measures (FFMQ vs MAAS). Most of the interventions were different to the current study so it is difficult to draw conclusions when comparing results.

The current study’s strength was it analysed actual app usage data with Headspace as the primary, not supplementary intervention component. However, participants may have eventually practiced mindfulness in addition to using Headspace. Although this study
captured a subjective, self-reported measure of practice for the last two months, it was not useful to analyse, and in any case, it would be unfeasible to ask for details of practice over 12 months. It is plausible that combined app usage and additional practice could have raised the level of mindfulness in low Headspace usage participants. A study of regular mindfulness meditators vs non-meditators found that regular meditators scored significantly higher in the five mindfulness facets (Baer et al., 2008), which suggests that continued practice maintains higher mindfulness levels.

**Health-related outcome – perceived stress.**

RCT studies (Jayawardene et al., 2017) and Study 1 in this thesis found a significant post- online mindfulness-based intervention reduction of perceived stress, however this was not reflected in associations with amount of usage.

In the current study, the amount of Headspace usage did not predict significant changes in perceived stress over 12 months. H1b which predicted greater reduction (positive direction) in perceived stress was not supported. The regression coefficient was negative and the effect size was small.

To compare with the results of the current study, there were five workplace studies and one study using a population sample of adults recruited on-line which examined the impact on perceived stress of the usage amounts of mindfulness-based interventions. Intervention usage measures differed greatly between the studies. Results of the first three studies (Aikens et al., 2014; Bazarko, Cate, Azocar, & Kreitzer, 2013; Krusche, Cyhlarova, & Williams, 2013) showed significant improvements, and improvements shown in the last three studies were not significant (Allexandre et al., 2016; Ribeiro et al., 2018; Stanley et al., 2011).

In the first study, Aikens et al. (2014) conducted a post-intervention and 6-months follow-up analysis of 31 American chemical company employees using an abbreviated MBSR-based intervention designed for mixed video-home-use and live, 1-hour virtual class meetings over seven weeks. They created two usage groups to report on differences in perceived stress (PSS14): self-reported participant completion of 50% and of 75%-100% of the 7-weeks program material (data collection method unspecified). At post-intervention and at 6-months follow-up, the increased usage group had a larger effect size for improvements in perceived stress. In the second study, Bazarko et al. (2013) conducted a post-intervention
and 4-months follow-up analysis of 36 nurses using an 8-weeks class-room and telephony MBSR-based intervention. They created two unequal sized usage groups to report on differences in perceived stress (PSS14) at 4-months follow-up: those who self-reported continued mindfulness practice post-intervention and those who did not continue practice. At 4-months follow-up, perceived stress was significantly lower in the post-intervention practice group \((n = 27)\) compared with the no practice group \((n = 9)\). In the third study (sample of adults recruited on-line), Krusche et al. (2013) examined self-reports of total weekly practice and differences between the intervention’s formal practice (e.g., meditation) and informal practice (e.g., mindful eating). Krusche et al. (2013) used a 10-session mindfulness app (bemindfulonline.co.uk) with 273 participants, and found that total practice significantly predicted decreases in changes to perceived stress (PSS10) from baseline to 1-month follow-up with a large effect size, although formal practice lost significance when comparing results of the two types of practice. Results in perceived stress from the three studies all showed improvement. The differences in the three studies to the findings of the current study might be due to the three studies using self-report practice, they were conducted over a shorter period of time, and had different intervention content.

The results of the next three studies provide some consistency with results from the current study. Allexandre et al. (2016) found the reductions in changes to perceived-stress (PSS10) with self-reported weekly app usage were small, not significant with medium effect size at the 8-weeks follow-up. The Ribeiro et al. (2018) study used a 6-weeks intervention combining online group and home-based mindfulness meditation exercises. They found that recorded actual usage of online mindfulness exercises did not significantly predict the decreases in perceived stress (PSS) at post-intervention. Stanley et al. (2011) found that the self-reported amount of time spent complying with non-group mindfulness exercises did not predict a significant decreased change in perceived stress (PSS) at 8-weeks post-intervention. There are differences of significance in the results of the six studies (Aikens et al., 2014; Allexandre et al., 2016; Bazarko et al., 2013; Krusche et al., 2013; Ribeiro et al., 2018; Stanley et al., 2011) and current study, and there is insufficient indication that interventions (virtual class or app usage) or app usage with supplementary mindfulness practice can predict a significant reduction in perceived stress over 12 months.
Work-related outcomes.

H1c predicted the impact of increased Headspace usage would be greater increases (positive direction) in four of the five work-related measures, and this was partially supported. There were significant increases in work-life balance and job-engagement-emotion in the current study which is consistent with Study 1 RCT findings of this thesis. In Study 1, there was significant improvement in work-life balance and job-engagement-emotion in the Practitioner (individuals who completed 10x10 minute sessions of Headspace Foundation Level-1 within two months) compared with control groups. Although studies were found that analysed mindfulness-based intervention program usage impact on mindfulness and perceived stress, few studies were found that examined the impact on work-related outcomes. The results for each work-related outcome are discussed.

Work-life-balance.

An RCT workplace study (Michel et al., 2014) and Study 1 (Practitioners sample) in this thesis found significant post-intervention effects on work-life-balance from online mindfulness-based interventions, however the results did not reflect associations with amount of usage.

The amount of Headspace usage in the current study predicted small but significant changes in increased work-life-balance over 12 months.

Although there are no studies of the impact on work-life-balance from the amount of mindfulness intervention practice, two studies offer explanations on how improved self-regulation from mindfulness may increase satisfaction with work-life-balance. T. D. Allen and Kiburz (2012) posited that mindfulness can help individuals gain greater satisfaction and effectiveness in both job and personal roles. Michel et al. (2014) suggested that mindfulness training helps individual employees to use a cognitive-emotional strategy to separate work from home life by helping to create and manage boundaries between the two. The mindfulness training program in their RCT study focused on improving self-regulation of attention and the development of a decentered perspective of events. Practicing decentering (a way of being aware of internal experiences from an objective perspective to create a mental distance from self) is part of mindfulness training (Bernstein et al., 2015). Mindfulness training in the Michel et al. (2014) and in the current study includes exercises to
improve attention and to encourage decentering so this self-regulation mechanism may explain the current study results.

**Job engagement.**

Findings of RCT workplace studies of mindfulness-based interventions and job engagement are mixed. Studies reported significant positive differences between intervention and control groups in job engagement (Aikens et al., 2014) and non-significant positive differences (Study 1 [Full ITT sample] in this thesis; van Berkel, Proper, Boot, Bongers, and van der Beek (2011). However, the results did not reflect associations with amount of intervention usage.

In the current study, the amount of Headspace usage predicted small changes in job engagement and was in the hypothesised direction (positive) with the exception of physical. Increased levels of physical engagement decreased with usage (-0.017; opposite direction from hypothesized). The amount of Headspace usage predicted significant changes in the emotional facet but not in the physical and cognitive facets or total job engagement over 12 months.

Workplace studies, with different study methods, have examined usage of mindfulness intervention components and total work engagement (UWES-17, Utrecht Work Engagement Scale) with mixed results (Leroy et al., 2013; van Berkel et al., 2014). van Berkel et al. (2014) designed a 6-month mindfulness intervention combining 8-weeks classroom, e-coaching sessions, and home exercises. They examined the impact of intervention compliance (i.e., instructor-led session attendance categorised into two compliance groups: low and high) on work engagement at 12-month follow-up (N = 120; group size not reported). They found no significant difference between the two groups, a result which neither supports nor contradicts results of the current study since intervention design and measures of job engagement and intervention usage were different. Another study (Leroy et al., 2013) found no change in job engagement at 2-months post-intervention (N = 76) and 4-months follow-up (N = 68) associated with the amount of self-reported informal meditation practice. However, the Leroy et al. (2013) intervention (8-week MBSR) and job engagement measure (UWES) and usage data (self-reported, informal mindfulness practice) were different to the current study. Rich et al. (2010) argued that the simultaneous activation of all three facets is required for job engagement. The results of the current study, Leroy et al. (2013) and van Berkel et al. (2014) indicate that amount of mindfulness practice
and training do not significantly change measures of total job engagement regardless of research method.

Nimon, Shuck, and Zigarmi (2015) advocated the separation of cognition, affect and behaviour in studies of job engagement and satisfaction. It is interesting to compare results of the current study with the Aikens et al. (2014) study which examined the impact of usage on three sub-factors of engagement (Shirom Vigor Scale; Shirom, 2003). Aikens et al. (2014) used an abbreviated MBSR-based intervention designed for mixed video-home-use and live, workbook, and 1-hour virtual class meetings over 7 weeks. They created two usage groups to analyse differences in job engagement: self-reported participant completion of 50% ($n = 6$) and of 75%-100% ($n = 28$) of the 7-week program material. They reported on differences in job engagement effect sizes at post-intervention and 6-months follow-up for the two participant usage groups. At post-intervention, usage effect sizes were identical for one facet (emotional energy) and, with increased usage, there were smaller effect sizes for two facets (physical strength and cognitive liveliness). At 6-months follow-up, increased usage had a larger effect size for physical strength and smaller effect sizes for emotional energy and cognitive liveliness. The mixed results of increased usage on different engagement facets in the Aikens et al. (2014) and current study indicate that changes in engagement are more complicated than examining engagement as a whole. This conclusion is reinforced in the RCT study 1 of this thesis where a significant improvement was reported for emotional job engagement at 2-months post-intervention, in spite of a non-significant change in total engagement. Differences in results of the Aikens et al. (2014) and current study may be explained by differences in dosage data collection, interventions, sample sizes, and results reporting (differences in effect size only in (Aikens et al., 2014). However, both studies did not measure the amount of mindfulness practice (beyond formal training) by participants in addition to the intervention and this might help to explain the results at follow-up.

Organisational behaviour.

RCT studies of part- and full-time employees (Giluk, 2010) and Study 1 in this thesis found no significant post-intervention effects on organisational behaviour from mindfulness-based interventions, although the results did not reflect associations with amount of usage.
Although in the hypothesized direction (positive), the small increases in organisational citizenship behaviour were not significantly predicted by the amount of Headspace usage over 12 months in this study.

Increased Headspace usage was expected to increase the improvement in mindfulness levels and organisational citizenship behaviour (individual; OCBI), however neither mindfulness nor organisational citizenship behaviour changes were significant.

Studies (Allred, 2012; Giluk, 2010; Reb et al., 2015) have investigated the relationship between mindfulness and organisational citizenship behaviours; and some research has used self-regulation theories to explain the relationship between mindfulness and OCBI (Allred, 2012). There is extensive research on the association of mindfulness and self-regulation (Ostafin, Robinson, & Meier, 2015),

Self-regulation can be viewed as a resource which depletes with exertion, and self-regulation can be improved when exercised (Baumeister & Heatherton, 1996). Mackenzie and Baumeister (2015) posited that interventions for self-control and mindfulness have similar procedures, and physical and psychological well-being results. Therefore, mindfulness exercises which heighten awareness and control of reactions (as measured by mindfulness facets such as observation and nonreacting) might replenish depleted self-regulatory functions. Self-regulation is important because there are interpersonal benefits from the ability to exert self-control (Tanovic, Gee, & Joormann, 2018) such as an awareness of others’ perspectives, and control of anger. When applied in the workplace, these interpersonal benefits could take the form of employees being more aware of the needs of their colleagues and regulating their own reactions to act in a way that might help others rather than react in ways which might be dysfunctional; and this can contribute to effective organisational citizenship behaviours between individuals. The cross-sectional design study by Allred (2012) appears to support the role of self-regulation in the relationship between mindfulness and OCBI. Allred (2012) found a significant association between high dispositional mindfulness, particularly the facets observe, describe, and non-reactive, and high organisational behaviour at an individual level. However, the results of regression analysis in the Giluk (2010) study found no significant impact on organisational behaviour at an individual level from participation in the intervention (MBSR and MSCT). In the Giluk (2010) study, citizenship behaviour of 17 participants was rated by supervisors and co-workers four weeks after the intervention.
No published quantitative studies on the impact of mindfulness intervention dosage on organisational citizenship behaviour were identified at the time of this study so the two studies are not directly comparable with the current study. The mixed findings reflect differences between the research questions and methods used, intervention designs (group and online), and the organisational behaviour measures used (self-reported OCBI and work colleague ratings). Giluk (2010) suggested that improvements organisational behaviours may take longer to establish since, during an intervention, participants may be concentrating on learning rather than applying mindfulness lessons. Given the 12-month duration of the current study, the Giluk (2010) supposition may not explain the lack of significant improvement. The different results between the studies demonstrate that more consistency of research methods is required to further examine any relationship between mindfulness, mindfulness interventions and organisational behaviour.

**Curiosity.**

Study 1 (RCT) in this thesis found a non-significant post-intervention increase of curiosity, however the results did not reflect associations with amount of usage. No RCT mindfulness-based intervention studies exploring the impact on curiosity were available.

The amount of Headspace usage did not predict significant changes in curiosity over 12 months and increased levels of the explore/stretch facet decreased with usage (-0.004; opposite direction from hypothesized).

Two studies offered suggestions on how improved mindfulness may increase curiosity. Brazier (2013) posited that by training to observe the bodily functions of self and others, individuals can develop a curiosity about processes and things. Carlson (2013) suggested that *general* curiosity is reflected by the non-judgmental observation aspects of mindfulness. In addition to curiosity, the current study measured two mindfulness facets: observe (being open and attentive to internal and external stimuli) and nonjudging (regulating judgmental or self-critical views on thoughts and emotions). The improvements for total curiosity and both mindfulness facets were small and not significant. It is possible that curiosity is more complex than can be captured by the measures of mindfulness and curiosity used in the current study. No published quantitative studies on the impact of mindfulness intervention dosage on general curiosity were identified at the time of this study.
Intention to quit.

Study 1 (RCT) in this thesis found a non-significant post-intervention decrease of intention to quit, however, the results did not reflect associations with amount of usage.

Although in the hypothesized direction (positive), the amount of Headspace usage in this study did not predict significant changes in the decreased intention to quit over 12 months. H1d which predicted greater reduction in the intention to quit was not supported.

No studies using the amount of mindfulness-based intervention practice to assess the impact on turnover intentions were found to compare with findings of the current study. However, a number of workplace studies have shown that there is a significant negative correlation between dispositional mindfulness and turnover intention (Andrews et al., 2014; Dane & Brummel, 2014; Reb et al., 2017).

The studies suggest that the self-regulation processes of mindfulness have an impact on turnover intention. Dane and Brummel (2014) suggested that the improved self-regulation associated with mindfulness helps employees cope with work demands thereby reducing their intention to quit. In the second of two studies, Reb et al. (2017) found that more mindful individuals had lower turnover intentions and lower emotional exhaustion; however the relationship between mindfulness and turnover was fully mediated by emotional exhaustion. They suggested that less mindful individuals might be more emotionally exhausted, leading to greater turnover intentions. Emotional exhaustion can be improved by emotion regulation processes of two mindfulness mechanisms: decentering and a non-judgment, non-reaction to thoughts and emotions (Hulsheger et al., 2013). Andrews et al. (2014) examined the relationship between mindfulness and turnover with self-regulation as the mediator, using regulatory focus theory (RFT; where goals can be pursued via prevention or promotion focus). Individuals with a promotion focus pursue positive outcomes and avoid paths that do not lead to these outcomes. They found increased turnover intentions for more mindful individuals with a promotion focus, surmising that those individuals might view leaving their employers as a way of achieving their goals. In the current study, Headspace usage did not significantly increase mindfulness, so the results cannot support nor contradict the associations of mindfulness-related self-regulation and turnover intention.
Analysis of change in means for outcomes over time.

Although analysis of dosage found no significant improvements in mindfulness and perceived stress, the paired samples t-test results showed significant increases in total and all facets of mindfulness, and significant improvements in perceived stress. The work-related outcome, work-life balance showed a significant improvement in both analysis of dosage and change over time. Changes over time for organisational citizenship behaviour, total curiosity and both curiosity facets improved significantly, although analysis of dosage found no significant improvements for these outcomes. Interestingly, there was no significant improvement in the change from baseline to T3 in emotional job engagement, although the analysis of dosage showed a significant improvement. These results suggest that many participants may have used enough of the Headspace app for them to incorporate the mindfulness techniques independently through additional mindfulness meditation practice. There were 45% participants who had ‘a little’ to ‘moderate’ amount of additional mindfulness practice in the last two months prior to T3. Although individuals’ definitions of little or moderate may differ, this gives some support for the suggestion. An alternative suggestion is that, following their use of Headspace, the participants may have learned the mindfulness concepts sufficiently to change their daily awareness, and that this was reflected in their T3 scores.

Summary.

The current study results showed consistency in direction although not significance with the dosage results for mindfulness in other studies. The direction of dosage results for perceived stress in the current study were not consistent with other dosage studies, however the results for some studies were not significant. Although the current study results for total job engagement supported other dosage studies, the mixed results of increased usage on different engagement facets in the Aikens et al. (2014) study and current study indicate that changes in engagement are more complicated than examining engagement as a whole.

Past research of workplace studies examining dosage impacts are limited, and the current study is even more unusual in examining the impact of an intervention dosage over 12 months. With the exception of one study (van Berkel et al., 2014) which examined dosage effects on job engagement over 12-month using a mixed 6-months intervention delivery method, most studies reporting on dosage were over briefer periods (e.g., immediately following intervention, and one to six months post-intervention). Interestingly, Leroy et al.
(2013) found that the significant impact of self-reported practice on mindfulness from their MBSR intervention at two months disappeared at four months follow-up. This raises the possibility that effects decrease over time if most practice is conducted early in the period of examination, a potential area for future research. Future studies might benefit from examining more detailed information about usage to validate results. In a recent study comparing stress intervention usage delivered via a website versus a smartphone app, Morrison et al. (2018) suggested that summarising usage data, such as total time individuals spent on intervention, may be insufficient for research purposes and that more detailed usage patterns should be analysed. A more detailed usage analysis may help to explain usage or dosage results, however Ribeiro et al. (2018) found that recorded actual usage of online mindfulness exercises over the 6-weeks intervention did not significantly predict the decreases in perceived stress at post-intervention, and their examination of recorded app usage frequency, average daily duration, and type of meditation exercise did not change the results. Most other studies cited used self-reported meditation training practice as the source of dosage compared with the actual meditation training data utilised in the current study.

Strengths, limitations and future research.

Longitudinal designs of 12 months are not common in workplace studies of mindfulness-based interventions, particularly using self-help app interventions. The results of this study and study 1 (Practitioner sample RCT) have been consistent in showing significant improvements for work-life-balance and emotional job engagement. Future research could explore the self-regulation mechanisms in both mindfulness-based intervention and supplementary practice on work-life-balance and job engagement facets, particularly emotional regulation which may be pertinent to the increase in emotional engagement seen in both quantitative studies of this thesis.

The study sample has limitations. The generalizability of findings is limited by the use of a single university employee sample and because participants were self-selected volunteers. Future studies could use other workplace samples. Additionally, the small effect sizes indicate the need to use larger sample sizes in future research to ascertain whether these are real effects or due to sampling error.

Self-report outcome measures may be considered flawed as measures of constructs (Chan, 2008), however construct validity evidence for outcome measures was provided in Study 1 of this thesis. Highlighted in this study is another issue with self-reporting:
participant responses regarding their use of Headspace. Access to Headspace is available directly to the general public. Participants were dropped from analysis if there was no Headspace record of usage but the participants stated that they used Headspace. Some participants included in analysis may have stated that they did not use Headspace but used their personal email addresses not the Headspace subscription code issued in this study; this may have masked Headspace usage.

The amount of supplementary mindfulness practice during the 12 month period was not measured. In the two months preceding T3 questionnaire completion, over half (53%) of the participants self-reported some mindfulness practice (non-Headspace usage) with 47% having no practice. Future validation studies should examine whether outcomes are sensitive to the effects of mindfulness practice in addition to training as recommended by Jamieson and Tuckey (2017). In the Parsons et al. (2017) review of MBSR and MBCT studies, the amount of self-reported formal home practice during 8-weeks had a significant association with study outcomes, which indicates the importance of this factor in mindfulness-based intervention studies. However, to obtain an accurate measure of mindfulness practice is a challenge for longitudinal studies. Depending on the length of questionnaires, future longitudinal research could consider including a version of the Baer et al. (2008, Table 3) set of four meditation practice characteristics (regular practice duration, meditation session frequency, session length, and days on meditation retreats) or a set of fifteen questions in the Applied Mindfulness Process Scale (AMPS) developed by Li, Black, and Garland (2016).

**Conclusion.**

The purpose of the current study was to explore the dosage effects, over a 12 month period, of using an online/smartphone, mindfulness-based self-help app on mindfulness, perceived stress, and work-related outcomes which might benefit employees and their employers: perceived stress, work-life-balance, job engagement, organisational-behaviour, curiosity, and intention to quit. The study showed that higher usage amounts of a mindfulness training app, Headspace, without supplementary guidance, led to greater improvements in work-life-balance and emotional energy in job engagement. Higher usage had no significant impact on mindfulness, stress and a number of work-related outcomes. However, a brief analysis of change in outcomes over 12 months showed significant improvements in mindfulness, perceived stress and some work-related outcomes: work-life balance, organisational citizenship behaviour, and curiosity which suggests that there are
other factors than intervention dosage which should be considered in longitudinal studies. More research is needed to gain a fuller understanding of the link between the use of a cost-effective mindfulness training app and these outcomes.
CHAPTER FOUR

Study 3: Employees’ experiences of a mindfulness-based intervention: A qualitative study at 12 months

4.1 Introduction

Overview.

To date the studies of this multi-methods thesis used a quantitative method approach to examine participant responses to a set of pre-determined topics of interest: mindfulness, stress and a selection of work-related outcomes. This chapter uses a qualitative method to explore the work-life experiences of employees in a U.K. university who learned mindfulness techniques via Headspace, a mobile mindfulness-based self-help (MBSH) app.

The quantitative topics of the previous studies of this thesis were chosen because the researcher believed that it was likely that these topics would be influenced and improved by mindfulness training. Topics included: mindfulness, perceived stress, work-life-balance, job engagement, organisational citizenship behaviours-individual, curiosity and intention-to-quit. However, the experiences of participants in this thesis could be broader than the limited number of topics measured in the two earlier studies. Good et al. (2016) stated that there are many open questions worth investigating in research on mindfulness in the workplace. To open the current research thesis up to potentially new understandings of the impact of mindfulness-based interventions on employees, this study conducts interviews with a selection of participants from Study 2 (Chapter Three) to examine the changes that participants perceived and their experiences of mindfulness.

Background.

Kabat-Zinn (2015, p. 1481) defined mindfulness as: “moment-to-moment, non-judgmental awareness, cultivated by paying attention in a specific way, that is, in the present moment, and as non-reactively, as non-judgmentally, and as openheartedly as possible” and that it can be developed through practice. Brown and Ryan (2003) explained that mindfulness, a state of consciousness, combines awareness of both internal and external environments with attention or focussed awareness for various durations. Baer (2003, p.
125) elaborated suggesting that “mindfulness is the non-judgmental observation of the ongoing stream of internal and external stimuli as they arise.” Implicit in these definitions is a greater knowledge of self. Carlson (2013) suggested that mindfulness can address two key barriers to self-knowledge: informational (information about self) and motivational (self-protection when processing information about self). Self-knowledge shows an awareness of thinking, feeling and behaving tendencies, of how others behave and how they are perceived by others. Individuals can develop inaccurate self-perceptions when protecting themselves from information about themselves. Since mindfulness involves a heightened awareness and non-judgemental reaction to stimuli, mindfulness training can improve self-knowledge. In this study, participants were interviewed about their perceptions of changed work-related experiences as a result of using the mindfulness training app, Headspace. It was expected that participant perceptions of change would be illuminating as participants’ self-knowledge evolved with increased mindfulness.

**Rationale for experiential study.**

This study retrospectively explored the experiences of university employees after learning mindfulness techniques via a mindfulness-based mobile self-help (MBSH) app. To date, there were no qualitative studies of employees’ workplace experiences over 12-months following the offer of an MBSH app. At the time of data analysis for this study, there were a limited number of peer-reviewed qualitative studies of employees’ experiences following mindfulness interventions. Most studies were of healthcare professionals’ experiences arising from mindfulness training workshops and they identified improved people interactions in clinical settings (Beckman et al., 2012; Cohen-Katz et al., 2005; Nugent et al., 2011). Most qualitative workplace studies conducted interviews of participants immediately or shortly after the completion of a 4-week to 9-week intervention, although the Beckman et al. (2012) study used a 10-month, group-based intervention.

More recently, the results of two qualitative studies using modified mindfulness-based stress reduction (MBSR) programmes in the workplace found that the positive changes in wellbeing from the programme generated workplace benefits (Hugh-Jones et al., 2018; Wongtongkam et al., 2017). Interviews of 21 university employees were conducted up from 6- to 16-months following the completion of the group-based, 8-week intervention in one study (Hugh-Jones et al., 2018) and interviews of five university employees were conducted
two weeks after the 7-week intervention in the second study (Wongtongkam et al., 2017). The mindfulness skills identified in the studies included increased self-awareness and the ability to respond non-judgmentally. The wellbeing improvements included feelings of calmness, relaxation and greater appreciation of the need for self-care and self-compassion (self-acceptance). Workplace improvements were achieved through improved control of emotional responses. In a recent qualitative study of intervention engagement with healthcare staff, 16 participants were interviewed two weeks after they used an 8-week mindfulness-based self-help (MBSH) intervention (Banerjee et al., 2017). They identified increases in calmness, self-compassion and control as the benefits from the intervention. In interviews with 16 nurses conducted in a more recent qualitative study, increased calm was a reported benefit from the study’s brief multi-delivery-format mindfulness-based intervention (Slatyer et al., 2018). There remains an opportunity to better understand participants’ perceptions of the impact of self-help mindfulness-based interventions by extending the scope beyond health and wellbeing outcomes to investigate work-related outcomes.

**Research aims.**

The aim of this study was to explore participants’ experiences of practicing mindfulness during a 12-month period and the perceived impact on their workplace issues. This study, part of a multi-methods thesis, was a qualitative exploration of participants’ change experiences as a result of the intervention used in the two prior studies described in chapters 2 and 3. The intervention was Headspace®, a self-help, internet-based/mobile-device, mindfulness-based training app. The quantitative measurements used in Study 1 (RCT) and Study 2 (longitudinal – 12 month follow up) of this research thesis examined the outcomes of the intervention on pre-set measurements without more broadly exploring participants’ experiences in relation to their work. This qualitative study provided an opportunity to address that gap in understanding. The participant sample was sourced from participants recruited at Study 1 baseline who also completed Study 2.

**4.2 Methods**

**Design.**

Semi-structured interviews were conducted in this qualitative study. Thematic analysis was used to explore, identify and analyse broad, high-level themes from the data.
Interviews were conducted and recorded over the phone. By conducting phone rather than face-to-face interviews, there was more flexibility in scheduling times and locations to suit the participants. Conducting phone interviews has a number of strengths compared with face-to-face, e.g., can be less expensive and can reduce the effect of the interviewer (appearance) on participants (Wilson, 2014).

Reflective notes were made throughout design, data collection and analysis (for examples refer to 4.5 Reflective notes).

**Participants.**

Participants were recruited from the University of Surrey as part of a multi-methods research thesis. There were no incentives for participating in the interviews.

Inclusion criteria: Participants were included if they had completed the follow up questionnaire in Study 2 at 12 months, males or females over the age 17 and they were contracted to work for at least three days (21.6 hours) per week at the University. At the beginning of the research thesis, individuals were excluded if they were under the supervision of a mental health professional for psychiatric conditions or if they had previous experience of using Headspace.

**Sample size.**

Of the 67 participants invited to be interviewed, a total of 13 (19%) participated in semi-structure interviews in this study, an adequate number for this study. Published workplace MBI studies using mixed quantitative and qualitative methods have typically interviewed between five to sixteen participants (Mellor, Ingram, Van Huizen, Arnold, & Harding, 2016; Slatyer et al., 2018; Wongtongkam et al., 2017).

**Procedure.**

The participant recruitment procedure is detailed in Chapter Two, Study 1, Section 2.2. Participants were screened for eligibility in Study 1. In Study 1, the Information Sheet PDF was available within Qualtrics; the University of Surrey provided survey management software. Study 3 participants’ consent was obtained using Qualtrics at the beginning of the thesis, in Study 1. If participants responded positively to an interview request when completing the Study 2 questionnaire, they were provided with the Information Sheet and were asked to reconfirm their consent (using Qualtrics). Contact details were requested and
participants were asked for suitable interview dates. Interviews took place within one month of Study 2 (T3) questionnaire completion.

Interviews were conducted via phone land-line for an average of 45 minutes by the researcher and recorded on an audio digital recorder. An interview schedule (Table 4.1) was used to guide all interviews. The schedule included open-ended questions, prompts and probes which allowed the interviewer to follow up on participant comments as opportunities arose (see Appendix S for full schedule including introductory and concluding interviewer comments/debriefing). The questions built on an interview schedule used in a study of participants’ experiences of a mindfulness-based stress reduction intervention (Dobkin, 2008). A shorter version of the schedule was not followed since all participants had used Headspace. An email thanking participants was sent on the same day. Data was transferred from audio recorder to encrypted hard-drive (within 1 hour). Data was transcribed and validated for accuracy and anonymised by the interviewer (researcher).

Table 4.1

<table>
<thead>
<tr>
<th>Interview schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>What did you expect from the offer of a Headspace subscription</td>
</tr>
<tr>
<td>Did you use Headspace and by how much</td>
</tr>
<tr>
<td>If not used: why not</td>
</tr>
<tr>
<td>Tell me about your experience of the Headspace application</td>
</tr>
<tr>
<td>If you used Headspace to cope with your workplace issues, explain how</td>
</tr>
<tr>
<td>What was it about Headspace, if anything, which helped you to deal with your workplace issues</td>
</tr>
<tr>
<td>Tell me about aspects of the Headspace offering that were most helpful to you</td>
</tr>
<tr>
<td>Tell me about aspects of the Headspace offering that were most problematic to you</td>
</tr>
<tr>
<td>Explain to me what role mindfulness plays in your current life</td>
</tr>
<tr>
<td>Were your expectations of Headspace met</td>
</tr>
</tbody>
</table>
**Intervention.**

Headspace, a mindfulness-based self-help (MBSH) training application (app) was used as the intervention (during Studies 1 and 2). The app was available to participants for a period of 12 months and its use was discretionary. Over a 12 month period, the Headspace offering consisted of 30 foundation sessions and other mindfulness series and stand-alone sessions (e.g., health, relationships, and performance). Founded by Puddicombe (2011) and officially launched in 2010, Headspace is available on-line or it can be down-loaded to participants’ mobile devices for off-line access. Participant usage data was provided by Headspace with participant’s consent.

**Ethical approval.**

Documentation for the studies in this multi-methods research thesis was submitted to the University of Surrey Ethics Committee as one protocol document (Ethics Protocol PDF). The studies received favourable ethical opinion (Appendix J; Reference: UEC/2016/040/FHMS). Refer to detailed information in Chapter Two: Study 1, Section 2.2, Ethical Approval. The primary concern was the collection of data and the anonymization and storage of confidential data. Participants’ company email addresses collected in Study 1 were deleted at the end of Study 3. All original recordings of interviews conducted in Study 3 were destroyed. Participation in the studies was not expected to cause participants any psychological or physical harm.

**Data analysis.**

In the current study, analysing data using thematic analysis and an inductive bottom-up approach ensured that identified themes were linked to the data rather than to analytic preconceptions associated with a particular theory. It was believed that experiences might be identified which had been under-researched in previous studies of mindfulness in organisations. For example, it has been noted that there may be unintended results in individuals’ performance in the workplace (Hyland et al., 2015). The analysis followed the five coding and analysis stages described by (Braun & Clarke, 2006, p. 86): ‘data familiarisation’, ‘initial coding’ across the entire dataset, ‘searching for themes’, ‘reviewing themes’ to create a thematic map and ‘theme definition and labelling’. Initial coding generated 40 codes related to the research question and ultimately organised into three themes (Appendix T). The first four stages were an iterative process conducted by the
researcher and the final two stages were performed in collaboration with the other two researchers. The tool, NVivo was used to store transcripts and interview reflections. The researcher identified and stored codes and themes associated with transcript text which proved useful since the process was iterative and NVivo made it easier to track coding changes and retain the code-transcript source integrity. The NVivo reporting format was limited. To append data in the thesis, the researcher needed to create an example of a coded transcript by recreating the coded transcript in Microsoft Word in the more usual thematic analysis format (codes and themes in margins). Appendix U provides an example of part of a coded transcript.

4.3 Results

Sample characteristics.

The 13 participants were composed of four men and nine women. Participants were aged between 21 and 59 years (mean = 39.0), and the mean Headspace mindfulness training duration was seven months (range from 2 to 12). Occupations were from academic/research roles (n = 3), management and professional support roles (n = 8) and clerical support roles (n = 2). The length of time since the app was last used and the interviews ranged from one month to one year. Participants’ expectations of Headspace training were varied and included an interest in the Headspace app, desire to establish meditation habit, and self-care for anxiety or stress management. Characteristics and Headspace usage are shown in Table 4.2. All participants were given pseudonyms.
Themes identified.

Participants’ stories can be presented in three themes: i) Challenges (workplace related), ii) Selective Focus and iii) Work Impact. The themes illustrate changes in the way in which mindfulness is experienced on a day to day basis. Theme 1 exemplifies participants’ work experiences prior to mindfulness training. Theme 2 represents participants’ explanations of their experiences of mindfulness. Theme 3 exemplifies a mindful approach to the workplace. The model which evolved from the analysis contains the three themes and for each theme there are three sub-themes (Figure 4.1). Each sub-theme in the second theme, selective focus, illustrates the ways in which mindfulness helped participants address an associated challenge in the first theme (e.g., being calmer helped agitation). Quotes are presented verbatim, with commas (,) indicating pauses and question marks (?) indicating an uplift in tone, and words in brackets [ ] are added for reading clarity.

Table 4.2
Participant characteristics and Headspace usage (N = 13)

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Sex</th>
<th>Age (years)</th>
<th>Education (highest level)</th>
<th>Married / Cohabitating</th>
<th>Occupation Category</th>
<th>Hours of Headspace training</th>
<th>Mindfulness training duration (elapsed months)</th>
<th>No of Headspace topics used*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rod</td>
<td>Male</td>
<td>22</td>
<td>A Level</td>
<td>No</td>
<td>Campus Backoffice and Support</td>
<td>49</td>
<td>12</td>
<td>20</td>
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<tr>
<td>Celia</td>
<td>Female</td>
<td>59</td>
<td>Post-grad</td>
<td>No</td>
<td>Academic and Research</td>
<td>7</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Chris</td>
<td>Male</td>
<td>35</td>
<td>Under-grad</td>
<td>Yes</td>
<td>Campus Backoffice and Support</td>
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<td>6</td>
</tr>
<tr>
<td>Sue</td>
<td>Female</td>
<td>54</td>
<td>GCSE/O-level/NVQ</td>
<td>No</td>
<td>Campus Backoffice and Support</td>
<td>9</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Joanna</td>
<td>Female</td>
<td>48</td>
<td>Under-grad</td>
<td>Yes</td>
<td>Academic and Research</td>
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<td>4</td>
</tr>
<tr>
<td>Debbie</td>
<td>Female</td>
<td>39</td>
<td>Post-grad</td>
<td>No</td>
<td>Campus Backoffice and Support</td>
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<td>2</td>
<td>3</td>
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<tr>
<td>Karen</td>
<td>Female</td>
<td>50</td>
<td>Under-grad</td>
<td>Yes</td>
<td>Campus Backoffice and Support</td>
<td>11</td>
<td>6</td>
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</tr>
<tr>
<td>David</td>
<td>Male</td>
<td>29</td>
<td>Post-grad</td>
<td>Yes</td>
<td>Campus Backoffice and Support</td>
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* a single Headspace topic may have multiple, separate training modules
Theme 1 — challenges.

Participants describe the work related challenges that they experienced prior to the mindfulness training in this study. Challenges are in the form of three sub-themes: (a) agitation, (b) being dumped on, and (c) disempowered.

Agitation.

When faced with challenges, participants reacted in ways which made them uncomfortable. Participants would become more ‘stressed’ (Eve) during their workday and some would be habitually ‘worried’ (Joanna) about their work and in some circumstances ‘angry’ (John). These reactions impacted participants’ ability to perform their jobs as expected, especially in situations where they were interacting with others:

I would opt out of certain things because I would be, it would I would just find it too daunting, the social side of it. (Eve)
…behaviour um you know that means obviously you’re not listening and, so yeah I was I was shocking! …I could literally feel my blood boil in my head…(John)

Participants may have felt ‘really bad for having toxic thoughts’ (Mary), and others may not have been aware of their internal responses:

I wasn’t aware at all of what um, what an anxious person I was, um you know I was aware I was an anxious person, but when I was in that anxiety I didn’t see it (Kate)

In many cases, participants’ well-being at work and home would be affected:

I would’ve ruminated on that team meeting for the rest of the afternoon (Kate)

It was in my head all the time, even when I’d get home and I would wake up in the night from sleeping (Karen)

*Being dumped on.*

Participants also described how they were over-burdened with the allocation of work by their line managers or in meetings, and they acknowledged that their own responses would often lead to further demands.

You know, you do more and more hours, it just becomes accepted that that is what you are going to be doing? (Karen)

If a group are talking about a particular issue, in the past what would have happened is that I would have got an action, I’d have gone away, it would’ve been one of many actions that, um, I’d have been given, even though it shouldn’t have come to me (David)

Participants’ responses to excessive demands sometimes affected their relationships with line managers:

Um, we had a fairly sort of good relationship on the outside, um, but really, it was a bit kind of destructive, um, behind closed doors, um, and that was really because I was, for example, the fact that I had such a high volume of work. (David)

Instead of a healthy sense of responsibility for their workload, participants would sometimes assume blame for the work being required in the first place:
I always internalised so that if anything went wrong I’d look internal what could I have done differently so it would have prevented this not, you know, one person shouldn’t have done whatever they’d done and it was bloody stupid but, you know I’d blame myself and think, ‘how could I have foreseen that coming?’ you know which is quite a lot of pressure on myself. (John)

*Disempowered.*

Instead of being equipped with skills needed to effectively deal with workplace challenges, participants would describe how they were unable to ‘focus’ (John) and would ‘knee-jerk’ (John) react to situations, and generally lacked ‘confidence’ (Eve) at work to raise their concerns.

Because participants were not prepared for their daily challenges, this had implications for their employer:

I would have quit and, just gone off and done something else. Um, and that is definitely where I was, at the beginning, of Headspace. I was actively looking to leave, um. (David)

By lacking the confidence to address issues at work, the personal aspirations of participants, such as undertaking a degree programme or preparing for early retirement, were not being realised:

I don’t think in years before, I would have thought I’d I would have had the confidence to do it. I think I would have felt like it was too much, it was going to uh, stress me or overload me. (Eve)

Um, I am quite an assertive person but um, no, I don’t think, um, being able to assert myself to actually say to my boss ‘how about giving me more money?’ No. (Sue)

*Theme summary.*

The theme ‘challenges’ encapsulates the different work experiences that participants described, and the sense that these experiences were things to be overcome rather than enjoyed. Each sub-theme represents a different perception of the experience. For example, ‘agitation’ invariably resulted in a habitual response of stress, anxiety, avoidance which affected participants throughout the day and night. ‘Being dumped on’ usually meant the
participant owned the problem and not always in a positive sense. The perceived responsibility could in turn cause friction between participants and their line manager and colleagues. When a participant was ‘disempowered’, there was a sense of not being in control. This had very real implications for employers if participants felt that they had to leave the organisation in order to escape from their challenges.

**Theme 2 — selective focus.**

After mindfulness training, participants describe a change in their ability to focus internally and externally which they attributed to the application of a combination of mindfulness techniques (e.g., breathing, body scanning). Selective focus is in terms of three, mutually sustaining sub-themes: (a) being calmer, (b) appropriate responsibility, and (c) mastery. These sub-themes illustrate the ways in which participants started to manage some of the Theme 1 challenges.

**Being calmer.**

By applying mindfulness techniques during the day, participants have become calmer, improving how they deal with ‘the stress and anxiety that can well-up inside me’ (Sue). Participants were more attuned to their internal responses as the illustrations demonstrate:

And it’s like a calming, it calms me so I get I start to get irate about something and then I sort of think really I shouldn’t get irate at it, focus on breathing going in and out feeling the breath going in and out and it is very calming to do that…realising that, um you can cope with whatever you are doing and it will get better eventually (Joanna)

Um, with the breathing it is more about, uh, it’s almost a quick sort of, very quick and becoming I guess more of an unconscious thing that I sort of just stop myself and do that very quickly beforehand? Um, I just stop myself from becoming flustered? So, it’ll literally be a thirty second thing. (David)

And, when participants regularly deployed these techniques at work, their improved responses were sustained:

Um and I find that, actually when I’m in those situations even if it’s not my natural, not in my comfort zone, I don’t, panic in the way I used to before. Sometimes, sometimes I still might, but not, not as frequently as I would have before. (Eve)
Although applying mindfulness techniques was beneficial for most participants, there were some exceptions. When focussing internally some participants found that certain techniques made their conditions worse so they were selective about the techniques they used, or waited until they were in a better state of health:

I can’t focus on my body? Because of my medical condition? [laugh] It sounds barmy but. If I focus on my symptoms they get worse? So I find that body scans are a no no… so, observing the thoughts, just laying down and observing the thoughts is good if you get thoughts racing in your head. (Debbie)

In the first few sessions I was finding it quite difficult to focus…I was so anxious I had so many worries juggling in my mind… Trying to focus on my breathing made my panic attacks worse…because of that [CBT] my meditation has gone back to normal and I can focus and I no longer go into this like very heightened state of arousal and doing my breathing. But yes, I can just enjoy my meditation. (Mary)

_Appropriate responsibility._

When work situations became particularly difficult, participants felt an unsustainable weight of responsibility for successful outcomes. To cope with this, participants described how mindfulness helped them to pause or stop and that this enabled them to temporarily distance themselves from the situation before continuing. Employing the breathing technique seemed to help the changed focus:

Consciously when things are getting a bit fraught particularly meetings, just to mentally step back. Focus on breathing. Focus on, you’re sitting on a chair, what can you see or feel sitting on the chair and just dissociate yourself from, the sort of ratcheting up of emotion that’s going on, just for a few seconds, enormously helpful. (Celia)

…the breathing one that I like to use because you can do that and suddenly you can start focussing on something else and you can get away from something that’s annoying you. (Joanna)

A sense of perspective and self-acceptance helped participants deal with a tendency to self-blame or assume fault:
I think it also helps to put things into perspective a little bit? That actually um, yeah it might feel like things are getting on top of me but, that I don’t know that, they’re not the end-of-the-world kind of thing that um, it doesn’t matter if I can’t juggle everything and if one falls, um yeah, um, I think that’s the main things (Jan)

To me, mindfulness is more about, um, being able to focus and to, organise your thoughts and and eh, another part of it is more kind of accepting? Of who you are? And um before Headspace when doing things I had a lot of um, um other worries or concerns coming up in my mind um, and by utilising Headspace I learned to accept them? And before [Headspace] I used to thought bad about them and I was always putting myself down (Mary)

*Mastery.*

Participants described a greater awareness of external triggers (e.g., workload, people interactions) and recognition of their internal responses. They felt more open, and that they could cope better as the illustrations demonstrate:

I’m able to to zone out all the background noise and listen to the one person that I want to hear the message from. And then deal with that in a calm way and this is attributable to mindfulness definitely! (John)

I just feel like that if I have so many things happening at the same time this is going to, lead, to something bad. So sometimes I feel like, distracted I mean I feel like the distraction. So I need to pause, and bring myself back to neutral, mode, and then come back to work. (Chris)

By practicing mindfulness participants acquired skills that gave them a sense of control. As one participant phrased it:

I, I just assumed that it was, like, something was wrong with me and that it would go away and I couldn’t understand why, it hadn’t done and all the things I tried etc. but Headspace kind of made me realise that’s not really the way to approach it or think about it, it’s more that kind of regulation and being able to manage that process more than anything? (David)
**Theme summary.**

The theme ‘selective focus’ recognises that, through the application of mindfulness techniques, participants were able to direct their focus to external and internal stimuli and felt better equipped to respond to workplace challenges. The sub-themes were mutually sustaining. A sub-theme could represent a flip of a challenge. So, for example, the ‘agitation’ experienced by participants could be more positively managed by ‘being calm’. The challenge of ‘being dumped on’ could be more positively managed by adopting ‘appropriate responsibility’. The feeling of being ‘disempowered’ at work could be more positively managed by a ‘mastery’ of mindfulness techniques and the understanding that mindfulness does not remove the challenge – it helps an individual manage it.

**Theme 3 — work impact.**

Participants gave examples of work related changes that they associated with their experience of increased mindfulness. Work impact is in the form of three sub-themes: (a) people, (b) activities, and (c) home. These sub-themes illustrate the ways in which participants believed that their work and associated home lives changed by applying mindfulness lessons.

**People.**

When participants described the challenges they faced, many of those revolved around their relationships with their work colleagues and line managers. Similarly, when expressing how their behaviour changed as a result of practicing mindfulness techniques, many of the changes exemplified improvements in their relationships with other people. Changes with work colleagues might arise through participants’ improved confidence or control of their emotions as the two illustrations show:

...before Headspace, if I thought, if I thought that I had, upset someone, there would then be um, you know a series of worried emails or um, you know lots of checking that everything was still okay. That I don’t do anymore. Um so, eh, so I’m not putting that on them anymore, on my teammates anymore. (Kate)

I’ve actually felt as though I’m about to become extremely angry um when somebody’s done something particularly stupid, eh for example you know making a [anonymised] change and they just um basically [anonymised] before they checked to see if anybody is [anonymised] and we’ve had complaints. And um. I was able to,
um realise the anger was coming and not show it and talk rationally through you
know ‘what was going through your head why didn’t you follow the process?’ that
sort of thing, so, so feeling anger coming and actually coming keeping it from other
people noticing. (John)

Participants perceived an improved relationship with their line managers. In many of
the cases this was a result of a changed perspective of their responsibilities and an increased
confidence in sharing their concerns with their line manager as illustrated in this example:

…what happened through the Headspace sort of journey was that I sort of realised
that actually I had more control over that than I think I have and, it's, as I said before,
no one was going to change it but me so, I then started communicating that and my
feelings to my manager, just having those conversations has now led to a fairly
constructive relationship and, the passive-aggressive nature of that has gone. (David)

Activities and tasks.
Participants were able to better manage their workloads. Focusing on one task at a
time contributes to this improvement, as illustrated:

Well, I’ve used it to be able to focus on what I am doing rather than getting bogged
down or overwhelmed by the amount of work that I have and that comes in (Sue)

At work and so, if I have many windows open, and I feel that I need to stop. I just,
switch off all these, windows and I give myself, a few seconds, just pause. For like
thirty seconds or twenty seconds, and then come back to what I was doing. And I
tend to, do things, individually, like, just one thing at a time. (Chris)

Another contribution to this improvement is a change in the participants’ perspective
of their work responsibilities:
Well, I’m actually moving away from thinking that it is my responsibility to cover all
the gaps, through to it’s my responsibility to find someone to cover all the gaps,
which is a big shift really. ‘cause previously you just want to leap in (Celia)
A change in perception of the importance of self and health helped participants to
reduce the impact of work overload and unfinished business at the end of a workday:
I just felt a bit more able afterwards to say ‘Actually no.’ um ‘I can say no’ um, ‘I’m
important too’ (Jan)
I’m much better at saying no to things, still not brilliant but I am much better, I’m very much more aware of the impact, of the impact on me if I take on too much (Karen)

Home.

Changes in participants’ lives have not been isolated to their workplace. Regardless of their cohabitation status, participants indicated that, by better managing their work challenges, their home life improved as described in these statements:

Um, I feel better equipped to cope with the pressures of daily life, both work wise and in my personal life. Um, living alone, again, through choice, but it is something maybe that most people don’t understand. You don’t, when you come home, you don’t have anyone to sound off to, you, you are your own critic, your own judge, your own best friend, um so, um you need to have a healthy mind and a healthy way of thinking and Headspace has helped me to improve that. (Sue)

…prior to Headspace what I would have done is I would’ve ruminated on that team meeting for the rest of the afternoon and until my husband got home. And then I’d have talked it all over with him. And he would’ve done, the job of what I now use Headspace for, that just occurred to me now! Um, so yeah so after the meeting um, just to stop that anxiety I will plug myself into Headspace, give it ten minutes, and feel so much better afterwards. (Kate)

The changes in perspective and increased confidence experienced by some participants enabled them to better tune their work-life-balance. Some participants recalibrated the focus between work and personal life:

…it’s made me realise that it’s this is just, a way of, work is just a way of of paying bills um and I think I used to spend too much time focussing on work, um and it was my main priority. (Joanna)

For other participants, it has supported them in their pursuit of further education:

Once I became familiar with the techniques and once I really kind of, once I could feel that really making a difference, I was able to think more clearly. I started making sort of better decisions about, um, my work-life balance? And so, the pressure of the course, and workload was quite significant and that was the point where I sort of said
‘I’d prefer to go down to four days per week’ and work supported me in that. And that, that was a request that, I think pre-Headspace days I wouldn’t have made…so it was really an outcome of, going through that sort of first six or seven months of, calming myself down and um, reassessing the things that were important to me (David)

Theme summary.

The theme ‘work impact’ encompasses examples provided by participants to represent the changes that they experienced. These changes were made possible through a selective focus when applying the mindfulness techniques to challenges they encountered in the workplace.

Although not directly addressing the research question, it is valuable to understand participants’ views on the obstacles they encountered when engaging in mindfulness training and practice when examining the differences in participant app usage. Two most often cited reasons low usage were insufficient time and the difficulty in establishing a routine. Although the Headspace app can be used anywhere, some participants found it difficult to use while at work and reverted to solo walks to practice their mindfulness techniques. The reasons for letting training or practice lapse may be more complex. One participant experienced difficulties with the Headspace content but on reflection acknowledged that they had established a routine of using the app with their pet and their pet’s death made it difficult to practice afterwards. This suggests that habits established by participants can have both a positive and negative influence on practice.

4.4 Discussion

This study explored the experiences of employees learning mindfulness techniques via a mobile mindfulness-based self-help (MBSH) app, Headspace. At the time of analysis, this was the first qualitative study of the impact on employees using a MBSH app. The discussion focuses primarily on participants’ workplace experiences and mindfulness-related mechanisms of change, and then concludes with a brief summary of their experiences of using a mindfulness training ‘app’.
Summary of results.

Three themes representing the experiences of the participants were identified: (a) participants’ challenges in the workplace, (b) participants’ internal selective focus facilitated by applying mindfulness techniques, and (c) the impact of practicing mindfulness on work and related home life. Participants’ descriptions indicated that they noticed an improvement as result of the mindfulness training and by applying techniques in their work environments. These themes will be considered within the notion of a model of change to describe the transition from challenges to using mindfulness in the workplace.

Model of change.

The study proposes a model of change from pre-mindfulness experiences to post-mindfulness workplace related experiences. The model starts from a baseline with the experiences of workplace challenges, through to experiences resulting from mindfulness practice and the way in which work related experiences can change. The model forms the core of the likely experiences of university employees who use reputable mindfulness apps (e.g., Headspace).

Participants recounted numerous examples of changes in self-knowledge resulting from their mindfulness training. Starting with the theme of challenges, participants often reported a lack of awareness of their feelings and behaviours prior to using Headspace. The theme of selective focus showed that their self-knowledge evolved over time as they mastered mindfulness techniques and applied them in the theme of work impact. The combination of the three themes supports the suggestion of Carlson (2013) that mindfulness can improve self-knowledge.

Challenges.

The baseline experiences of work related ‘Challenges’ were exemplified by feelings of agitation, being dumped on and disempowered. Participants described experiences of suffering when giving examples of their workplace challenges. They expressed feelings of distress related to events which they were often unaware of and which affected their behaviour at work and home. The feelings of distress support Cassell’s (2009) concept of suffering as an all-encompassing experience in individuals. These experiences demonstrate the need for improved self-knowledge which Carlson (2013) suggested is possible with enhanced mindfulness.
Selective focus.

The theme ‘Selective focus’ describes how, as a result of mindfulness training and practice, participants improved their ability to focus on internal and external stimuli. Participants reported that they were calmer, were better able to attribute responsibility for events and had mastery of mindfulness skills to deploy in situations. These changes were mutually sustaining. The results of this study support the findings of two recent qualitative studies using MBSR based interventions with university employees. Hugh-Jones et al. (2018) found that employees experienced enhanced awareness which enabled them to detect stress triggers and Wongtongkam et al. (2017) found that employees were calmer and better able to control their work situations. This study’s results also support the findings of Banerjee et al. (2017) who found that some clinical staff who engaged in a MBSH intervention were calmer and in better control of stress. This study supports the findings of a study using Headspace, the mindfulness-based training app used in the current study (Laurie & Blandford, 2016). They found that the feeling of calm was an effect commonly reported in interviews with adult participants from a general population 30-40 days after they started using Headspace.

Work impact.

The impact of mindfulness training on employees’ workplace experiences is the focus of this study, and participants’ experiences are examined and mindfulness-related mechanisms are identified.

Participants provided real-world accounts of how their post-training experiences changed, experiences specifically related to people, activities and home. Shifts in perceived responsibility and mastery of mindfulness skills were reflected in participants’ awareness of the impact their actions had on themselves and their work colleagues. They recognised the potential for self-harm through their previous workplace behaviours (e.g., avoiding social situations, confrontational or passive interactions) or through poor self-care. These shifts in perception helped participants to feel better about themselves and to develop self-compassion. This appeared to contribute to improvements in their relationships with others, and to attribute responsibility for tasks more appropriately. Compassion is a feeling arising from the awareness of suffering (Cassell, 2009). Participants’ increased self-compassion following Headspace training supports findings of qualitative (Banerjee et al., 2017) and quantitative (Birnie, Speca, & Carlson, 2010) studies. However, a quantitative study by (Keng, Smoski, Robins, Ekblad, & Brantley, 2012), provides a more nuanced explanation of
the impact of an MBSR intervention by making a distinction between self-compassion and mindfulness. They acknowledged that mindfulness helps individuals develop self-compassion but they found that self-compassion reduces worry, a feature of anxiety, and that increased mindfulness affects emotional regulation. Participants of the current study were frequently self-critical when accounting for their decisions and behaviour at work. Self-criticism can result in avoidant or passive behaviour, and this was evident in statements made by some participants. These coping strategies are associated with emotion-focused disengagement coping, and A. B. Allen and Leary (2010) suggested that instead of behaving defensively or in denial, self-compassionate people accept responsibility for failures and move on. They stated that self-compassion is part of a positive cognitive restructuring coping strategy which enables individuals to be mindfully aware of stressful situations and cognitively accepting of them (A. B. Allen & Leary, 2010). A. B. Allen and Leary (2010) speculated that when individuals perceive they are in control in situations, they may take action to resolve issues. The current study appears to support the speculation of A. B. Allen and Leary (2010). In the current study, participants recounted pre-mindfulness training examples of avoidant and passive coping strategies and intentions to leave their job. By practicing mindfulness, participants were self-compassionate and felt more in control of themselves and their situations, consequently taking actions at work that improved their relationships with colleagues and line managers, their workload and work-life-balance.

Stress and interactions with colleagues where aggressiveness was the norm for one participant resulted in his tendency to respond aggressively and to express anger. Following mindfulness training, the participant reported greater levels of emotional regulation (e.g., anger) in response to the actions of colleagues. The individual reported an awareness of the incipient feeling of anger, and was able to work through the issue without resorting to expressions of anger. The experiences of this participant illustrate the concept of mindful metacognition (stimuli are observed without bias toward implications to self) introduced in Chapter One of this thesis. In this study, the individual felt anger but was able to control it. This example supports the Frewen et al. (2008) quantitative study 2 result which showed that university students with higher mindfulness scores after a MBI (based on combined MBSR and MBCT instructions) had negative thoughts but there were fewer of them, and when negative thoughts occurred, the more mindful individuals were better able to let the thoughts go. In a qualitative study, Banerjee et al. (2017) found that, post-MBI (8-weeks, online MBSH), some participants were better able to regulate their emotions and experienced
reductions in getting angry. While the current study supports this finding, the Banerjee et al. (2017) study did not explicitly state differences in experienced but not expressed anger. A recent quantitative study of workplace anger found that over half the sample experienced anger-provoking events; however they found that the expression or suppression of anger in response to those events is determined by individuals’ perceptions of their work relationships and environment (Booth, Ireland, Mann, Eslea, & Holyoak, 2017). Bergman et al. (2016) found, in a quantitative study that expressions of anger by police officers reduced following an MBI and that mindfulness facets of acting with awareness and nonjudging were significant predictors. A more recent qualitative study of 16 nurses’ experiences of a multi-delivery MBI found that one nurse reported feeling calmer and shouted less at others in work (Slatyer et al., 2018). Statements from the participant in the current study support the Slatyer et al. (2018) qualitative study and lends support to the Bergman et al. (2016) quantitative study. The participant had previously blamed himself when things went wrong and would express his anger with others. After Headspace training, he could recognise when others were responsible for problems, could recognise that he was feeling angry, and was able to respond with a greater awareness of his reactions, and reduce his expressions of anger.

Participants reported that they were better able to focus on their tasks and perform one activity at a time which reduced feelings of being overwhelmed by the amount of work. The participants attributed their improved focus on mindfulness. In a theoretical paper, Dust (2015) posited that trait-based mindfulness enables individuals to be aware of both their immediate task and their own psychological state, and that this wide awareness of external and internal stimuli enables them to make adjustments in the situation to better align their psychological state to the needs of the current task. There is an element of self-regulation exercised since the individual is not automatically responding to the current situation based on previous experiences (automaticity). In Chapter One of this thesis, the concepts of bare attention (non-judgmental receptive observation in the present) in mindfulness, and mind wandering (broad attention span but thinking of things not relevant to immediate task) were introduced with a study (Bennike et al., 2017) illustrating how mindfulness-based training impacts mind wandering. They conducted a study with university staff participants to compare an MBI and a cognitive brain training intervention and found that the MBI was significantly more effective in reducing behavioural markers of mind wandering when performing a sustained attention task. In the current study, a number of participants perceived that they improved their task performance through an increased focus on specific...
tasks. This appears to support the quantitative findings of the Bennike et al. (2017) study. Accounts in the current study would also appear to align with the findings of an RCT study on multi-tasking. Levy, Wobbrock, Kaszniak, and Ostergren (2012) used an 8-week MBI with employees, and compared pre- and post-intervention results which showed that the mindfulness group spent more time on single tasks and switched between tasks less whereas the control group did not. The current study also supports accounts of 12 participants interviewed in a research-based public sector organisation during a mixed-methods MBI (8-week, MBSR based) study (Mellor et al., 2016). In their study, some individuals stated that they were able to focus their attention on the task at hand, and by planning their workload they worried less, a result attributed to the MBI training to focus attention during mind wandering.

There was a spillover effect from mindfulness training where improvements in individuals’ work lives spilled over into their personal lives. Spillover is one theory used to explain work-life balance and it may ultimately contribute to life satisfaction (Sirgy & Lee, 2018). Spillover occurs within-person and transfers affect from one domain (e.g., work) to another (e.g., home). Participants in the current study reported being in a healthier mental state with an improved ability to deal with work and personal pressures and, in one case, less reliance on a partner for help in reducing work-related worries. This supports the qualitative findings of three studies. A qualitative MBI (52-hour mindful communication) study found that a majority of the 20 physicians interviewed reported that they could listen and respond to others more effectively at work and home (Beckman et al., 2012). In the Mellor et al. (2016) mixed-methods study, some individuals reported that they worried less about work and spent more time with their families. Wongtongkam et al. (2017) conducted a more recent mixed-methods MBI (7-week modified MBSR) study and interviewed five university staff two weeks after the intervention. They found that some individuals improved relationships with family members, illustrated by one account of a participant feeling better at the end of the workday and feeling more relaxed with the family when at home.

Mindfulness practice is not without its dangers, and concerns about the risks of mindfulness-based interventions have been raised in various studies (Banerjee et al., 2017; Dobkin, Irving, & Amar, 2012). In the current study, some participants found that certain techniques made their conditions worse. They described a level of self-awareness of what techniques were not suited to their conditions and they would be selective about which technique they used, or wait until they were in a different state before continuing their
practice. Since most stress management interventions (SMIs) include an element of relaxation, it is possible for some individuals to experience relaxation-induced anxiety (RIA; Schabracq et al., 2003). Symptoms of RIA can be feelings of anxiety or discomfort as an individual relaxes and this can occur with clinical patients diagnosed with chronic anxiety who require supervised medical treatment. The proliferation of mindfulness apps available for download raises three considerations: i) employees are directly exposed to apps which are not directly supported or supervised, ii) it is important for an organisation to be very selective when offering a suitable MBSH app, and iii) if an organisation offers a MBSH app to employees, they should provide additional support for those who may need it. To help organisations assess employees’ need for additional support, there is a useful screening document for appropriate pre-intervention guidance (Appendix A of Dobkin et al., 2012).

They expressed the belief that people must own their well-being and are capable of determining what activities may be harmful.

Finally, organisations could consider actively promoting their mindfulness app offering. For example, organisations could offer family subscriptions to employees so that mindfulness and app usage can be normalised at work and home. Participants in the current study describe habits they developed in association with their meditation (e.g., meditating with pet or partner). In a recent qualitative study of participant experiences of using Headspace, the involvement of other people (e.g., partner) during meditation was a factor in their motivation to use the app (Laurie & Blandford, 2016).

In summary, after mindfulness training participants perceived that an increased focus on their responses to negative workplace challenges helped to improve work relationships, the execution of work tasks, and associated improvements in home life. Participants’ perceptions of internal changes in response to stimuli and some behavioural responses support results of other studies. There is evidence to suggest that improvements in work-lives spill over into personal lives, and that the practice of mindfulness carries some risk.

**Limitations and future research.**

There are limitations in the current study. Participants had different app usage levels over a 12 month period (Table 1). Jamieson and Tuckey (2017) suggested that how an intervention is received by participants is critical to fully understand intervention engagement levels in working populations. Headspace is a mindfulness-based self-help app that offers flexible content and can be available on an as-needed basis. In this study, Kate, who used
the app over the full 12 months, appeared to rely on using Headspace during the work-day to help her cope with challenges whereas other participants who used the app over shorter periods of time indicated that they applied mindfulness techniques without the need for regular and continuous training throughout the year. While this example demonstrates the flexibility of Headspace, it does suggest that training maintenance levels are not the only indicator of an intervention’s effectiveness, an observation which could be explored further. Future research could examine perceived self-efficacy in applying techniques as well as focusing on strategies for continued mindfulness training and identifying obstacles.

Participants identified other influences which helped them (e.g., line manager, CBT). Although the use of Headspace may have helped some individuals improve their work relationships and work-life balance, it is unlikely that the improvements would have been achieved without the positive response of their line managers (the managers’ responses are a good example of the individual and organisation interface stress-management interventions introduced in Chapter One, section 1.1). Reporting on the results of a 2012 survey of university employees, Grove (2012) stated that causes of stress (stressors) included conflicting demands from management, workloads, time pressures and unachievable deadlines. The experiences of some participants in the current study demonstrate the benefits of individuals trying to manage their stress combined with help from their line managers in addressing stressors. The data analysis method (inductive thematic analysis) employed in this study accepted participants’ perceived attribution of improvements due to mindfulness. When some participants revealed that they experienced strong anxiety symptoms, they indicated they had received other forms of support (e.g., CBT) at some stage (e.g., prior to the study and in one case during the study) and found it did not completely address their anxiety related issues. Participants identified which mindfulness techniques they used to improve their challenges, and one participant made a very clear distinction between the CBT focus on changing cognitive processes with the Headspace mindfulness emphasis on acceptance. A recent meta-analysis (Singh & Gorey, 2018) compared cognitive behavioural interventions (CBI) and mindfulness in treating anxiety disorders and found no significant difference between the interventions in reducing anxiety. Singh and Gorey (2018) recommended further research on the comparative effectiveness of CBIs and mindfulness interventions (MBI). The number of participants who expressed feelings of anxiety in the current study would lend support for the need to conduct comparative research using a CBI and MBI in the workplace environment since this combination is a possible wellbeing programme, stress-management
intervention (SMI) offering for employees. The intervention techniques are different and a combination of interventions might be most effective, or one intervention might be more appropriate than another to alleviate anxiety at different stages. It is important to note that people may choose to try a number of options before finding an approach which is effective for them (Lazarus, 1984). This comparative approach would necessitate a longitudinal study which included an analysis of different levels of participant anxiety. Research may help organisations when making decisions on providing additional support for those who need it. The flexibility and cost-effectiveness of mindfulness-based self-help apps alone may be insufficient in satisfying the needs of some employees.

Participants may have been positively biased since they volunteered for an interview. However, participants described issues they sometimes encountered with certain mindfulness techniques and were open about receiving other forms of mental support (e.g., CBT). Participants may have been influenced by standardised measures that they completed in the Baseline to T3 questionnaires although the interview schedule avoided inferences to specific outcomes. Participants’ ability to recall what happened over one year may be a source of bias as they may have shared experiences which fit with a story that they wished to convey.

By restricting the study to the experiences of employees in a single university, the model has limited generalisability to other populations. However, the participants in this study were reflective of a variety of demographic characteristics within universities. They were differing in the exposure to other forms of mental health support, and differing in Headspace usage.

Conclusion.

Despite the limitations, this study proposes a model for how mindfulness is applied by university employees when the offer of a mindfulness-based self-help app is taken up. The model tracks changes from pre-mindfulness experiences to post-mindfulness workplace related experiences, starting from the experiences of workplace challenges, through to experiences resulting from mindfulness practice and the way in which work related experiences can be affected. In particular the results indicated that employees noticed improvements in their work and home lives. The selection of a flexible mindfulness programme which accommodates the needs of different individuals is an important consideration for organisations, especially since organisations are unlikely to place restrictions on who is offered the opportunity.
Reflective notes.

**Design:** I think that the phone provided a sense of distance from the interviewer (me) so they could share personal experiences of anxiety, miscarriages, views about their line manager and role. The richness of some examples may not have been achieved in a face-to-face interview.

**Data collection:** By transcribing throughout the interview process, I recognised opportunities to delve more deeply on subjects in subsequent interviews, asking individuals for more specific workplace examples rather than general comments. Additionally, the wording was changed from workplace *issues* to workplace *challenges* since the former wording was negative and elicited no examples in the first interview.

**Analysis:** During the course of analysis, there was a wealth of informative material covered. For example, the interviews provided insight into participant’s experiences of using the Headspace app, including usage obstacles. However, the participants’ perspectives of their evolving levels of mindfulness from pre-training to current day were of greater relevance and addressed this study’s research question. Evidence of their experiences (positive and negative) was demonstrated by how they cope with workplace issues.
CHAPTER FIVE

Discussion and Conclusion

Discussion

This final discussion presents the thesis aims, a summary of the findings, illustrates how these results link to the existing literature, outlines methodological limitations, and then discusses the implications for research and conclusions.

Aims of thesis.

This thesis used a multi-method approach with three studies to examine the impact of an internet-based/mobile-device, mindfulness-based self-help (MBSH) training app called Headspace, with no supplementary guidance, on university employees in terms of mindfulness, perceived stress and work-related outcomes.

The first two studies used a quantitative methodology to examine the impact of the intervention of changes in the following outcomes: (a) mindfulness; (b) a health-related outcome, perceived stress; and (c) five work-related outcomes: work-life-balance, job engagement, organisational citizenship behaviour-individual, curiosity and intention-to-quit.

The aim of Study 1 was to examine if the availability or offer of a mindfulness-based intervention to employees improved the outcomes. The aim of Study 2 was to examine the extent to which Headspace usage over a 12-month period predicted improvements in the outcomes. A qualitative study was conducted in Study 3 with the aim of exploring participants’ experiences of practicing mindfulness during the 12 month period when they had access to Headspace and the perceived impact on their workplace issues.

Summary of findings.

The findings of each study are summarised below.

Study 1: A randomised control trial of the impact of a mindfulness-based intervention on workplace outcomes.

The intention-to-treat (ITT) results using participants in the Full ITT sample were mixed. The study had three hypotheses in which results were examined for improvements in:
(a) mindfulness, (b) perceived stress and (c) five work-related outcomes. Hypothesis 1 was partially supported with significant improvements in total mindfulness and two of five facets. Improvements in remaining facets were not significant. Hypothesis 2 was supported with significant improvements in perceived stress. Hypothesis 3 was not supported by significant improvements in work-related outcomes. However, results improved with increased participation in the study as shown when examining changes in participants who completed the post-intervention questionnaire, and for those who completed the questionnaire and Foundation Level-1 of Headspace. With increased participation, there were greater improvements in mindfulness and perceived stress, and improvements in work-life balance and the emotional energies of job engagement. The samples obtained for this study were: Full ITT (125 out of aimed sample of 128); T2 Completer sub-sample (101); and Practitioner sub-sample (87) giving reasonable power to detect medium effect sizes.

**Study 2: Longitudinal study of the longer term usage of a mindfulness-based intervention: usage as a predictor of outcomes at 12 months follow-up.**

The hypothesis for Headspace usage prediction results was partially supported. Increased Headspace usage significantly predicted small improvements in satisfaction with work-life balance and with emotional job-engagement. There were no significant results for the remaining outcomes. This study recorded Headspace app usage over 12-months and obtained a sample (60) exceeding the aim for the sample size (55) allowing a reasonable power for detecting medium effect sizes.

**Study 3: Employees’ experiences of a mindfulness-based intervention: A qualitative study at 12 months.**

Three themes representing the experiences of the participants were identified: (a) participants’ challenges in the workplace, (b) changes in participants’ internal selective focus facilitated by applying mindfulness techniques, and (c) the impact of practicing mindfulness on work and related home life. Participants’ descriptions indicated that they noticed an improvement as result of the mindfulness training and by applying techniques in their work environments. After mindfulness training participants more selectively focussed on their responses to negative workplace challenges with resulting improvements to their work relationships and the execution of work tasks. Participants recounted situations where improvements in their work-lives spilled over into their personal lives.
Existing literature that is relevant to this thesis.

Past research which is supported by the results of each study is summarised below.

**Study 1: A randomised control trial of the impact of a mindfulness-based intervention on workplace outcomes.**

The Study 1 Full ITT sample results for mindfulness outcomes were significant in part and support the mixed results (intention-to-treat; ITT) in the Aikens et al. (2014) randomised-control-trial (RCT) study where four of five mindfulness facets were significantly higher (nonjudgment was the exception) after a 7-week, mixed delivery intervention with employees of an American chemical company. The two studies reported significant results for different facets which might be attributed to differences in the intervention content and structure or sample population.

The significant improvement in perceived stress (decreased) for the Full ITT sample supports ITT results in the Aikens et al. (2014), Allexandre et al. (2016), Huang et al. (2015), and Wolever et al. (2012) workplace RCT studies which showed significantly lower levels of perceived stress. All studies had different interventions, and sample characteristics and sizes.

There were few workplace MBI studies using ITT analysis of the work-related outcomes analysed in this thesis. The Full ITT sample results support two studies (van Berkel et al., 2014; West et al., 2014) which used ITT analysis on job engagement but the studies used different measures, interventions (the two studies incorporated group sessions during working hours) and the study durations were longer (six and nine months respectively). The three studies reported a lack of significant positive job engagement outcomes.

The Study 1 ITT analysis indicated that offering Headspace does not make a statistically significant impact on the work-related outcomes measured although in the Practitioners sample, there were significant differences in work-life balance and the emotional factor of job engagement between participants who completed Headspace Foundation Level-1 and those assigned to the waitlisted control group. The Practitioners sample work-life balance results support the findings of the Michel et al. (2014) RCT study which analysed differences between intervention compliant and WLC groups — both studies used the same measure (Valcour, 2007). Michel et al. (2014) used a different intervention (3-
week online), and had different sample population sizes \((N = 246)\) and characteristics (cross-section of employees from German companies). The Practitioners sample results for job engagement (emotional) partially supports the significant results of two workplace studies which used different measurements of total engagement and different 8-week interventions (Klatt et al., 2015; Leroy et al., 2013).

In summary, the findings of Study 1 supported a number of workplace studies. Perceived stress was the most common outcome examined in literature relevant to this study. This may reflect the focus of organisation and workplace studies, or that MBIs are commonly associated with stress related conditions since mindfulness-based stress reduction (MBSR) is one of the original MBIs. The Lomas et al. (2017) review of workplace literature made a number of observations about mindfulness-based intervention studies, and recommended improvements. As discussed below, this study is compared with some of the improvement points raised by Lomas et al. (2017).

Lomas et al. (2017) noted that of the 112 intervention studies, only 44% were randomised control trials and that future research could be improved by adopting RCT designs that include active control groups, with large sample sizes. This study partially satisfies this improvement suggestion in that the design is a RCT. The Full ITT sample obtained was 98% of the sample size needed to detect a medium effect size; however the control group was waitlisted, not active since this was a pragmatic study which examined the impact of providing a mindfulness app within an organisation.

The Lomas et al. (2017) review noted that intervention studies had considerable heterogeneity in study designs, especially interventions and outcome measures and they recommended the use of established MBIs (rather than customised). The heterogeneity of MBIs is reflected in the literature linked to this study, with interventions which were MBSR, modified MBSR and MBCT, and specially developed curriculums for studies. Of the literature relevant to the ITT results in this study, two studies used MBIs that were primarily self-help with no supplementary guidance (Alexandre et al., 2016; Michel et al., 2014). In using the commercially available app, Headspace, without supplementary guidance as the MBSH intervention, this thesis reduced the risk of developing and using an untried digital application. The Practitioner results for mindfulness partially supported a study which used the Headspace app (Morrison Wylde et al., 2017). Differences in intervention content and duration have been cited as potential explanations for differences in study results. Where
possible, results of this study were compared to literature using the same outcomes however differences in measures may have contributed to differences in results. Also, this study recommended the use of multi-faceted measures for more complex outcomes such as mindfulness, job engagement, and curiosity since significant results could vary at facet level and be present at facet level even if not at total.

**Study 2: Longitudinal study of the longer term impact of a mindfulness-based intervention: predictor of outcomes at 12 months follow-up.**

Studies were found that analysed mindfulness-based intervention (MBI) program usage impact on mindfulness and perceived stress however at the time of writing few studies had examined the usage impact on work-related outcomes. Past research which is supported by the results of this study is discussed below.

The non-significant increase in the total and five facets of mindfulness in 12 months partially supports a study by Stanley et al. (2011) who found that the amount of self-reported non-group, audio guided practice significantly predicted an increased change in total mindfulness (FFMQ) but none of the mindfulness facets over the much shorter duration of 8-weeks. Partial differences in results may be due to the shorter duration and the self-reported rather than recorded actual amount of practice in the Stanley et al. (2011) study.

The non-significant decrease in perceived stress supports the non-significant improvements in three studies (Allexandre et al., 2016; Ribeiro et al., 2018; Stanley et al., 2011). All studies used the full or short versions of the same measure (PSS) but the cited studies analysed “dosage” over much shorter durations of 6-weeks and 16-weeks compared with the current study. Two studies used self-reported practice and one study (Ribeiro et al., 2018) used recorded app usage. The interventions and sample populations differed, where the Allexandre et al. (2016) study analysed “dosage” at 8-weeks follow-up using an 8-week online intervention for call centre employees, the Ribeiro et al. (2018) intervention supplemented individual weekly sessions with a training app over 6-weeks for older adults, and Stanley et al. (2011) intervention used an 8-week MBSR customised for the military. Despite these differences, there were non-significant improvements in perceived stress.

Only workplace studies examining the impact on total work engagement from mindfulness intervention usage were found. The non-significant results of Study 2 supported two workplace studies, Leroy et al. (2013) and van Berkel et al. (2014). The Leroy et al.
(2013) study used an 8-week MBSR intervention, analysing self-reported practice at post-intervention and 4-months follow-up. van Berkel et al. (2014) designed a six month mixed delivery intervention, analysing results of instructor-led attendance at 12-months follow-up. The consistency of results regardless of research method indicate that the amount of mindfulness practice and training do not significantly change measures of total job engagement.

It is noteworthy that, with the exception of one study (van Berkel et al., 2014), the durations analysed were much shorter in literature linked to this study. Additionally, studies used primarily self-reported accounts of practice and there were few MBSH app interventions. Study 2 of this thesis included speculations about possible mindfulness mechanisms which might explain work-related outcome changes when past research on intervention usage was unavailable for comparison (e.g., work-life balance, organisational citizenship behaviour, curiosity, and intention to leave). For example, there was a small, but significant change in increased work-life-balance in the current study. In seeking to understand possible mechanisms which might explain the significant change, this study referred to a study by Michel et al. (2014). They suggested that mindfulness training can improve self-regulation of attention and develop a decentered perspective of events which can help individual employees to use a cognitive-emotional strategy to separate work from home life by helping to create and manage boundaries between the two.

**Study 3: Employees’ experiences of a mindfulness-based intervention: A qualitative study at 12 months.**

Participants’ descriptions of their experiences following mindfulness training (e.g., two themes: improved selective focus, and work-related impact of mindfulness) supported some of the experiences documented in other studies.

Participants’ descriptions of feeling calmer with an enhanced ability to detect stress triggers and to control work situations support participants’ recounting in many mindfulness studies (Banerjee et al., 2017; Laurie & Blandford, 2016; Wongtongkam et al., 2017). Although the Laurie and Blandford (2016) study was conducted with adults in the general population, it used Headspace as the intervention and reported increased levels of calmness. Participants in the other two workplace studies reported increased calmness and control at work. In particular, the reduced expressions of anger following mindfulness training in this
thesis supported the findings in other qualitative workplace studies (Bergman et al., 2016; Slatyer et al., 2018).

Some participants in this study shifted their perception of responsibility for events. This shift helped them to attribute responsibility for tasks more appropriately and develop self-compassion which contributed to a sense of increased control and improved their coping skills so they no longer avoided challenging situations. A. B. Allen and Leary (2010) suggested that people can develop self-compassion and that self-compassionate people rely less on avoidance coping with negative events and more on positive cognitive restructuring which enables individuals to be mindfully aware of stressful situations and cognitively accepting of them. The changes recounted by participants in this study support the speculation of A. B. Allen and Leary (2010) that when individuals perceive they are in control in situations, they may take action to resolve issues. The participants’ actions in the case of this study included taking steps that improved their relationships with colleagues and line managers, their workload and work-life-balance.

**Summary.**

In summary, existing literature highlighted a number of gaps in the research on mindfulness-based interventions and the workplace. These gaps are discussed before summarising the thesis results and achievements in addressing the gaps.

MBI research focusing on mindfulness and stress outcomes is mature and the quantitative results for these two outcomes supported the findings of a number of other studies. However, during the process of comparing previous literature to this thesis, it became clear that there continues to be a limited number of quantitative studies which examine MBIs and their impact on work-related outcomes in particular. This view is reinforced by recommendations made in recent reviews of literature in this area which suggest that future research address work outcomes such as job engagement.

Additionally, there were few randomised control trials analysing ITT results, and even fewer studies examining dosage effects on work-related outcomes and these studies tended to be of a short duration. There were a variety of MBIs used in the studies, few of which used MBSH with no supplementary guidance. The heterogeneity of MBIs and measures used in studies, combined with small sample sizes (thus potentially under-powered effect sizes) is a challenge when assessing the studies for their relevance to the results in this thesis. Some of
these issues have been raised in reviews of literature which have recommended improvements to research design (e.g., conduct RCT studies, use active controls, determine by a priori power calculations sufficiently large sample sizes required, and use established MBIs).

The findings presented in this thesis provide support for the effectiveness of brief mindfulness-based training in increasing mindfulness and decreasing perceived stress. The thesis contributes to research on individual level stress management interventions for the workplace with the finding that those who use a training app to learn mindfulness techniques and concepts can improve their work-life balance and the emotional aspect of job engagement within two months. Furthermore, with increased use of a training app, the two work-related improvements can be predicted over a prolonged period of time (one year), although improvements in other work-related outcomes (organisational citizenship behaviour, curiosity, intention to quit, and total job engagement), mindfulness and perceived stress do not. The qualitative results of this thesis supported the findings of many other workplace studies which examined mindfulness-based interventions. However, in the qualitative study there were a few participants who revealed that they had a history of experiencing strong anxiety symptoms and that, over time they had participated in other forms of intervention such as cognitive-behavioural therapy. Additionally, some of the meditation techniques had the effect of heightening their anxiety. Since most SMIs include an element of relaxation, it is possible for some individuals to experience relaxation-induced anxiety (RIA) and this can occur with clinical patients diagnosed with chronic anxiety who require supervised medical treatment. This reinforces the need to provide multiple interventions which utilise different strategies (e.g., somatic, mental, cognitive) to employees.

When considering these thesis outcomes and their implications, it is important to remember that one cannot place too much of the responsibility for the prevention, coping and management of stress on individual employees (Glazer, 2011). The results of this thesis should be considered with the caveat that individual level stress-management interventions are only effective when combined with interventions targeted at an organisational level such as the provision of clear job descriptions, a positive work environment (e.g., recognition and reward for employee achievements), and flexible work hours (Wheeler & Lyon, 1992). And as comments by participants in Study 3 of this thesis showed, the support of line managers (an example of individual and organisation interface stress-management interventions) can
help to reduce workplace stressors which might otherwise prevent employees from realising the full benefits of their endeavours to manage stress.

This thesis addressed many of the gaps and recommendations made in literature reviews of mindfulness interventions and the workplace (Eby et al., in press 2017; Lomas et al., 2017). A number of work-related outcomes were examined, including work-life balance, job engagement, organisational behaviour between individuals, curiosity and intention to quit. Concerns about research designs were addressed by using an RCT design (although the control group was waitlisted not active), and longitudinal design to examine intervention dosage as a predictor of outcomes. Additionally, data on mindfulness training usage for dosage was actual usage rather than based on self-reports. An established MBSH app, Headspace, was made available without supplementary guidance to ensure consistency of content delivery. Furthermore, Headspace had the highest average score of commercially available mindfulness-based apps reviewed for quality and features, and a trained Buddhist monk, Andy Puddicombe, was involved in the app’s development and delivery hence potentially providing an efficacious development of mindfulness. There were multiple statistical analytical methods used. Outcome measures (mindfulness, job engagement, curiosity) were analysed by facets (where available) as well as total levels.

Methodological limitations.

The present study provided evidence for the impact of the mindfulness-based intervention on workplace outcomes using a RCT design, a 12-month follow-up for an app usage (dosage) analysis, and detailed qualitative interviews. There are some problems however that need to be considered.

Limitations of the two quantitative studies are discussed, followed by limitations of the study which analysed qualitative data.

Quantitative studies limitations.

A limitation was the sample ($N = 101$) of participants obtained who completed Study 1 due to a 19% participant dropout at T2 (2-months). It is not possible to know how this impacted the variability and effect sizes although it seems most likely that it would have reduced both. The small effect sizes for some of the results made it difficult, for some outcomes, to detect if changes over time were real, or if results were due to sampling error. However in mitigation of this limitation, the use of a randomised waitlisted control design,
and the analysis which imputed missing T2 data enabled conclusions to be drawn regarding the take-up and the likely impact on mindfulness and perceived stress in the employee population of the offer of Headspace (ITT sample \( N = 125 \)). The inclusion of two separate subsamples, T2 Completers and Practitioners suggest that the drop-out rate did not compromise the reported results.

The sample obtained (\( N = 60 \)) in the 12 month follow-up (T3 in Study 2) exceeded the aim (i.e., 55) however, the small effect sizes indicated that a larger sample size would be required in future research. The retention (to T2) in the control group was high (89%) despite participants being waitlisted for the intervention. The offer of a 12-months Headspace subscription at the end of two months may have been sufficient incentive for participants to complete the T2 questionnaire.

One potential limitation is that study outcomes were measured by self-reports since self-reports can be subject to several sources of bias, including social desirability bias (Chan, 2008). However steps were taken to mitigate this risk: (a) construct validity evidence for measures was provided, (b) intervention group participants were encouraged to complete questionnaires irrespective of their use of Headspace to minimise the potential for participants to elevate their mindfulness scores since the data used for the analysis was collected in the context of focusing on other outcomes, (c) work-related outcome topics were not shared with participants in the recruitment material and Information Sheet so there was no indication of how to respond to questions, and (d) app usage data were provided by Headspace.

The 12-months app usage (dosage) follow-up in Study 2 gathered limited supplementary mindfulness practice amount data. It is plausible that combined app usage and additional practice could have raised the level of mindfulness in low Headspace usage participants and this may have influenced the outcome results which were analysed by Headspace usage only. Obtaining an accurate measure of mindfulness practice is a challenge for longitudinal studies. In this thesis, participants self-reported the amount of non-Headspace mindfulness practice during the study by selecting a usage category (ranging from ‘not at all’ to ‘a great deal’). A recommendation for future research is to investigate and select an efficient and reliable method of obtaining an accurate record of the amount of supplementary mindfulness practice during a long intervention study.
Qualitative study limitations.

When answering interview questions in Study 3, participants may have been positively biased since they volunteered for the interview study after completing the 12 month intervention and T3 questionnaire. However, participants described issues that they sometimes encountered with certain mindfulness techniques, they were open about other forms of mental support that they had received (e.g., CBT), and made clear attributions to Headspace when giving examples of their changed experiences.

Participants’ experiences of trying multiple stress-management interventions should not be unexpected since people may try a number of options before finding an approach which is effective for them (Lazarus, 1984). With this understanding, and from the experiences with multiple interventions expressed by some participants in Study 3, future research could consider comparing the efficacy of different types of stress-management interventions for employees with differing levels of a psychological measure such as anxiety or stress levels. For example, Singh and Gorey (2018) recommended further research on the comparative effectiveness of cognitive-behavioural skills (CBI) and mindfulness (MBI) interventions.

Although not directly addressing the research question for Study 3, a limitation of this thesis is that it did not study the user engagement experiences with the Headspace app over the 12 months. However, participant comments about the obstacles they encountered when engaging in mindfulness training and practice were noted since it could have accounted for differences in participant use of the app. The most often cited reasons were insufficient time and the difficulty in establishing a routine. Laurie and Blandford (2016) conducted a qualitative study of user experiences with Headspace by interviewing employed adults before and 30 to 40 days after subscription enrolment. Laurie and Blandford (2016) found a number of enablers and obstacles in using Headspace. Primary obstacles were time pressures and issues with establishing routines, views which are consistent with those expressed in Study 3. Social context (e.g., the views of others or the meditation time shared with a partner) was an enabler and obstacle in the Laurie and Blandford (2016) study. In Study 3, examples containing a social context had a negative impact for some participants whereby they no longer walked with their work colleagues so that they could use Headspace and practice mindfulness, and where the death of a pet who was present during Headspace practice time caused a participant to stop using Headspace. Because Laurie and Blandford (2016) interviewed participants before they used Headspace, their study was able to analyse the
influence of participant intentions on their actual usage. Although some Study 3 participants shared their retrospective thoughts about initial intentions and goals in using Headspace, this was not an objective of this study so pre-intervention interviews were not conducted and data for analysis were limited. Future research on MBSH apps could consider including pre-intervention interviews to gain a fuller perspective of participant experiences and the changes in their views since this may help to explain study outcomes as well as helping researchers to gain further insight on what can motivate employees to participate in the well-being interventions offered by organisations since this remains an ongoing issue (Parks & Steelman, 2008; Richardson, 2017).

Implications for research and practice.

Research implications for each type of outcome (mindfulness, health- and work-related) are discussed.

Implications for mindfulness.

In the RCT study of this thesis, the intervention group showed a significant improvement in mindfulness two months after the offer of the mindfulness-based self-help (MBSH) app, Headspace® compared to the waitlist control. The effectiveness of self-help interventions is an area of interest in research. The Cavanagh et al. (2014) meta-analysis of self-help mindfulness- and acceptance-based interventions found that self-help interventions significantly increased mindfulness and acceptance. The results of this thesis demonstrate the short-term (2-months) effectiveness of MBSH apps, such as Headspace, in increasing mindfulness in a university employee population. MBSH apps require minimal trainer/practitioner resources and this satisfies organisations’ need for cost-effective delivery options. However, the 12 month longitudinal study of this thesis looked at how the Headspace app usage (dosage) predicted change in outcomes, and dosage did not predict a significant change in mindfulness. Therefore, further research is needed to determine the degree to which the specific content and delivery of an MBSH, or the offer promotion program is most efficacious in the long-term, and this could be examined in conjunction with the pattern of app usage.
Implications for health: perceived stress.

ITT results of workplace studies on the effect of MBIs on perceived stress are mixed. Some studies report significant improvements (Aikens et al., 2014; Allexandre et al., 2016; Wolever et al., 2012) and others not (Duchemin et al., 2015; West et al., 2014). This thesis showed a significant improvement in perceived stress resulting from the offer of the Headspace app. Furthermore, if employees completed the first 10 sessions of Foundation 1, which are available to the general public, the improvement was even greater. However, like the mindfulness results in this thesis, Headspace app usage (dosage) did not predict a significant change in perceived stress at 12 months. “Dosage” results in existing literature are mixed, although all relevant studies analysed dosage after a shorter post-intervention period than Study 2 of this thesis. The reasons for the non-significant 12 months dosage result in this thesis are unclear. Further research on the attributes of the MBSH (Headspace), the promotion program over extended periods (e.g., 12 months), and pattern of app usage is suggested. Qualitative studies examining adult engagement with MBSH interventions usually have been conducted after interventions of brief (e.g., 4 to 8 weeks) durations (Banerjee et al., 2017; Chittaro & Vianello, 2016; Hugh-Jones et al., 2018; Laurie & Blandford, 2016). The experiences and associated recommendations for short-term versus longer-term use of MBSH apps might be different. Over extended periods of time, issues of mindfulness practice and applying mindfulness techniques rather than issues of app content and delivery might be more important.

Implications for work-related outcomes.

Results in this thesis clearly show that just the offer of a mindfulness-based app such as Headspace, appears insufficient to make a significant difference in employee work-related outcomes. It may appear to be an obvious statement but: an app must be used if work-related outcomes are to show improvements.

Of the work-related outcomes investigated in this thesis, two significantly benefited from participants’ more extensive Headspace use over 12-months: work-life balance, and emotional job engagement.

Significant improvements in work-life balance for Headspace usage supported a workplace MBI, RCT study (Michel et al., 2014). When examining the relationship of dispositional mindfulness (MAAS; Brown & Ryan, 2003) and work-life balance, T. D. Allen and Kiburz (2012) found that the link was indirect through the mediators of sleep quality and

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vitality. However, Michel et al. (2014) suggested that mindfulness training helps individual employees to use a cognitive-emotional strategy to separate work from home life by helping to create and manage boundaries between the two. The congruent example of Sue in Study 4 lends credence to the possibility that mindfulness training facilitates a cognitive-emotional strategy. Sue increased her work-life balance score over 12-months and stated that her mindfulness training helped her to take control over her concerns about impending retirement by developing a plan to maximise savings and start a part-time job in addition to her work at the university. Intervention rather than disposition studies can provide a more controlled method to examine the mechanisms linking mindfulness and work-life balance. The significant improvements in work-life balance for those who actively used Headspace over 2-months to 12-months in this thesis indicates work-life balance benefits from mindfulness-based interventions (MBI) so there is merit in further research on the relationship.

Past studies of the impact on total job engagement have been mixed, however the results of this thesis suggest that mindfulness may impact specific aspects of job engagement differently. The emotional aspects of job engagement were significantly improved but not the physical and cognitive aspects. Factorial differences would have been missed if the thesis examined total engagement only. Two studies which explored the impact of MBIs on total and sub-factor levels of job engagement found one engagement sub-factor contributed the greatest improvement in the total job engagement score (Aikens et al., 2014; Klatt et al., 2015). The measures used, and the contributing factors of the measures differed in the two studies. In the Klatt et al. (2015) study, vigor had the largest increase. Vigor indicates high energy levels and mental resilience at work (UWES-9; Schaufeli et al., 2006). In the Aikens et al. (2014) study, the physical strength factor of the Shirom Vigor Scale (Shirom, 2003) had a larger effect than emotional and cognitive energies. The differences in influential factors of job engagement are interesting. Rich et al. (2010) argue that the simultaneous activation of all three facets (physical, emotional, and cognitive) is required for job engagement. Study 4 in this thesis examined the congruency of interview quotes and total job engagement, not at sub-factor levels so it is difficult to draw conclusions. However, there are two examples of congruency in Study 4 which demonstrate how increased mindfulness can have different total job engagement results and this might support the Rich et al. (2010) argument that there is a mix of physical, emotional, and cognitive aspects in engagement. The example of Eve in Study 4 indicated that mindfulness helped Eve be more engaged in her job by acting with greater awareness and reducing her nervousness so she could better engage in the social demands of her job. The example of Joanna in Study 4 indicated that mindfulness helped her
to be less engaged in her job by acting with greater awareness and being less reactive. This enabled her to reduce the time she spent focusing on work and worrying about the work that needed to be accomplished each day. This highlights that a better understanding of the mindfulness mechanisms involved in job engagement is needed for future intervention research. Gunasekara and Zheng (2018) conducted a recent study examining dispositional mindfulness facets (Cognitive and Affective Mindfulness Scale-R; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007) and total job engagement (UWES-9 Schaufeli et al., 2006). Gunasekara and Zheng (2018) found that total job engagement had significant associations with total mindfulness, as well as the facets ‘attention’ and ‘acceptance’ but the associations with present focus and awareness facets were not significant. They suggested that the two significant facets, attention and acceptance are required for external interactions, whereas the two non-significant factors are more innate processes. They stated that being attentive rather than distracted at work is important for engagement and that having a non-judgmental attitude regarding tasks and people helps individuals to self-regulate during stressful situations, and this acceptance can contribute to increased work engagement. These studies demonstrate the different understandings that can be drawn of mindfulness mechanisms in relation to job engagement. This thesis, and the Aikens et al. (2014), and Klatt et al. (2015) studies indicate that there is a link between MBIs and job engagement, and that future MBI research would benefit from the development of a theoretical model, investigating at a sub-scale level for both mindfulness and job engagement to better understand the relationship.

In this thesis there were small, non-significant improvements in organisational-citizenship-behaviour at an individual level for participants who actively used Headspace over 2-months to 12-months. As these findings differ from the non-significant, negative results of a study by Giluk (2010) it is difficult to definitively state what impact MBIs have on this outcome. Allred (2012) found a significant association between high dispositional mindfulness, particularly the facets observe, describe and non-reactive, and high organisational behaviour at an individual level. Given the conflicting study results, one can conclude that it is too soon to eliminate the possibility of a link between the MBIs and organisational-citizenship-behaviour and that more research is required.

Research shows that job performance can be predicted by curiosity of employees at work (Mussel, 2013; Reio & Callahan, 2004). When developing the curiosity measure (CEI-II) used in this study, there was a strong correlation between the mindfulness observation facet (being open and attentive to internal and external stimuli; Baer et al., 2006b) and the curiosity embracing facet of CEI-II. However, changes in curiosity were non-significant in
both quantitative studies in this thesis. The lack of a significant increase in mindfulness observation facet in both studies may explain the non-significant increases in curiosity. Changes in curiosity may require an extended period of time to develop, however sufficient time was allowed for the development of curiosity in this thesis, which took snapshots at 2-months and 12-months after the offer of Headspace. Perhaps a more work-orientated measure of curiosity would have resulted in a different outcome. Mussel et al. (2012) developed a German work-related curiosity scale which provides a measure specific to the workplace as an alternative to other generalised curiosity measures, such as the 7-item version of the CEI measure used in this thesis, so salience of measurement wordings for research aims is important. And as the Study 4 congruency analysis results showed, some of the congruent quantitative and qualitative results could be explained by topics that were salient to participants. A curious mind can be valuable within the workplace, so a link between mindfulness training and its impact on curiosity merits further research.

Steel and Ovalle (1984) stated that employee intention to quit is a significant predictor of turnover. In both quantitative studies (at 2- and 12- months) of this thesis, there was a lack of significant improvement in the intention to quit. Research results linking mindfulness and reduced turnover intention were made in a number of studies (Andrews et al., 2014; Dane & Brummel, 2014; Reb et al., 2017; Zivnuska et al., 2016). However, some of the studies suggested that the link was indirect (Reb et al., 2017; Zivnuska et al., 2016) which may explain the insignificant decrease in intention-to-quit despite the significant mindfulness increases at 2 months in Study 1. In a review of work-life balance research, Sirgy and Lee (2018) suggested that turnover intentions are a consequence of work-life balance. In this thesis there were significant improvements in work-life balance for those who actively used Headspace over 2-months to 12-months so the lack of significant improvement in the intention to quit is unexpected. Exploring mediating factors in the relationship between mindfulness and the intention to quit may prove to be more fruitful in future research.
Conclusion

The findings presented in this thesis provide support for the effectiveness of a brief mindfulness-based training intervention in increasing mindfulness and decreasing perceived stress. The thesis contributes to workplace specific research with the finding that those who use a training app to learn mindfulness techniques and concepts can improve their work-life balance and the emotional aspect of job engagement within two months. Furthermore, the two work-related improvements were predicted by dosage over a prolonged period of time (one year), although dosage did not predict improvements in mindfulness and perceived stress and other work-related outcomes (organisational citizenship behaviour, curiosity, intention to quit, and total, physical and cognitive job engagement). More research is recommended to understand the mechanisms underlying the relationship of mindfulness and the two work-related outcomes, work-life balance and job engagement, since they were the most promising outcomes of this thesis.

Additionally, this thesis contributes to nascent research on the use of digital smartphone apps as an effective delivery method of mindfulness-based training without the need for supplementary guidance. Apps such as Headspace can deliver training more cost-effectively, with a consistent level of quality, and with the flexibility that many employees need to fit around their busy work and personal lives. Improvements in the four outcomes were possible within two months for employees using the first 10 free sessions of Headspace. This makes it feasible for employers to contain their expenses and to consider subsidising annual subscriptions for those who complete the first, free Headspace foundation level. If possible, future longitudinal studies using digital apps should gather data on the combined amount of training and home-practice required for the study outcomes. The analysis of congruence between quantitative and qualitative results in this thesis was novel for this research area. The analysis provided a richer understanding of employees’ experiences as a result of using Headspace and provided speculations about reasons why changes in some mindfulness facets may have contributed to changes in work-related outcomes.

The conclusion of this thesis is that Headspace® is an efficacious mindfulness-based training app that can increase mindfulness and improve perceived stress, work-life balance and emotional job engagement, and that these results should help universities who are considering investments in individual level stress-management interventions for their employees as part of their wellbeing programs.
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