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**Investigating the effects of an ACT-based mobile application on
stress, anxiety, and burnout in the workplace**

A thesis

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of the requirements for the Degree of
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By

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Abstract

Acceptance and Commitment Therapy (ACT) is a third-generation therapy that teaches individuals to accept their internal thoughts and feelings instead of modifying or challenging them. The main aim of ACT is to encourage individuals to develop cognitive flexibility when faced with challenging situations. ACTcompanion® application is based on the principles of ACT. The app has a number of exercises to help develop skills that would benefit the user in effective coping during stressful times. I used a single subject A-B-A design with 10 participants to examine the effectiveness of the ACTcompanion® app in reducing stress, anxiety, and burnout at workplaces. Most participants showed a noticeable decrease in their daily anxiety levels. Participants also showed improvements in their level of stress, mindfulness, exhaustion, affect, and depression. Overall, the results of the current study support the ACTcompanion® app as a good option for reducing anxiety and improving wellbeing in the workplace.

Keywords: Acceptance and Commitment Therapy, Anxiety, work stress, burnout, ACTcompanion®

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Introduction

Mental ill health among employees negatively impacts employee motivation, interest, and their capacity to perform tasks which, in turn, impacts workplace efficacy leading to lower productivity rate, increased sickness, and absenteeism (Stratton et al., 2017). Workplace mental health issues are a source of a wide range of problems, including physical issues such as hypertension, heart disease, back pain, headache, and migraine as well as psychological problems contributing to chronic stress, anxiety (Largo-Wight, Chen, Dodd, & Weiler, 2011; Rajgopal, 2010), and exhaustion. The individual's prolonged exposure to stressors at work can lead to burnout which is a strong predictor of many health-related issues (Maslach, 2003; Maslach, Schaufeli, & Leiter, 2001; Portoghese et al., 2014). Stress is a major global health issue (Ly, Asplund, & Andersson, 2014). Stress from one part of life can disseminate into others and lead to stress-related serious illnesses (Michie, 2002). Many people experience stress but it is important that an individual recognises the stress affecting them and find rational ways to cope with them. Given that the majority of the people spend a great deal of time at a workplace, it has become an ideal place for supporting and executing interventions to improve workplace mental health concerns (Tan, 2014). Many organisations are now recognising the importance of individual mental health to create a positive workplace culture for the person, which also benefits the productivity of the organisation (Robyn et al., 2017). Interventions focussing on reducing stress and anxiety, and promoting better coping strategies to combat stressful events have been efficacious in reducing work stress and absenteeism (Wahlbeck, 2015).

Over recent years, there has been widespread use of ehealth interventions that focus on improving various mental health conditions through applications (apps) on smart phones and through the internet (Stratton et al., 2017). The World Health Organisation (WHO) has discussed

the potential that technology such as internet, smart phones, computers, and patient monitoring devices have on improving lifestyle and wellbeing, creating better accessibility, for learning and training professionals as well as clients, monitoring client's progress and so on (Sloninsky & Michael, 2008).

Tate, Wing, and Winett (2001) explored the efficacy of computer-based interventions for treating a number of health issues like obesity, alcohol and substance use, and suicide ideation. To counter health imbalances and serious mental health issues that hinder people's lives, researchers, along with clinicians, are moving at a fast pace to develop interventions through digital media (Naslund, Aschbrenner, & Bartels, 2016).

Globally, about 3.5 billion people use mobile phones and more than half of them are social media users (Naslund, Aschbrenner, & Bartels, 2016). The availability of health care apps has exploded as people attempt to overcome problems in their lives in both developed and less developed countries (Osma, Barrera, & Ramphos, 2016). Increasing app use could be due to the minimal cost to download an app compared to exorbitant payments for an hour of doctor visit. eHealth options are also convenient in a climate where there are lack of therapists, when people cannot afford insurance, and when there is a long waitlist for therapy (Lui, Marcus, & Barry, 2017). The modern trend of using technology as a part of the treatment process has powered the expansion of traditional treatment practices from the therapists' office to integrating it as a part of a person's daily schedule (Schueller, Aguilera, & Mohr, 2017). However, it is important to be aware of how such digital supportive interventions are being put to use in the treatment of serious illnesses (Naslund, Aschbrenner, & Bartels, 2016). Recently, there has been a growing interest in the use of mobile apps, especially within the healthcare sector, indicating many positive effects and the popularity it has gained in mitigating serious illnesses and in bringing

about wellbeing (Boulos et al., 2014; Nasi, Cucciniello, & Guerrazzi, 2015; Ventola, 2014). The far reach and availability of the internet has put a number of eHealth interventions in a favourable position.

Literature Review

Stress, Anxiety, Workplace Stress, and Burnout

Stress. Moving to New Zealand from India to study was challenging yet exciting for me. I initially thought it would be very easy, but being apart, and the issue of time difference, made it harder to keep in touch with my family and friends back home. This initial loneliness was very stressful to me and I felt emotionally weak until I developed friends here and started work. During the first half of my initial year in NZ, I went through a lot of ups and downs on a practical and emotional level. Being prone to experiencing stress, this emotional feeling took a toll on me and the slightest pressures at University would stress me out even more. It also made me feel negative about the whole experience of moving abroad, which made me become more reserved, and hence I preferred staying home most days. However, my inner traits of being more open, flexible, and accommodating helped me cope positively with the stress of being away because I explored different activities and met new people which kept me from constantly feeling physically and emotionally strained.

Stress is inevitable and is part of our everyday life. Stress is a condition caused by the effect of an event that changes the internal milieu of the person. Constant disruption in the homeostasis in the body causes stress (Oken, Chamine, & Wakeland, 2015; Schneiderman, Ironson, & Siegel, 2005). A stress response is the way an individual responds to any actual or perceived threat that is a stressor (Schneiderman et al., 2005). However, stress is not a one-dimensional concept but is a syndrome that includes physical, psychological, emotional,

behavioural, and cognitive factors. In a stressful situation, these factors may help the individual to be more vigilant and adapt to the demands that arise in order to maintain their personal wellbeing (Ashkanasy, Ashton-James, & Jordan, 2003). Personal wellbeing is attained when there is a balance between the demands of the person and the environment (Ashkanasy, Ashton-James, & Jordan, 2003).

When an individual is faced with a stressful situation, the body's nervous system takes charge to guard itself. The sympathetic nervous system (SNS) puts the body in a situation where the body becomes involuntarily frozen. The SNS signals the adrenal glands to secrete adrenaline, responsible for creating physiological changes in response to stressful situations, and cortisol, a hormone that helps the body respond to stress by controlling the immune system, into the blood stream to evoke the physiological reactions where the body gathers all the resources to cope with the emergency (Stults-Kolehmainen & Sinha, 2014). Ongoing stress causes regular wear and tear of the nervous system which can result in long-term negative effects. The increased level of blood sugar in the body resulting from the constant release of cortisol causes redundancy of the immune system as it keeps weakening over time and hence the body becomes susceptible to various health conditions like cardiovascular disease, blood pressure, anxiety, depression, emotional and other mental health disorders (Kivimäki, 2010; Torres & Nowson, 2007).

Stress starts to become detrimental when external demands overpower the individual's perceived capacity to respond appropriately, leading to negative consequences. The ability to cope with internal (thoughts, feelings, attitudes) and external demands (job, trauma, relationships) is essential for an individual to survive (Samira et al., 2015). The personality of the person influences the intensity of stress as it depends on the way the person perceives the stress. Some are more susceptible to stress and unable to cope with it, while other people do experience

stress but are capable of handling it (Afshar et al., 2015; Judge & Klinger, 2008). Some individuals also resort to behaviours like drinking alcohol, eating, and smoking as a way of (non-effective) coping (Torres & Nowson, 2007).

It is often believed that stress improves productivity and some amount of stress is required for any person to perform (Bickford, 2005). Some stress is essential in our lives to keep us active and alert. A monotonous repertoire would be boring without any challenges and hence our level of satisfaction and self-esteem or self-worth might deteriorate without challenges to overcome. For instance, if our work or study life had no deadlines or expectations, we would be less motivated and challenged to move ahead. Our bodies are also built with an adaptive recovery process to regain homeostasis, especially when stressors are prolonged, unexpected, and of a high intensity that would result in some form of physiological, biochemical, and cognitive as well as behavioural upheaval (Stults-Kolehmainen & Sinha, 2014).

Seyle (1976) explained his stress model on how an individual would respond when faced with a stressor. He described the three-stage process in responding to a stressor called the General Adaptation Syndrome. When the body is at a threat, the initial reaction of the body is the alarm stage, where the sympathetic nervous system is activated and is positioned for either flight or fight. Second is the resistance stage where the parasympathetic nervous system tries to regain normalcy after responding to the stressor, as most of the bodily resources have been used. However, the body is now on high alert and prepares to fight any more stressors that might arise. The last stage is exhaustion where the stressor remains for a sustained period of time and the bodily energy is used up and is unable to combat any further. This stage leads to increased and prolonged stress leading to burnout and other health-related problems unless addressed at the right time. The problem lies when a person fails to understand when the level of stress becomes

overwhelming and starts affecting other arenas of one's life. Work related stress has a direct impact on the employee in terms of increased sick leaves and decreased productivity which also financially affects the organisation (Bickford, 2005).

Anxiety. Uncertainty of what to expect is a major cause of anxiety (Grupe & Nitschke, 2013). Taking a workplace scenario, if the organisation is planning on restructuring roles, job security will be one of the first factors for an employee to be anxious about (Nella et al., 2015). Anxiety is one of the most common disorders associated with affective, cognitive, and behavioural change (Trivedi & Gupta, 2010).

Anxiety disorders include a range of disorders such as panic disorder, Generalized Anxiety Disorder (GAD), social anxiety, phobias and separation anxiety, leading to adverse health effects (Bandelow & Michaelis, 2015). Anxiety can be maladaptive and make attention to tasks difficult as well as adaptive as it makes us alert and aware of what is to be expected (Robinson, Vytal, Cornwell, & Grillon, 2013).

Our beliefs, emotional and physiological reactions, and coping strategies work together for effective management when dealing with an anxious situation (Bystritsky, 2013). Fear or anxiety is caused when there is an association with an aversive situation and any contact with anything related to that aversive situation can elicit fear reaction (Steimer, 2002). Fear and anxiety are often used interchangeably as fear is an avoidant defensive reaction to any situation that poses as a threat. The emotional response of anxiety is accompanied by physiological and behavioural changes in the body (Shin & Liberzon, 2010).

Spielberger (1972) introduced two constructs of anxiety; trait and state anxiety. State anxiety refers to the psychological and physiological reaction to danger (Pollyana et al., 2017). This, for example could be a normal response of an employee when the news of restructuring is

announced without the employee being reassured. Trait anxiety refers to the individual's proneness to responding to a perceived threat. People with high trait anxiety would experience greater levels of anxiety than others hence some employees would be more anxious about the restructuring as compared to others as each employee has a different propensity to experiencing high or low level of anxiety (Cheng & McCarthy, 2018).

Another important symptom of anxiety is worry, which is also a prominent feature of Generalized Anxiety Syndrome (GAD) (Eagleson et al., 2016). Worry involves negative associations, as the thoughts that run through our mind when we worry are mainly negative things, either anticipating the future or negative emotions about a future event (Grupe & Nitschke, 2013; Hirsch & Mathews, 2012). Individuals who constantly engage in worrisome thoughts have very low tolerance to uncertainty and interpret any miscellaneous event that is unrelated to the person with negative emotions, which increases anxiety and depressive symptoms (Mathews & MacLeod, 2005; Wu et al., 2015).

Individuals with GAD show higher trait anxiety (Hirsch et al., 2013) and find it hard to recover from negative mood states and demonstrate more anxiety and sadness than ability to maintain or regulate their emotions (Mennin et al., 2005). Individuals who have prolonged anxiety disorders also have a higher risk of developing depression at some point in their life, as anxiety disorders and depression are frequently co-morbid diagnoses (Coplan et al., 2015; Kaufman & Charney, 2000; Wu & Fang, 2014).

Workplace is central to a person's life and is a major influence on a person's well being. Muschalla et al. (2013) explored the negative effect of job anxiety that leads to long-term sickness, absence from work and, irrational decision-making. Sanderson et al. (2006) discussed

the problems of health-related issues among employees leading to decreased productivity and more importantly increased risk for accidents by working when they are unfit.

McLaughlin and colleagues (2011) found that individuals who have difficulties with expressing and controlling their emotions have a higher chance of developing anxiety and aggressive behavior. Research indicates a positive association between individuals who hold irrational beliefs about their workplace or colleagues and various forms of anxiety like trait, state, generalized anxiety disorder, as well as depression (Ciarrochi, Said, & Deane, 2005; Turner, 2016; Wijhe, Peeters, & Schaufeli, 2013).

Work stress and Burnout. The experience of stress depends on the intensity and duration of the stressor, and availability of resources as well as support in performing a given task (Ashkanasy, Ashton-James, & Jordan, 2003).

Stress of high intensity and duration can lead to frustration and exhaustion, leading to burnout, a syndrome that was explored by Freudenberg (1974). Burnout has gained recognition only recently as, earlier, people failed to consider it as a legitimate phenomenon. However, as a result of growing research and awareness, burnout has come to be recognised as a serious social issue (Maslach, Schaufeli, & Leiter, 2001).

Earlier, burnout was considered to be a personal issue and hence the main focus of concern was with a person's personality dispositions, family history, and socio-economic background. With a number of researchers working in this area, the burnout framework has been expanded to include the workplace as a major source of stress leading to burnout (Lasalvia, 2009).

Burnout is considered to be a syndrome encompassing three factors; emotional exhaustion, which is when a person is emotionally and physically drained with no motivation to face another

day at work; depersonalisation, referred to as cynicism is a feeling of detachment towards one's work; and a low sense of achievement characterised by feeling of incompetence and low productivity. All these factors interfere with the individual's performance at work (Paterson & Adams, 2011). Extreme cynicism and exhaustion leads to burnout (Bakker & Costa, 2014).

The transactional model of burnout shows the interaction between the demands of the environment and the way in which an individual perceives and reacts to stress (Mark & Smith, 2012). Burnout might at times create a spill over into family life dynamics, as work life might interfere with family responsibilities (Alarcon, 2011). After prolonged stress, a person might feel fatigued and would find opportunities to distance themselves from their place of work.

When the individual performs over and above their capacity despite their stress, their personal energy deteriorates over time, unless it is replenished. Investing energy with no returns over a sustained period leads to emotional and physical exhaustion and cognitive difficulties (Saboonchi, Perski, & Grossi, 2012). Burnout could also result when the individual has ineffective coping strategies to deal with the challenging work environment (Montero-Marín et al., 2014). Research shows that employees who work within the sector related to helping people experience increased levels of burnout, as the job demands in such a field are long-term and challenging, given the frequency of closely engaging with people's problems (Kirk-Brown & Wallace, 2004).

Due to the strain of working under strenuous conditions, people would find interacting with others to be an additional burden and hence drift away from any social interaction, which in turn leads to emotional exhaustion as there is no path to let out one's emotions. Saboonchi, Perski, and Grossi (2012) found that when daily tension and stress mounts up at work, it leads to physical fatigue, disrupting the person's ability to execute and complete tasks. Deadlines add

more pressure to the existing stress that trickles down to result in low motivation, lack of concentration and memory power, and ultimately a downside spiral in one's performance.

Coping strategies. The coping strategies used to deal with stressors vary for each person and their ability to cope also depends on their level of resilience. Stress is experienced when the demands of the job are too high which causes adverse effects on the individual's family life, child responsibilities, and soon becomes a vicious cycle (Michie, 2002). Anxiety disorders are a product of maladaptive thoughts and avoidant behaviour to escape from anxious symptoms.

One coping strategy used in the treatment of stress and anxiety disorders represents dealing with negative thoughts. This involves changing the negative and maladaptive cognitions to deal with stressful situations (Schwetschenau, 2008). People experience stress, anxiety, and worry as a result of their dysfunctional thought process (Newman et al., 2013). The main focus of the intervention is on people's cognitions and behaviours and how they are related to the experience of stress. Suppression of thoughts does actually lead to more complicated implications and an exaggeration of the thought that the person was trying to hide or replace (Newman et al., 2013).

However, a new wave of behaviour therapy provides a different way to cope without eliminating or escaping from negative thoughts. Acceptance and Commitment Therapy (ACT), takes a different path to understanding work stress among staff. While the aim of previous coping strategies, was to replace negative thoughts and feelings that could intensify a negative thought process (Schwetschenau, 2008). ACT techniques suggest having a flexible approach towards the (irrational) cognitions and beliefs and encourages acceptance of them and as such changes the way we respond to stressors (Eifert et al., 2009; Hofmann & Asmundson, 2008; Spinhoven, Hemert, & Penninx, 2017; Schwetschenau, 2008; Wetherell et al., 2011). The aim of

ACT is try to help clients modify their cognitions by developing positive self-evaluations and increasing self-compassion (Sharp, 2012; Vander Haegen, Etienne, & Duregger, 2016). Shorey et al. (2015) highlights the importance of moment-to-moment mindful attention in reducing anxiety symptoms by directing the client's attention from ruminating over anxiety-related thoughts and feelings to the present moment. Bond and Bunce (2000) showed promising results in improving workers' mental health, reducing burnout, and increasing levels of innovation by using an ACT intervention that focussed on accepting undesirable thoughts and feelings as opposed to suppressing or challenging cognitions.

History of Acceptance and Commitment Therapy

ACT has evolved from three generations of empirical behavioral therapies. The first generation was traditional behaviour therapy, which was based on classical and operant conditioning learning theories. According to the traditional behaviour therapy, certain maladaptive thoughts, feelings, and physiological experiences are related to dysfunctional behaviour states and hence a change in behaviour can create a state of equilibrium (Almeida, et al., 2017; Harley, 2015). The second generation led to the merging of cognitive and behavioural techniques; namely, the cognitive revolution, where the main emphasis was on how thought patterns affected emotions and behaviour. CBT is an example of a second-generation therapy (Rachman, 2015).

Hayes (2004) coined the term "third-wave" therapies for those that do not fit into the framework of traditional behaviour therapy and focus on the way people react to their thoughts and feelings. Third-wave therapists incorporate strategies such as mindfulness and acceptance of negative thoughts and feelings into traditional cognitive and behaviour therapy. ACT promotes distancing oneself from thoughts and considering them to be just thoughts that pass our mind. In

the ACT paradigm, no thought is seen as good or bad or correct or incorrect but, rather, only thoughts that are useful for the future fulfilment of life are considered and pondered upon, while all other thoughts are allowed to pass by without any interruptions (Bass, Nevel, & Swart, 2014). Third-generation therapies focus on treatments that use a broad and flexible approach in understanding the problem within the context in which it occurs (Hunot et al., 2013).

The ACT approach, among many of the third-generation therapies, has gained visibility in recent years. ACT emphasizes the importance of normal thinking, believing, analyzing, and problem solving as ways of approaching the situation (McCracken & Vowles, 2014). ACT emphasizes how our private behaviour (thoughts, emotions, etc) can become a source of distress. As humans, it is quite natural to fixate on a negative thought and to struggle to free oneself from the ongoing cycle of rumination. ACT would focus on our reaction to negative experiences and not the experience itself (Hofmann, Sawyer, & Fang, 2010; Ruiz, 2012).

ACT is defined by the values that a person prioritizes. ACT features mindfulness and acceptance as ways of living a value-guided life and not struggling internally with negative and distressing thoughts but pursuing that which matters the most to a person (Hayes, 2004). As such, ACT focuses on changing the individual's relationship with psychological events (internal thoughts and feelings) rather than changing the event itself (Hayes, 2004).

Relational Frame Theory (RFT) is the underlying foundation of ACT. RFT explains how language and cognition create a causal link for emotional distress by exploring the ways in which verbal relations and rules are used to develop certain language learning competencies (Harley, 2015). The context and our interaction with the environment is important to acquire language. Most humans use language, either publicly (such as talking) or privately (such as thinking), constantly. Using language, humans are also capable of making relations between abstract,

arbitrary, concepts and hence the integration of RFT and ACT shows how we develop language and how language itself influences the way we act (Bell & Harris, 2017; Dahl et al., 2014).

Hayes and Smith (2005) describe the basic idea that behaviour is influenced by a series of mutual relations between things and events called relational frames. These relational frames develop from infancy as we learn to form the connections required for the development of language skills, rules, analogical reasoning skills, and higher order skills like perspective taking and empathy. An abnormal development of relational framing is associated with cognitive deficits and other clinical disorders (Hayes et al., 2013). Human beings learn to make relations even among concepts that lack a physical form (Fletcher & Hayes, 2005). Relational responding helps us make connections between stimuli that are not related to each other (Hayes, 2004; Hayes & Smith, 2005). However, developing these relational frames is a double-edged sword that can also be the cause of psychological distress (Harley, 2015). Take an instance where a person is embarrassed and hurt by his boss who yelled at and ridiculed him in front of his colleagues. As a result of transformation of stimulus function, the person is able to make arbitrary connections between the boss's photo, workplace, any talk or comments from others about the boss, and so on. Any trigger will elicit negative thoughts about the boss. The person may even try and avoid everything related to the boss to attempt to avoid those negative experiences (Hayes, 2004).

We can use RFT to explain the association between the employee and stress at the workplace. If a person encounters a stimulus at work that causes a stressful reaction, they would try and avoid such stimuli in the future. The stressful reaction does not require the physical presence of the stimulus, instead an established verbal or cognitive connection could suffice. We generally try to escape from stressful events and avoid distressing memories, thoughts, or emotions associated with the events. However, avoidance can cause more psychological harm, as

trying not to think about the negative experience, or to suppress a negative thought, increases the frequency of its presence as we are actually thinking of that thought while trying to escape from it (Hayes, 2004; Hayes & Gifford, 1997).

ACT is recognized as a whole word and not as separate initials, as it is a behavioural therapy that encourages being aware and present in the moment and assessing actions which are more value-based than just a random act. As the action is consistent with one's thought process, it becomes easier to set goals and not to act in ways that are beyond one's personal skills and ability. The two major goals of ACT are to foster acceptance by encouraging the client to enter the present moment with a vigilant mindset and to change or persist in behaviour leading to psychological flexibility of unwanted experiences that are beyond the control of the person. The other is to commit and act towards leading a value-based and meaningful life (Hayes et al., 2006; Kanter, Baruch, & Gaynor, 2006). Psychological flexibility is the ability to align one's behaviour to values rather than engaging in behaviour based on thoughts and feelings (Zhang et al., 2018). Fletcher and Hayes (2005) describe psychological flexibility as the ability to be fully present and aware of the internal thoughts and feelings, including those that are negative, the ability to be open and accepting of the experiences and avoid escaping from them, and finally to commit to actions that are consistent with one's values.

Therapists who use ACT teach individuals to use techniques of mindfulness to help them cope in ways that are consistent with their values while also developing flexibility. The practitioner helps the client understand that it could be detrimental to suppress, manage, and control their emotional experiences. They counsel them to become better able to guide their actions based on values that support wellbeing, while coming to terms with the pain that the individuals experience (Eifert & Forsyth, 2005). ACT is said to be exposure-based in the sense

that it gives the individual the chance to experience the anxiety without living with the struggle of being anxious (Pierce, Twohig, & Levin, 2016).

The goal of ACT is to reduce attempts of experiential avoidance that is escaping from negative thoughts or emotional experiences (Hayes, 2004) and increase psychological flexibility by using techniques of mindfulness. The terms *attention* and *awareness* are related to one another and are a product of consciousness. Mindfulness is a technique of learning to direct one's focus to enhance our attention and awareness to experience each moment as it unfolds with acceptance and without any judgement (Brown & Ryan, 2003). Kabat-Zinn (1990) describes mindfulness as the process of being able to pay attention to the present moment in a non-judgemental way.

The main teaching behind mindfulness is the ability to mindfully learn to respond to maladaptive thoughts and emotions that cause distress (Bishop et al., 2004). The influence of mindfulness has risen as a number of therapists and psychologist use mindfulness techniques as a part of their sessions (Dunn et al., 2012).

Mindfulness encompasses three concepts; attention, awareness, and acceptance (Brown & Ryan, 2004). Mindfulness training begins with the skill of regulating one's focus to the current experience of thoughts, feelings, and emotions as they arise and skilfully switching from drifting away back to mindfully breathing after acknowledging and attending to that thought or feeling. It is not about suppressing or running away from thoughts but labelling the thought as an object and increasing awareness of it while not stopping and contemplating on it (Hayes & Shenk, 2004). Finally, it includes the ability to accept whatever one encounters without judgement but with openness. For instance, if a person comes to accept that their panic attacks can be controlled

and last for only a few minutes, they would be better able to redirect their attention and calm themselves rather than engaging in maladaptive thoughts and actions (Baer, 2003).

Mindfulness has been associated with wellbeing as it teaches the person to disengage from any worrisome thought or emotion and any maladaptive behaviour patterns (Keng, Smoski, & Robins, 2011). Research also targets the use of mindfulness in enhancing wellbeing through advanced level of moment-to-moment experience of all bodily sensations (Brown & Ryan 2003; Davis, Hayes, & Hilsenroth, 2011). The efficacy of mindfulness has been explored in a number of areas, such as treating patients with sleep disturbances (Black et al., 2015; Ong & Sholtes, 2010), anxiety, (Edenfield & Saeed, 2012; Sharma, Mao, & Sudhir, 2012), depression (Hofmann et al., 2010; Klainin-Yobas, Cho, & Creed, 2011), eating disorders (Kristeller & Wolever, 2011), chronic pain and illness (Banth & Ardebil, 2015; Hilton et al., 2017), borderline personality disorder (Keng, Smoski, & Robins, 2011), workplace stress (Baer, 2006; Dane, 2011; Hülshager et al., 2013), and relationship issues (Carson et al., 2004). The treatment methods used in ACT cannot be described in terms of mindfulness or meditation but they contain strategies that are consistent with mindfulness techniques (Baer, 2003).

Symptom reduction is not the main focus of ACT but rather a consequence of the intervention. ACT stands at an advantage among the other treatments in the way it functions. The end result of ACT would be flexibility in psychological functioning and level of reactivity corresponding to the values that one holds. Symptom reduction is not the ultimate target of ACT but instead guiding individuals to engage and act in appropriate and situation specific behaviours that assist in reaching their goals (A-tjak et al., 2015; Orsillo & Batten, 2005).

In addition to mindfulness, ACT targets six core processes that enable the client to connect with, and be more conscious in, the present moment and to behave consistent with the values that they identify with. Being more mindful about the moment will increase their efficacy in detangling themselves from experiential avoidance, a very fundamental problem, that is, not to escape from a stressful situation but to respond more rationally and mindfully to it so that they no longer look at those difficult thoughts and emotions as major challenges (Hayes et al., 2006). The six processes that lead to psychological flexibility are interconnected and complementary and do not follow a specific path. They are divided into two groups; mindfulness and acceptance, and commitment and behaviour change. Mindfulness and acceptance includes acceptance, diffusion, and contact with the present moment and self. Commitment and behaviour change includes values, committed action, present moment, and sense of self (Hayes et al., 2006). As a way of rectifying any maladaptive thinking and ways of behaving, ACT helps to cultivate psychological flexibility by focusing and strengthening the six core processes. It is important to understand that these processes (in Figure 1) do not work as individual segments but in tandem.

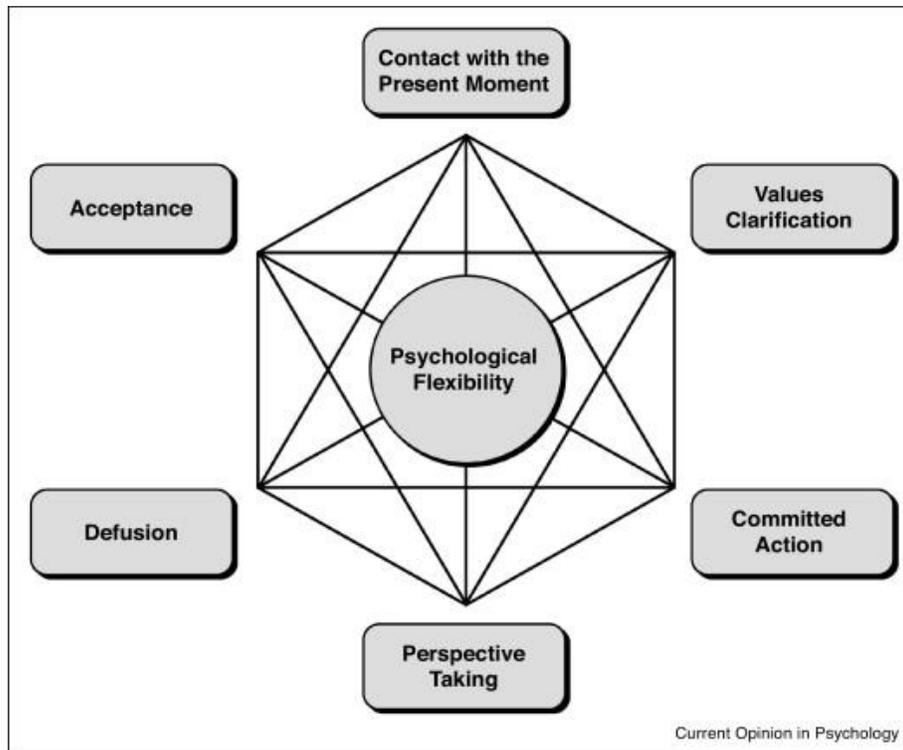


Figure 1. The traditional ACT hexagon model. From “Acceptance and Commitment training in the workplace” by Morgan, D, 2015, *Current Opinion in Psychology*, 2, 26-31.

‘Acceptance’ in ACT is concerned with dealing with private experiences without changing them. For instance, a person experiencing anxiety is encouraged to experience the anxiety as a feeling by being fully aware of the experience instead of trying to let go of it or escape from it. The participants are encouraged to tune in to their internal experience and develop a sense of curiosity and objective awareness through mindfulness activities (Harley, 2015).

Mindfulness techniques are used in a more structured manner to make individuals connect with the present moment and to watch their thoughts, even if uncomfortable or painful, come and go without being attached to them. The aim is to observe and have a friendly relationship with one’s thoughts and experiences (Menin et al., 2013). Research shows that using acceptance alone, or in combination with, other processes helps reduce anxiety, depression, and experiential

avoidance and increase sustained attention, which encourages better decision making (Enoch & Dixon, 2017; Daltry, 2015; Eifert et al., 2009).

‘Cognitive diffusion’ is the ability to step back from one’s thoughts and feelings and notice them from a distance. It is natural for human beings to slip into negativity and negative thoughts are connected to negative emotions. The result of diffusion would be to reduce the intensity attached to a particular thought (Eifert et al., 2009; Hayes, 2004). Cognitive diffusion must be learned in order to change the way individual’s respond to the thoughts and feelings that arise rather than immediately reacting to them (López & Salas, 2009). Sometimes writing unpleasant thoughts down, or singing or repeating them aloud, reduces the intensity of that thought (Hayes, Pistorello, & Levin, 2012). Repetition of negative words reduces their believability and the negativity experienced caused by that thought (Hayes et al., 2013; Masuda, Hayes, Sackett, & Twohig, 2004).

‘Self/perspective taking’ can be explained in three ways. It reflects a deep understanding of oneself as being distinct from one’s thoughts and feelings. Self-as-process refers to the experience of observing and watching every thought and feeling even though they might be uncomfortable and mindfully try to distance them and disentangle from the inner experiences (Harley, 2015; Hayes, 2004; Hayes et al., 2013). Self-as-content is the ability to conceptualize a stable sense of self by describing and evaluating one’s own skills and abilities. Self-as-context refers to the person’s ability to take a stand or perspective according to the situation (Luoma, Hayes, & Walser, 2007). Moran (2015) explains the importance of ‘Self/perspective taking’ in a workplace setting for all employees by initially becoming more realistically aware of their strengths and weaknesses so as to engage in behaviours that could positively influence psychological flexibility. For example, if a trainee believes that they do not require any more

training; they would be filled with negative thoughts and emotions when asked to attend a training session. This, in turn, could negatively impact their productivity and increase stress and anxiety.

‘Being Present’ is the ability to be fully present in the here and now and experience every bodily sensation that occurs and events in the external surrounding without being lost in a trail of thoughts either ruminating about the past or worrying about the future. This skill is fostered by mindfulness practices and attention control techniques (Hayes et al., 2012). Mindfulness helps a person to focus on being present and hence targets psychological flexibility rather than suppressing negative thoughts among individuals with traumatic experiences (Block-Lerner et al., 2007; Follette, Palm, & Pearson, 2006).

‘Values’ in ACT is a guiding source for an individual working towards the core idea of ACT, that is, to accept what one is going through as beyond one’s control while committing to acting rationally (Harris, 2006). Individuals who are caught up in experiential avoidance more often than not engage in behaviours that are inconsistent with their values. In ACT, individuals choose to experience thoughts and feelings that might be stressful in order to engage in behaviours that are consistent with their values, hence fostering acceptance (Hayes, Pistorello & Levin, 2012). For example, when an organization goes through a lot of changes within departments, it can be highly stressful and anxiety provoking for an employee. In such a situation, the employee first would have to mindfully accept the change and then set certain value-based goals that align with the goals of the organization such as being positive, meeting deadlines and so on as an effective way of dealing with the situation. Research suggests that those suffering from anxiety should be more accepting and understand their thought pattern rather than suppressing it or using avoidance as a strategy as well as act in ways that are

consistent with thoughts and feelings that hold value in their lives (Pearson, 2006; Selby, 2011). In a study on coping with pain, those who were exposed to a values intervention showed higher tolerance to pain and decreased believability of pain experienced in the past (Gutiérrez, Luciano, Rodríguez, & Fink, 2004).

‘Committed action’ refers to engaging in behaviours consistent with those prioritized to be valuable to bring meaning to one’s life, even though those behaviours might be difficult (Hayes, 2004).

In ACT, it is important to evaluate whether one’s actions are consistent with our values before acting out. ACT involves learning to live with negative thoughts and feelings, developing a sense of acceptance, and no longer perceiving the thoughts as harmful (Harris, 2006).

Effectiveness of ACT interventions

Interventions using ACT have shown promising results in reducing levels of stress and burnout and increasing general mental health among social workers (Brinkborg, Michanek, Hesser, & Berglund, 2011). ACT has been effective in the treatment of Obsessive and Compulsive disorder (Vakili & Gharraee, 2014), symptoms of insomnia (Ong, Ulmer, & Manber, 2012), posttraumatic stress disorder (Orsillo & Batten, 2005), alcohol dependence (Svanberg, Munck, & Levander, 2017), and reducing stress related to work (Bond & Bunce, 2000; Moran, 2015). In the recent years, ACT has gained an evidence base for the treatment of depression (Richardson & Bramwell, 2017), anxiety (Bardeen, Fergus, & Orcutt, 2013), and other mental health problems (A-tjak et al., 2015; Bluett et al., 2014; Dindo, Liew, & Arch, 2017; Wetherell et al., 2011).

Fledderus et al. (2010) revealed a positive relation between intervention based on ACT and psychological flexibility and an increase in psychological flexibility results in positive behavioural outcomes, effective coping, better quality of life, emotional and psychological well-being, and job satisfaction Psychological flexibility is dependent on two factors: Firstly, acceptance of one's experiences and avoiding running away or controlling them when they are negative, and, second, committing to actions based on values.

Many exercises in ACT use techniques of mindfulness. Relaxation techniques help calm each muscle in the body therefore reducing stress and anxiety. Exercises on mindfulness helps refocus one's attention from unpleasant thoughts and emotions and elicit body coping mechanisms and adjustments when the person engages in repetitive mental activity (Manzoni, Pagnini, Castelnovo, & Molinari, 2008).

Self-help strategies are an inexpensive and easily available option for people to consider in order to deal with their mental illnesses and struggles without external professional aid. Studies evidence the effectiveness of the self-help strategy for mild to moderate anxiety symptoms (Jorm & Griffiths, 2006; Morgan, Chittleborough, & Jorm, 2016). Thomas, Foster, and Starkey (2011) evaluated the effectiveness of self-help books based on ACT on professionals working in the disability sector. The intervention was conducted for 7 weeks and both groups were subjected to pre- and post-assessments on measures of acceptance, mindfulness, quality of life, values, stress, thought and threat control, and general mental health. The ACT participants showed greater psychological acceptance and less depersonalization after completing the intervention compared to those in the control group.

Wersebe et al. (2018) showed the relevance of ACT interventions and particularly the contribution of psychological flexibility in reducing stress and improving wellbeing for individuals who reported high levels of work-related stress. A randomized control trial of an ACT-based self-help intervention was conducted. Stress, emotional, social, and psychological wellbeing, and psychological flexibility were measured pre- and post-intervention, and after a 3-month follow up. The intervention was delivered without a therapist but a book containing all the exercises and a link for the audio recordings was available. The results showed an increase in psychological flexibility, which led to a decrease in stress and anxiety during the intervention.

ACT interventions are effective in improving the performance of individuals working within stressful conditions. Biglan et al. (2013) investigated the importance of ACT training on early childhood special educators. The level of stress is high for those in this profession as they deal with children who present with challenging behaviour. The ACT workshop was successful in increasing psychological flexibility, reducing stress and anxiety, and increasing self-efficacy among teachers by diffusing negative thoughts.

Flaxman and Bond (2010) compared the efficacy of Stress Inoculation Training (SIT) and ACT training on working individuals with above-average stress levels. Employees were randomly assigned to one treatment or a control group for 3 months. Both ACT training and SIT were effective in decreasing psychological distress but those who received ACT training showed an increase in psychological flexibility by altering the context in which the negative thoughts were experienced rather than challenging those thoughts. Experiential avoidance has a major impact on burnout especially in the area of exhaustion (Powers et al., 2009). Job stress as a result of lack of flexibility and control over work can result in an increase in personal or social distress

related to work and create an attitude of indifference among colleagues as a way of coping with stress (Bond & Flaxman, 2006).

Working in professions related to mental health can be challenging and demanding, leading to an increased risk of distress and burnout. Interventions based on ACT have successfully reduced maladaptive emotion-focused strategies as they teach the individual to become more accepting of their distressing thoughts and feelings (Leoni et al., 2016; Vilardaga et al., 2011). Hastings and Noone (2010) examined the effect of the Promotion of Acceptance in Carers and Teachers (PACT) intervention among support staff working in the disability sector. The intervention was based on ACT showed positive results for reducing psychological distress post intervention. Results suggested that ACT interventions are beneficial to support staff, especially in conditions where the individuals are in close contact with clients of high risk.

Interventions delivered digitally show promising results and offer opportunities of providing innovative forms of therapy. However, there is a lack of research on interventions delivered through smartphones in the organizational sector. Ly, Asplund, and Andersson (2014) explored the efficacy of a smartphone intervention based on the six main processes of ACT among middle managers working in medium- and large-sized companies. The participants completed a 6-week programme that included behaviour techniques on handling stress based on the core principles of ACT. The intervention decreased the level of perceived stress and increased general health, however, it had no effect on their actual leadership behaviours.

Psychological flexibility training is effective in reducing stress and anxiety and improving mental health, well-being (Biglan et al., 2008), and job performance among individuals with moderate to high work stress levels (Moran, 2011). Biron and Van (2012) used ACT training with service industry workers compared to those in a control-group setting. The

training was beneficial in helping the workers to manage their level of stress and exhaustion on stressful days and also to handle their emotions by accepting them rather than suppressing them.

Psychological acceptance is important in understanding the relationship between job satisfaction and job-specific health and productivity. When people experience negative internal states related to their job, if, through psychological acceptance, they learn to accept those thoughts and feelings rather than avoid them, through practice they are able to use their control to engage in actions that are consistent with their values and goals of reaching optimum work effectiveness and productivity (Bond & Bunce, 2003).

Effectiveness of online interventions

A substantial proportion of the population use smart phones to an extent that they are integrated into their daily routine and are a major part of their life (Wang et al., 2016). The demand for mental health apps has been increasing due to their convenience and availability. Studies have explored the effectiveness of electronic interventions in bringing about behaviour change to improve user's wellbeing (Stratton et al., 2017; Firth et al., 2017). Presently, within the behavioural change arena, there are many interventions available on apps for reducing stress and anxiety (Ly, Asplund, & Andersson, 2014), smoking cessation (Haskins et al., 2017), to promote the importance of fitness and weight loss (Flores Mateo et al., 2015) and in the social, medical, and educational field (Boulos et al., 2014).

Health-related apps motivate people by keeping track of their wellbeing as the user receives immediate feedback about their progress from the app. The ACTcompanion® app used in the current study has a feature of updating the client's weekly check-in to show the number of times the client has used the app as well as their psychological flexibility score. Many eHealth interventions serve as an alternative method to overcome various behavioural concerns. Even

though group, as well as individual, visits are advantageous in improving health, some people do not prefer face-to-face interventions (Tate, Wing & Winett, 2001). Wireless devices allow privacy and portability and convenience, as people can access information at any time and place without physically meeting the therapist (Lui, Marcus, & Barry, 2017; Torous & Powell, 2015).

Smart phone interventions can proactively interact with users by sending prompts or asking about a person's mood or sleep activity and provide real time feedback after the users engage in an activity or behaviour (Ivanova et al., 2016). Users can set goals on the app which encourage the user to achieve more and which become part of their routine (Ivanova et al., 2016). It is also more feasible to introduce health interventions on smart phones than on computers because people take phones everywhere they go. Hence, the number of tasks to be performed on the app could be easily increased as they could carry out interventions at any place and time (Ahmedani, Crotty, Abdulhak & Ondersma, 2015; Enock, Hofmann, & McNally, 2014).

Current study

It is imperative to understand a person's well-being at work as people spend many hours at a workplace. Work stress is caused when the individual is unable to cope with the demands put forth and hence they feel overloaded. The demands and pressures from one's workplace are the major reasons of stress and one of the leading causes of mental health problems (Michie, 2002). Career concerns in terms of job insecurity and lack of interest in the job, causing low motivation, job responsibility and conflicts within workplace, coupled with personal stressors can all cause stress in the person, the prolonged effect of which can be debilitating if it goes unrecognised (Bickford, 2005)

Mobile technology has been advocated to cope with various mental health issues (Mohr et al., 2013) and many health-related applications have flooded the mobile app market. Despite numerous studies on the importance of technology as a modern approach for improving health and wellbeing, there is a dearth of clinical evidence on the efficacy or effectiveness of such apps or on the rate at which people are interested in, and using, such apps (Mosa, Yoo, & Sheets, 2012; Zhao, Freeman, & Li, 2016).

As discussed earlier, we have seen a strong association between ACT training and reducing stress and anxiety levels, and improving wellbeing. Research also shows promising results between ACT and burnout in increasing work performance and in creating effective working conditions. Psychological flexibility is seen as a crucial factor in bringing about positive work experience and in reducing stress and anxiety by training individuals to become more accepting of negative thoughts and feelings.

The current study is based on The ACTcompanion® app which is a fairly new app and not much research has been conducted to evaluate the potential of this app. I aimed to explore the efficacy of this ACTcompanion® app as an intervention to reduce stress and anxiety and improve well-being at work in New Zealand. I used an A-B-A design to investigate whether scores of stress, anxiety, and burnout changed before and after app use. I expected that participants would report lower levels of stress and anxiety as measured by Perceived stress scale, State Trait Anxiety Inventory and Hospital Anxiety and Depression scale. I also hypothesized that the participants would show an increase in the level of psychological flexibility measured by AAQ II, hence showing increased acceptance and wellbeing. I also expected that the scores of emotional exhaustion and depersonalisation (cynicism) measured by Maslach burnout Inventory will decrease after the intervention.

As all the participants in the study received the intervention, I chose a small-N single-subject design. This design allowed for comparison of treatment outcomes, as well as providing a repeated measure of anxiety from baseline to intervention. Each participant served as his or her own control which reduced the impact of inter-subject variability. Finally, this research design allowed assessing the stability of behaviour through repeated measures at the baseline and posting intervention (Butler, Sargisson, & Elliffe, 2011).

Method

Participants

The final sample for the study was 10 people from the workforce. Table 1 describes the demographic details of the five male and six female participants.

The inclusion criteria for the study were that the participants had to have access to either a tablet or smart phone to download the app and be employed either full or part time.

Table 1
Summary of Demographic Details of the Participants who Completed the Study

Intervention group						
ID	Gender	Age group (yr)	Occupation	Time spent on baseline (days)	Time spent on the app (Weeks)	App Completed Y/N
PM 01	Male	30-60	Teacher	9	6	Y
PF 02	Female	25-30	Vocational consultant	8	3.6	N
PF 03	Female	30-60	Supervisor for support workers	11	5.5	Y
PM 04	Male	30-60	Solicitor	8	6	Y
PM 05	Male	40-60	Sales Manager	7	5.6	Y
PF 06	Female	25-40	Occupational Therapist	9	5.5	Y
PF 07	Female	25-60	Solicitor	10	4.5	Y
PF 08	Female	25-60	Resource planning	8	6.3	Y
PM 09	Male	25-30	IT	8	5.4	Y
PF 10	Female	25-30	Support Staff	9	5.5	Y

Materials

Once the participants expressed willingness to participate in the study, I emailed the information sheet (Appendix B). In agreement with the information sheet and the period for the study, I conducted a video chat (Skype) or met the participant in person to sign the consent form (Appendix C). After receiving the signed consent form, I emailed them a questionnaire package (Appendix E- L) and a daily questionnaire (Appendix M). The participant completed the questionnaire package before the baseline period and again post intervention. The ACTcompanion® app has four major components that contain exercises that require between 5 and 30 min to complete. It also contains about 2.5 hr of a variety of mindfulness recordings. Table 2 describes information about the measures used in the study.

Table 2
Information about Measures used in the Study

Name of the test	What it measures	Daily/ Pre/Post	Time taken (min)
PSS	Perceived Stress	Pre and post	1-2
PANAS	Emotional fluctuations	Pre and post	1-2
HADS- A	Anxiety in patients	Pre and post	1-2
HADS- D	Depression in patients	Pre and post	1-2
STAI –Y 1	Current state of anxiety	Pre and post	3-5
STAI –Y 2	Disposition to react anxiously	Pre and post	3-5
AAQ II	Psychological flexibility, experiential avoidance and acceptance	Pre and post	2-3
MAAS	Mindfulness and mind wandering	Pre and post	1-2
MBI	Work stress and attitude	Pre and post	1-2
DAS-A	Anxiety level in the past 24hr	Daily	1-2

Measures

The Perceived Stress Scale (PSS). This scale measures the person's current level of stress as well as thoughts and feelings during the previous month. It reflects the idea that some situations are more stressful than others, as well as the extent to which an individual would perceive a certain situation to be stressful. It is a self-report measure with 10 items using a 5-point Likert scale ranging from 0 indicating 'never' to 4 indicating 'very often'. The total score is the sum of all the items including the four reverse-scored items. A high score reflects higher perceived stress hence increased vulnerability to experience symptoms of stress in stressful event (Cohen & Janicki-Deverts, 2012). Cohen, Kamarck, and Mermelstein (1983) noted that the PSS has good internal consistency (Cronbach's alpha = .84 and .86) and test-retest reliability was also found to be good ($r = .85$) (Cohen & Williamson, 1988). It is used to assess coping strategies and personality factors that could predict a person's reaction or change in perceived stress.

The Positive and Negative Affect Schedule (PANAS). The PANAS is a measure of whether individuals experience life events with a pleasurable or distressing thought process (Merz et al., 2013). Emotional experience is assessed through Positive Affect (PA) and Negative Affect (NA). Participants respond to two sets of 10 items presented with words that describe the person's feelings or emotions at the present moment or the extent to which one has been feeling that way in the past week. The items use a 5-point Likert scale (very slightly or not, a little, moderately, quite a bit, and extremely). Positive affect reflects the extent to which the individual enjoys, and is involved with, the experiences in the environment. Hence, scores showing low PA reflect 'sadness and lethargy' whereas high scores show 'high energy and pleasurable engagement' (Lim et al., 2010). Scores indicating lower levels of NA describe 'a state of calmness and serenity' and a high NA score shows 'distress and 'unpleasant engagement' (Lim et al., 2010). The PANAS is often used, has desirable psychometric properties, and is adequate

for use across all ages (Crawford & Henry, 2004; Melvin & Molloy, 2000). Both scales have good convergent and discriminant validity as well as good internal consistency (Cronbach's $\alpha \geq .84$) (Tran, 2013).

The Hospital Anxiety and Depression Scale (HADS). This is a convenient measure of depression and anxiety among patients in hospital as it takes only 2 to 5 min to complete. It cannot be used a complete diagnosis but is a reliable and valid method of evaluating any further diagnosis for those who are already hospitalized (Snaith, 2003). The questionnaire is 14 items concerning the person's feelings over the past week. Depression symptoms (7 items) and anxiety symptoms (7 items) are scored separately. Scores less than seven indicate that the person is neither depressed nor anxious and high scores of 15-21 indicate severe anxiety or depression (Stern, 2014). The questionnaire has been validated across languages, countries, and ethnic groups and is used in community settings as well as in general medical practice (Stern, 2014). Amini, Maroufizadeh, and Samani (2017) also noted that this measure had good internal consistency (Cronbach's alpha for anxiety and depression subscales were 0.866 and 0.753 respectively).

The State-Trait Anxiety Inventory for Adults (STAI). The STAI is 40 items that measure two distinctive constructs of anxiety, that is, anxiety related to a specific situation or as a general trait. Twenty items measure the individual's momentary state of anxiety and the remaining 20 how they generally feel. The statements for S anxiety have four possible responses, namely, not at all, somewhat, moderately so, and very much so. Items on the S Anxiety measure the individual's current state of anxiety, worry, and apprehension. The questions on this subscale would be related to how the person is feeling at the moment. The responses for T anxiety, which is related to the person's proneness to developing symptoms of anxiety, are almost never,

sometimes, often, and almost always. The questions on this subscale relate to the person's level of calmness, situations related to understanding their confidence level and sense of security. The scales consist of anxiety-present questions (eg: I feel frightened) and anxiety-absent questions (eg: I feel calm). Nineteen of the anxiety-absent items are reverse scored. The total scores for the S anxiety and T anxiety add along with reverse scores on each scale. The questionnaire takes about 10-15 min to answer. The scores for each of the two subtests can range from 20 to 80, with higher scores indicative of higher anxiety. The scores can be compared with normative values available in the manual (Julian, 2011). STAI is considered to be very reliable in evaluating an individual's level of anxiety with test-retest coefficients ranging from 0.31 to 0.86 and high internal consistency coefficient of 0.86 (Julian, 2011). Hence, STAI can be used to assess and compare the client's anxiety levels across therapy sessions (Metzger, 1976).

Acceptance and Action Questionnaire (AAQ-II). Psychological flexibility or experiential avoidance is a key aspect in my study and I measured it using the AAQ-II. Responses to the 10 items on the scale use a 7-point Likert scale with 1 indicating never true and 7 indicating always true (Ciarrochi & Bilich, 2006). The questions are reflective of the person's level of flexibility. The AAQII has good construct validity and internal consistency and is widely used as a measure of psychological flexibility (Bond et al., 2011). The items on the scale are designed to assess experiential avoidance, acceptance, action, and immobility. Higher scores reflect greater experiential avoidance and immobility and lower scores are indicative of greater acceptance and action (Ciarrochi & Bilich, 2006).

Mindfulness Attention Awareness Scale (MAAS). As mindfulness is an important technique in ACT, it was important to assess the individual's tendency to be mindful and aware of the present moment. The 15-item MAAS is designed to assess the individual's awareness and

attention to their current surroundings (Brown & Ryan, 2003). Responses to the 6-point Likert items are 1 'almost always' to 6 'almost never'. Participants respond to the items depending on how often they have experienced the situation described by each of the statements. A higher total score is indicative of high level of mindfulness (Ciarrochi & Bilich, 2006). Brown and Ryan (2003) noted that this measure has good internal consistency with coefficients ranging from .82 for student populations and .87 for adults.

The Maslach Burnout Inventory (MBI). The MBI relates to measures of excess exhaustion leading to burnout. It is the most commonly used measure of burnout worldwide with promising psychometric properties (Poghosyan, Aiken, & Sloane, 2009). It is a self-administered test with 10 items reflecting how often the respondent experiences symptoms of burnout. The scale is divided into three subscales; emotional exhaustion (feeling emotionally overwhelmed by one's work), depersonalization (feeling of indifference and cynicism towards one's work), and personal accomplishment. Burnout is evaluated using a two-factor structure, which is the sum of each of the subscales, namely emotional exhaustion and depersonalization. (Kalliath, O'Driscoll, Gillespie, & Bluedorn, 2000). These two components are inter-related, as emotional exhaustion compels the person to distance themselves emotionally and cognitively from their work. The items use a 6-point Likert scale ranging from 1 = 'a few times a year' to 6 = 'every day' (Maslach & Jackson, 1981). The measure has good internal consistency for each of the scales (Cronbach alpha coefficients from 0.84 to 0.90 for emotional exhaustion and 0.74 to 0.84 for depersonalization measuring cynicism (Bakker, Demerouti, & Schaufeli, 2002).

The Daily Assessment of Symptoms-Anxiety (DAS-A). DAS-A assesses the daily level of stress and anxiety of the participants in order to track any changes as they progress through the app. It is a simple and quick self-administered questionnaire of eight items. Items use a 10-

point Likert scale ranging from low worry or anxiety to high. The total score is the sum of all items including Item 6 which is reverse scored. Higher scores are indicative of high anxiety. The DAS-A was used from baseline until the end of app use (Morlock et al., 2008).

The DAS-A is well recognized and widely used with patients with Generalized Anxiety Disorder (GAD) to evaluate changes in their anxiety symptoms after the first week of treatment. It has favorable item-level validity and internal consistency and is very helpful for trialing new treatments on patients with GAD (Morlock et al., 2008).

Research Design

I used a single-subject design with three phases, A-B-A, to evaluate the effects of the intervention. Each participant entered the study at various times. Phase A was the baseline period, during which no app was used, followed by Phase B, which was the intervention period when the app was in use. Phase A was repeated after Phase B.

Procedure

I recruited participants for the study using posters and emails inviting people to contact me if they were interested in participating in the study. I put up a small advertisement in the newspaper and sent emails to the different departments within the University of Waikato. I also emailed organizations, seeking their permission to recruit employees to participate in the study. Word-of-mouth was also used to recruit a few participants. Initially 39 employees expressed their interest and volunteered to take part in the study. A questionnaire package (Appendix E-L) and the Daily Assessment of Symptoms (DAS-A) (Appendix M) were used to screen participants and the ones who failed to exhibit a moderate or high anxiety level were excluded from the study.

Initial contact. I recruited participants with the help of posters (Appendix A) which I put up around the university of Waikato and different work organisations. The poster briefly explained the study, the length of participation required, and that the app may help to reduce work stress and anxiety. I also posted advertisements on social media and newspapers with the help of the marketing team at the University of Waikato. Participants were also recruited through word of mouth.

People who expressed interest in taking part in the study contacted me via email. I sent them a copy of the information sheet (Appendix B) that contained all the details of the study. I then met with each of them in person or through video chat (skype) and guided them through the information sheet, answering any queries that they had. I then gave a consent form (Appendix C) to those who agreed to participate. No force or coercion was applied to those who decided not to participate. They were informed about their right to withdraw from the study at any time during the process and that all their information in the questionnaire and the app would remain confidential.

Pre assessment. Once the participants returned the consent form, I emailed them a battery of questionnaires (Appendix A-L) to complete through Qualtrics®. I assigned participants a code. The participants completed the questionnaires on stress, anxiety, and burnout and were then provided with the Daily Assessment of Symptoms (DAS-A; Appendix M). The data from the DAS-A served as the baseline and used to determine the participants' further participation in the study. Participation continued if daily scores were 50+ on average. I asked the participants who continued in the study to complete the DAS-A daily until the study end.

Intervention phase. I provided access to the app once the participant's baseline levels of anxiety were 50 and above for at least a week indicating moderate or high anxiety. I gave each

participant a free code to download the app and I assured them that their confidentiality will be maintained and that I will not be able to access any information entered in the app. Participants started using the app at different times. I asked participants to complete at least one activity on the app per day. However, they could choose to complete more and finish it before the due date. I asked the participants to fill in the daily assessment while using the app. I sent email reminders on days that they did not complete the DAS-A. The entire study was about 6 to 8 weeks depending on when the participant completed the app.

Post-intervention phase. Once the participants completed all the requirements and exercises in the app, I gave them the same battery of tests (Appendix A-L) to answer. I did this to provide me a comparison with baseline data in order to evaluate whether the use of the ACTcompanion® app had any effect on their stress anxiety, psychological flexibility, and burnout levels.

Ethical Approval

I gained ethical approval from University of Waikato School of Psychology Research and Ethics Committee (#17:37). I obtained approval to recruit participants from the relevant personnel of the various organizations prior to attempting to recruit participants.

Data Analysis

I analysed the data and produced all graphs using Excel®. Once all participants completed their participation and returned the questionnaires, I carried out a series of repeated-measures *t* tests to compare the data before and after the intervention for each of the measures separately.

Results

I graphed the individual data showing the daily anxiety scores in baseline and intervention periods (Figure 2 a, 2b). The vertical dotted condition breaks show the end of the baseline period and the beginning of the duration of app use. In Figure 2a and 2b, Initial M indicates a male participant and F indicates female. Scores of 50 and above signify a high level of anxiety.

Figure 2a shows that PM 01's baseline score started at 55 and rose over the next few days. His anxiety score during the initial usage of the app was 57.5, but this had dropped to a 28.75 by the end of app use. Participant PF 02 stopped using the activities in the app after 3.5 weeks. Figure 2a shows that PF 02 had a high level of anxiety during baseline and a variation in the level of anxiety during the app use period as she had a few days where she was less anxious but she faced high levels of anxiety at other times. Participant PF 03 started with a score of 87.4 in baseline and continued to have high scores through baseline period. Her score dropped to 71.25 when she started the app. The score has decreased to a low of 31.25 during the last week of using the app. Figure 2a shows that she did have a few days with high anxiety levels, but they were followed by a decrease in scores. PM 04 used the app for 6 weeks and his scores fluctuated from high to low through the weeks. The scores ranged from a high of 72.5 to a low of 28.75. PM 04's anxiety levels were fairly high and they became more variable during app use, but often dropped below baseline. The scores for PM 05 gradually decreased from baseline through the app use. He started the app with a score of 50, which reduced to a minimum of 20 by the end of the app.

PF 06's scores were unpredictable during the app use with sudden increases and decreases in daily anxiety. In the initial period, it appears that the participant had many stressful days which settled over time and decreased to a low of 31.25 towards the end of the study. The overall trend for participant PF 07 was that she had many anxious days with one extremely low score. Her level of anxiety reduced over the weeks yet was still above the threshold for low anxiety. PF 08's daily anxiety scores on reduced over time compared to the baseline level (Figure 2b). Within the overall low level of anxiety, PF 08 had a few high scores, however, accompanied by consecutive days where her anxiety was at a lower level. The scores of PM 09 were unpredictable with sudden fluctuations in level of anxiety. The participant produced high anxiety scores during the baseline period. However, the scores reduced towards the end of the study to a low of 28.75. From Figure 2b, it can be seen that PF 10 started with high levels of anxiety, which decreased during the period of using the app in a downward trend from the beginning to the end of the study.

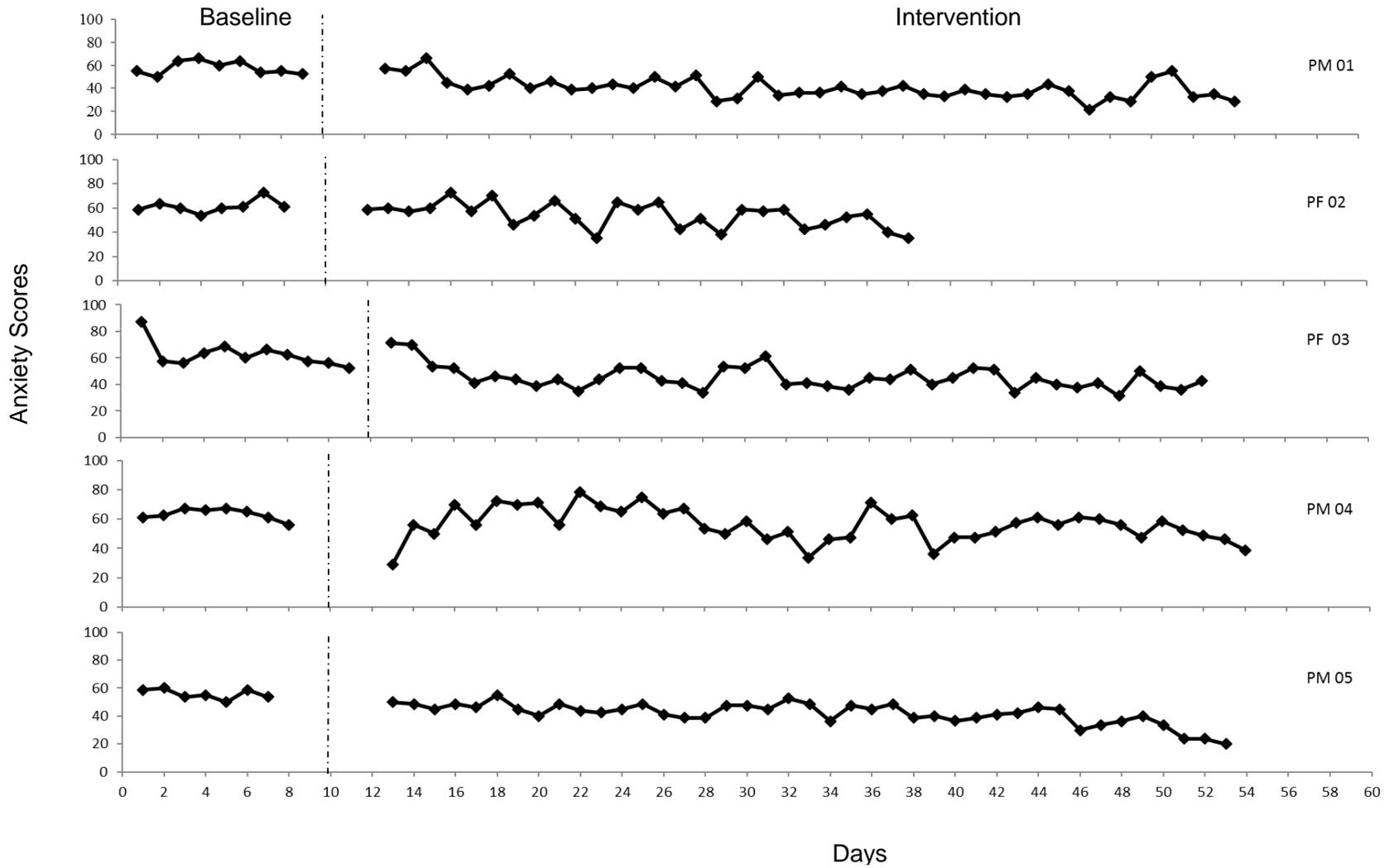


Figure 2a. Level of anxiety for each day across baseline and app use for each participant.

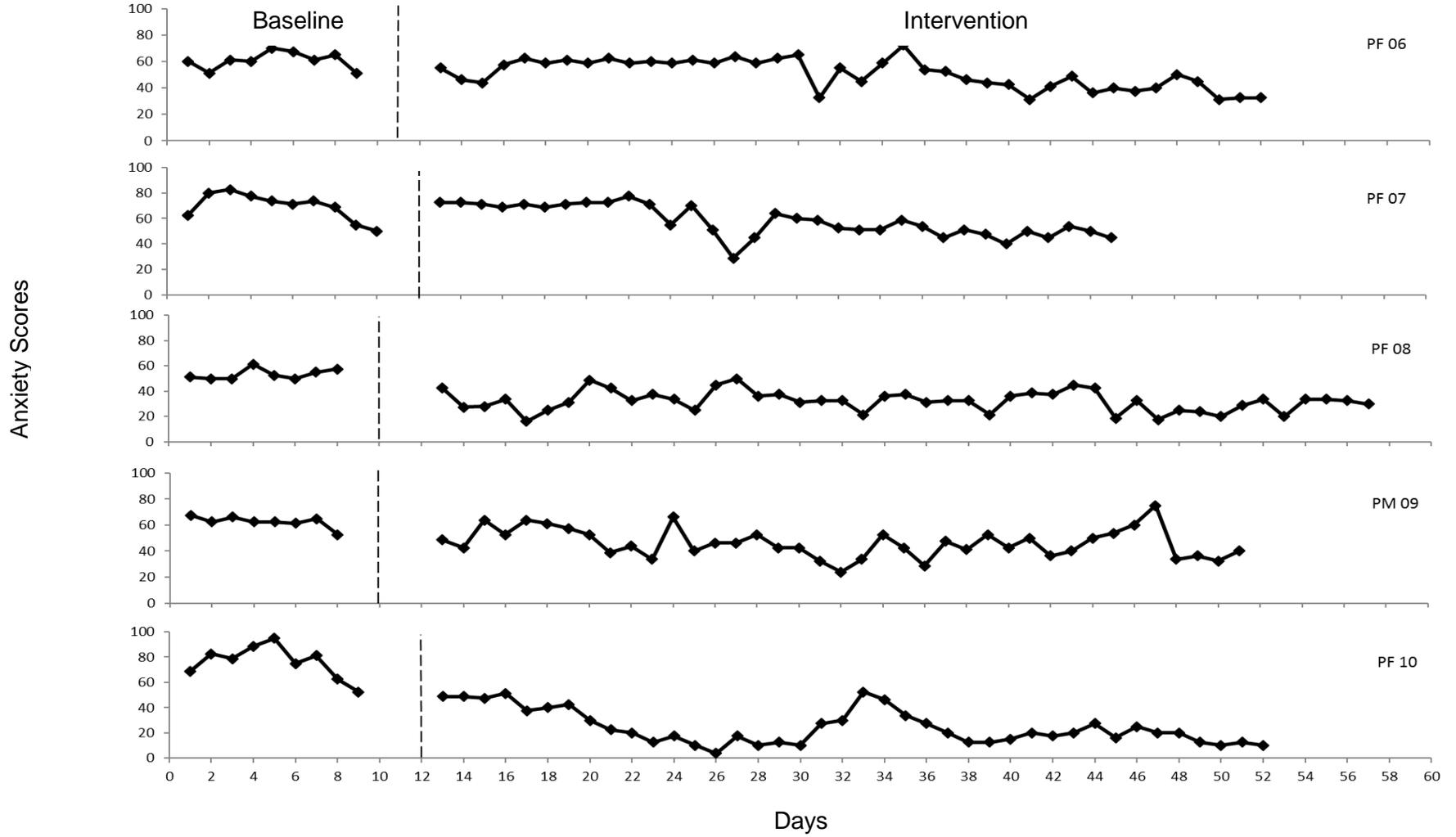


Figure 2b. Level of anxiety for each day across baseline and app use for each participant.

All participants showed a high level of anxiety during the baseline period, and anxiety scores for all participants, except for participant PF 07, decreased during the intervention period (Figure 2b). For PM 01, PM 03, PM 05, and PF 10, the decrease in the level of anxiety during app use was clearer than for other participants, especially for PF10. In contrast, the scores of Participants PM 04, PF 06, PM 08, and PM09 fluctuated with a much smaller change in anxiety scores from the baseline period to the end of the intervention.

PF 06 and PM 09 had unpredictable anxiety levels during app use. Figure 2a shows that during the initial period of app use, PF 03 had a number of anxious days, but these settled over time and decreased towards the end of the study. In contrast, PF 04 started with a low anxiety score but experienced high levels of anxiety most days while using the app. PF 10 was the only participant to show an extreme downward trend in anxiety from the beginning of app use to the end of the study, with extremely low anxiety scores towards the end of the app-use period.

Overall, of the nine participants who completed the app use, eight showed promising results. The exception was PF 04 who showed no decrease in anxiety following the intervention.

I ran a paired sample *t*-test using the mean of the last 3days of daily baseline scores and the mean of the last 3days' scores during the period of the app use. The test showed a significant decrease in the scores from before app use, $M = 62.91$, 95% CI[57.78, 68.04], compared to after app use, $M = 34.23$, 95% CI[27.22, 41.24], $t(9) = 6.36$, $p < 0.001$. The effect size of $d = 3.46$ met Cohen's (1988) criteria for a large effect. I conducted a series of paired-samples *t* tests to explore the effect of app use on a variety of measures conducted pre- and post-app use. Table 3 shows the results of the *t* tests.

Table 3
Results of Paired-Samples t tests on each of the Before-and-After Measures

Scale Name	Before Mean [95% CI]	After Mean [95% CI]	<i>t</i> value	<i>df</i>	<i>p</i> value	Cohen's <i>d</i>
PSS	24	17.3	2.97	9	0.01*	0.96
Positive affect	22.7	33.9	2.71	9	0.02*	0.99
Negative affect	23.9	17.3	2.44	9	0.03*	0.81
MAAS	3.03	3.66	2.84	9	0.01*	0.66
AAQII	44.7	50.4	1.91	9	0.08	0.96
Emotional Exhaustion	17.8	15	2.63	9	0.02	0.65
Cynicism	13.9	11.1	2.20	9	0.05	0.38
HAD-D	7	3.7	3.97	9	0.003*	0.89
HAD-A	11.3	7.7	2.69	9	0.02	1.05
Y- 1	51.4	39.5	2.03	9	0.07	0.91
Y- 2	54.5	41.6	3.48	9	0.006*	1.43

*Significant at an alpha level of $p < .05$ and after Bonferroni correction where appropriate.

Perceived Stress Scale (PSS) scores decreased significantly after app use. The effect size of $d = 0.96$, met Cohen's (1988) criteria for a large effect ($d > .80$). The significant difference indicates lower stress at post-intervention.

Positive affect is the extent to which a person experiences increased concentration, attentiveness, pleasurable engagement, activeness and high energy. Positive affect scores increased significantly from before app use. The effect size of $d = 1.0$ was large. The significant difference indicates increased positive affect indicating heightened mood affect.

Negative affect scores decreased significantly. The effect size for the analysis was large Cohen's (1988). The significant difference indicates decreased negative affect indicating the opposite of positive affect scores showing reduced anger, guilt, nervousness, and an increased sense of calmness and serenity.

Mindful Attention Awareness Scale (MAAS) assesses the characteristic of being aware and attentive to what is happening at the present moment. MAAS scores increased significantly, with a medium effect size. The significant difference reflects higher levels of dispositional mindfulness which is keen attention and awareness to one's own thoughts and feelings and being fully present in the moment without regressing in the past or worrying about the future. An increased score indicates that the respondent is aware of what they are thinking and feeling in the present moment, more organized and able to focus on one thing at a time, and be in touch with their immediate feelings regardless of the situation.

A paired sample *t*-test between the pre- and post-intervention measures for the Acceptance and Action Questionnaire (AAQII) showed a non-significant difference from before app use compared to after app use. The effect size was large according to Cohen's (1988) criteria. The scores were low before and after app use which indicates low level of psychological flexibility or experiential avoidance. This shows that the intervention did not increase the participants' ability to consciously be present in the moment and be aware of their thoughts and feelings rather than escaping from them and acting in ways that are consistent with one's chosen beliefs or values.

Emotional Exhaustion scores significantly decreased from before app use compared to after app use. The effect size of $d = .65$ was of medium size. The significant decrease in the mean scores indicates lower levels of emotional exhaustion after using the app, which is a feeling of being emotionally overwhelmed and exhausted as a result of one's work.

Cynicism scores did not decrease significantly, and the effect size was small. Cynicism measures the presence of distant and negative attitudes towards work and a non-significant difference showed no effect on cynicism.

The other measure of the Hospital Anxiety and Depression Scale (HADS) – Depression suggested a significant decrease in the score from before app use compared to after app use. The effect size of $d = 0.8$ met Cohen's (1988) criteria for a large effect. Hence, the results show a positive outcome post the app intervention in reducing the level of depression and presence of mood disorder.

Due to the fact that multiple t tests were conducted on data from scales measuring anxiety, a Bonferroni correction was applied whereby I divided the standard critical p value of .05 by three, which was the number of tests conducted (HADS-A, Y1, and Y2). This produced a new critical value of p of .02.

Anxiety scores in the Hospital Anxiety and Depression Scale –Anxiety (HADS-A) measure did not decrease significantly after using the app. The effect size was large according to Cohen's (1988) criteria, however, the intervention had no effect in lowering the level of anxiety and presence of mood disorder.

The results of the State –Trait Anxiety Inventory (Y-1) scores suggested a non-significant difference in mean score from before app use compared to after app use. The effect size was large. The non-significant results show no reduction in scores from the pre and post measure with regards to the individual's current state of anxiety.

The State –Trait Anxiety Inventory (Y- 2) scores resulted in a significant difference in the score before and after app use. The effect size was large. The significant decrease in the mean scores indicates lower levels of anxiety related to the individual's internal disposition to reacting in an anxious manner after using the app.

Discussion

In the current study, I examined the effect of the ACTcompanion® app with 10 participants within the workplace. I used a single-subject A-B-A design to explore whether the app had an effect on stress, anxiety, and burnout. I hypothesised that participants who used the app would show an increase in acceptance, mindfulness, and positive affect. I also predicted that the use of the app would produce a decrease in stress, anxiety, cynicism, exhaustion, and negative affect. The intervention did bring about changes in some areas.

Daily Anxiety Level

The effects of the ACTcompanion® app were examined on a daily basis using the Daily Assessment of Symptoms-Anxiety. There was a significant decrease in daily anxiety scores for most participants. Eight of 10 participants completed the app. The average anxiety level over the last 3 days of the baseline period had significantly decreased by the last 3 days of the intervention.

The graphical analysis (Figure 2a & 2b) showed the trend in the participant's level of anxiety. I found a marked decrease in the level of anxiety over a period ranging from 6-8 weeks of using the ACTcompanion® app from Phase A (no intervention) to Phase B (during the intervention). During the intervention (Phase B), the trend indicated a gradual decrease in anxiety over the weeks with some fluctuations in anxiety levels for most participants. Prior to using the ACTcompanion® app, anxiety was high for all participants except for Participants PM 03 and PF 07 whose anxiety levels dropped at the end of the baseline period but increased at the start of the intervention. My research adds to evidence that eHealth interventions, such as mobile applications, can be effective in improving wellbeing (Firth et al., 2017; Naslund et al., 2015; Stratton et al., 2017).

Research suggests that anxiety is a by-product of rumination and worry about the past or the future and is characterised by engagement in behaviours to alter the negative thought process. However, ACT interventions use a different approach to CBT in dealing with anxiety and other mental illnesses by including exercises and techniques (Eifert et al., 2009).

A reduction in the level of anxiety may occur because ACT teaches clients to acknowledge their thoughts and feelings with openness and acceptance, even if they are negative, rather than trying to reduce or escape from them. ACT also encourages clients to commit to achieving value-based goals (Hayes, 2004). The ACTcompanion® app has many exercises that teach the clients skills in handling any stressful situation or to mindfully deal with anxiety-filled thoughts by responding to those situations in ways that are consistent with the values and goals that the clients have chosen.

Two participants did not respond as well as the others to the app. Participant PF 02 dropped out of the study and did not find the app helpful. Participant PM 04 claimed to have enjoyed the app and found it to be very useful, however, there was no change in his daily anxiety scores. The discrepancy in app use and scores on the anxiety measure could be because the app has a lot of exercises and some may not be relevant to the difficulties the person is experiencing. It could be that the specific anxiety issue these two participants were experiencing was not well served by the app exercises provided. It would have also been overwhelming for the participants to go through every exercise in the app without guidance. A guided approach, where a trained expert selects exercises tailored to the client's needs, may produce better treatment outcomes (Andersson & Titov, 2014). Future research could look at the efficacy of the app when the participants are guided on the type of exercises to be completed.

Participant PF 09 experienced a relationship crisis during app use, which is evident in Figure 2b where there is a sudden rise in anxiety scores towards the end of the study. She claimed to use the exercises in the app as a coping strategy during this time. PM 10 found the app extremely helpful during the stressful process of moving to another city and another workspace, which can be seen in Figure 2b during the middle of the intervention period.

Overall, the other participants found the app to be useful, enjoyed the activities on the app, and the ACTcompanion® app was effective in reducing the daily level of anxiety for most participants.

Stress

Workplace factors, like the type of work and the social and organizational structure of the workplace, are determinants of stress, and other mental-health-related problems (Miche, 2002). In some situations, it is hard to alter or remove the factors that cause stressful experiences at work. ACT-based interventions help alter such stresses by emphasizing acceptance of negative distressing emotions as a result of any work stressor, diffusion of those negative thoughts, and development of value-specific goals that result in appropriate behavioural responses (O'Brien et al., 2012).

The participant's perceived stress level in the current study was measured using PSS, and the results showed a significant decrease in the current level of stress which indicated a positive change in the way the participants perceived a stressful situation. The participants experienced an increase in their feeling of control over their lives and hence reported feeling less stressful. Previous researchers investigating the use of ACT at work found similar results (e.g., Bond & Bunce, 2003; Hyland et al., 2015; Stafford-Brown & Pakenham, 2012). Extending on previous studies that show the efficacy of ACT interventions on reducing stress and anxiety, I showed

observable improvements using a more convenient method of delivering an ACT intervention through a smart phone.

Positive and Negative affect

Instead of getting rid of the negative emotions by escaping from them, ACTcompanion® app teaches the user to engage in experiential exercises and metaphors to experience negative emotions to gain a better understanding of, and to manipulate emotions, in order to reach their value-specific goals (Blackledge & Hayes, 2001). The 'Open up' section in the ACTcompanion® app has exercises to control one's emotions and also mindfulness recordings to practice the skill of observing one's emotions with an open mind. By using the techniques in ACT, the client understands their emotions and the description and nature of the emotion in a different manner such that the distressing emotion does not elicit any negative behaviour or create any internal emotional dysregulation. I expected that the participants who used the ACTcompanion® app would show a significant change in their emotional scores after the intervention. Consistent with the hypothesis, the participants showed a significant increase in positive affect and a significant decrease in negative effect. Congruent with my findings, Narimani et al.(2013) found that ACT training helped individuals to control their emotions, reduce risk-related behaviours, impulsivity, aggression, and anxiety by being fully conscious of their thoughts and feelings without suppressing or judging them and also experiencing the secondary emotions attached with those feelings (e.g., guilt and shame). Similarly, Fledderus et al. (2010) showed the effectiveness of ACT and mindfulness in bringing about emotional and psychological wellbeing. The ability to identify, reason with, and understand one's emotion ensures effective emotional regulation, which has a positive effect on leadership, conflict at work, impulse control, and work performance (Donaldson-Feilder & Bond, 2004).

Mindfulness

Mindfulness is one of the core techniques used among the six processes of ACT which teaches an individual to be fully aware of their current surroundings and bodily sensations and to accept any thoughts and feelings without any judgment (Brown & Ryan, 2003). All sections in the app have mindfulness activities such as practicing mindfulness while eating, walking, and doing a household chore. The participants showed a significant increase in their level of mindfulness after using the app with a medium effect size on the MAAS. Similar results were also found by Levin et al. (2017) who sought to determine the efficacy of an adjunctive mobile app based on Acceptance and Commitment Therapy to enhance psychological flexibility and found promising results for acceptance and mindfulness. My findings are also consistent with those of other researchers who have found a positive impact of introducing mindfulness practices in the workplace to increase work performance and reduce workplace health issues (Biglan, Hayes, & Pistorello, 2008; Bond & Bunce, 2003; Hayes et al., 2004).

Psychological flexibility

Psychological flexibility or acceptance was measured using AAQII. As psychological flexibility is one of the major goals of ACT (Kanter, Baruch, & Gaynor, 2006), it was important to assess it. A high level of acceptance is associated with use of appropriate coping strategies, less psychological distress, and engagement in avoidant and ineffective behaviours (Whiting et al., 2015). I expected the level of acceptance to increase from the baseline to post intervention. The results showed a non-significant difference in the acceptance level after the intervention. A higher level of psychological acceptance is a determinant of increased work productivity, and performance and lesser job-related health concerns (Bond & Bunce, 2003). In contrast to previous studies that support ACT intervention in increasing psychological flexibility

(McCracken & Gutiérrez-Martínez, 2011; Masuda et al., 2012), my participants did not show a significant change in their level of acceptance after the intervention, which suggests that they were still avoiding their internal experiences and using negative coping strategies such as denial or avoidance (Karekla & Panayiotou, 2011).

At an individual level, there were a few participants who obtained low scores on AAQ II before the intervention and scored high after the intervention. This situation, statistical regression to the mean, can occur as a result of repeated measurements on the same participants when the extreme scores move closer to the mean (Ostermann et al., 2008).

The main focus of ACT as well as the aim behind the ACTcompanion® app is to develop psychological flexibility in order to increase acceptance of negative experiences and to align one's actions with their chosen values. Another possible explanation for the non-significant result could also be explained by the findings by Bach, Hayes, and Kendall (2002), that the benefits of ACT may take time to appear and hence a longer intervention period with follow up sessions may have been more effective.

ACT interventions include exercises to teach individuals ways of enhancing mindful acceptance when faced with a stressful situation. We do see an overlap between the two constructs; Mindfulness and Psychological flexibility. However, the ACTcompanion® showed a positive effect in increasing mindfulness but no change in psychological flexibility. This discrepancy could be as the MAAS measure in the study has questions that focus on awareness of the present moment however, it does not reflect on the other aspects such as impulsivity, non-judgment, and engaging in value-based behaviour.

Emotional Exhaustion

Participants reported a significant decrease in scores on one of the burnout measures called emotional exhaustion measured by Maslach Burnout inventory. Maslach (2003) suggests that emotional exhaustion is the first step of burnout. My findings support those of previous researchers that show that ACT interventions are successful in decreasing the level of emotional exhaustion among those working in stressful conditions (Brinkborg et al., 2011; Lloyd et al., 2011; Morse, 2012; Thomas et al., 2011). Research shows the effectiveness of mindfulness in reducing emotional exhaustion as mindfulness techniques teach individuals to confront any potential stressful condition in a non-judgmental manner and to use appropriate emotional reactions to stressful situations such as high work pressure (Grégoire, Lachance, & Taylor, 2015; Weinstein, Brown, & Ryan, 2009).

Cynicism

The level of cynicism, which is another measure of burnout, was also assessed using Maslach Burnout inventory. There was a non-significant change in the level of cynicism after the intervention. My results were not consistent with previous research that showed a reduction in level of cynicism using an ACT intervention (Brinkborg et al., 2011; Flaxman, Bond, & Livheim, 2013; Lloyd et al., 2011; Morse, 2012; Thomas et al., 2011).

It is interesting to see that the ACTcompanion® had a positive effect on the participants' emotional exhaustion but not on cynicism. One explanation could be while the app is effective in teaching the participants to regulate their *internal* emotions, some may find it hard to regulate the way in which they *display* their emotions in front of others when operating within the expectations of the workplace. As most of the questionnaires used in the study reflect internalization of emotions, future research could incorporate more questions related to the

external display of emotions. Future research could also look into understanding the effect of the ACT intervention in reducing all the three components of burnout which can be then used as an intervention at workplace.

Depression

ACT interventions, delivered both through self-help books (Jeffcoat & Hayes, 2012) and the internet (Andersson & Cuijpers, 2009; Berger et al., 2011; Carlbring, 2013; Molander et al., 2015), have positive effects in buffering depression. My study extended findings related to app-delivered ACT interventions in reducing symptoms of depression. My participants' depression scores, measured using HADS-Depression, significantly decreased following the intervention. Rumination is considered to be an issue of concern that increases the person's vulnerability for depression (Kashdan, 2010). My findings align with the research by Bond and Bunce (2000) who found ACT reduced depression and increased innovation at work. I expected improvements in this area, as ACT emphasizes increasing tolerance towards challenging and distressing thoughts or emotions and accepting them.

Anxiety

The State-Trait Anxiety inventory (Y-1, Y-2) and the Hospital Anxiety and Depression Scale (Anxiety) were used to measure anxiety among professionals. There was a positive effect on the participants who engaged in the app and a significant decrease in the anxiety scores measured using the State-Trait Anxiety inventory (Y-2) which suggests a decrease in their inherent disposition to react anxiously to any situation. The app was useful in bringing about a change in their personal characteristic of becoming anxious. However, the participants did not show a significant change in their current level of anxiety after the intervention which was measured by the State-Trait Anxiety inventory (Y-1). The non-significant results in the level of

anxiety measured by HADS (Anxiety) could also be as the responses pertain only to the person's feelings over the past week and not their overall state of anxiety. My findings were inconsistent with previous studies that show the success of ACT interventions in reducing anxiety symptoms (Arch & Mitchell, 2016; A-tjak et al., 2015; Deady et al., 2017).

Strengths

To my knowledge, this is the first study to evaluate the efficacy of the ACTcompanion® app on reducing stress, anxiety, emotion, and emotional exhaustion. One of the strengths of the study was in using a small-N, single-subject, design where the behaviours for each participant were reported at baseline (Phase A), intervention (Phase B), and after the intervention (Phase A). There are several advantages in using this design. Firstly, strong conclusions can be drawn using this design as a small sample with repeated measurement allows for monitoring of the effects of the intervention at every step of the process. Secondly, each participant acted as his/her own control, hence, every participant got the potential benefit afforded by the app and there were none who did not receive the intervention. Thirdly, inter-subject variability was reduced because each individual acted as their own control. Random variability caused by having different people in control and treatment conditions is minimized in this design. Fourthly, the same behaviour is measured repeatedly which allows for consistent assessment of behaviour over a period. Fifthly, individual characteristics can be identified to understand the effectiveness of the intervention for each participant (Butler, Sargisson, & Elliffe, 2011). There was no fixed time for the participants to start the app and hence all participants had a different start and end date for their baseline and intervention period. Hence, the flexibility of this design allowed participants to use the app at their own convenience. Lastly, the individual's daily changes in behaviour could be monitored

and there was time for any changes to be made at an early stage (Alnahdi, 2015; Dallery, Cassidy, & Raiff, 2013).

Limitations

The participants who used the ACTcompanion® app showed improvements in their scores on the constructs being measured. However, the current study did have some limitations. Firstly, no information was retrieved regarding the kind of exercises that were beneficial and the number of times the app was used in a day or week. Future research could collect data about the daily and weekly check ins to compare the frequency of app use with effect of the app. Future research could also discover the particular problems of the participants so that the exercises in the app can be allocated according to the needs of the client. Secondly, a few participants did have some opinions about the app but they were not assessed in detail or documented using a questionnaire. However, interviewing participants to understand their perspective of using the app could add to information on the efficacy of the app. Future studies could also include follow-up measurements to explore the maintenance effect of the intervention.

Conclusion

Single-subject design was used to understand the effectiveness of the ACTcompanion® app on stress, anxiety, and burnout among participants in the workplace. The participants in the current study showed a significant reduction in their daily anxiety level after using the ACTcompanion® app. Following the intervention, the participants also showed improvements in the measures of perceived stress, positive and negative affect, depression, emotional exhaustion, and mindfulness. There were a few measures that showed no significant change. However, my findings generally support the use of the ACTcompanion® app in improving wellbeing when assessed over a period.

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Appendix A

Poster

FEELING STRESSED OUT AT WORK???

Take a deep breath and try using this ACT Companion app

The study involves investigating the effects of a mobile app on stress,
(and/or wellbeing) in the workplace.

Participants!!!

- *Full time or part time within the working sector with a smartphone*



What you are going to do???

- *Fill in some questionnaires regarding anxiety and stress.*
- *Manoeuvre through the small tasks on the free based ACT App at any time through the day*

Benefits??

- *Participants will be offered a chance to enter a draw to win a \$50 voucher.*

Duration?

- *A few minutes of your time daily for about 6-8 weeks and about 20 minutes in the beginning and the end of the study for the questionnaires.*

Free code will be provided to download the app!!

For more information regarding the study, contact Deborah Lobo, Researcher and student, Master of Applied Psychology (Behavioural Psychology) at dal19@students.waikato.ac.nz

Appendix B

Information sheet

A Research Project: Investigating whether the ACT mobile app affects the level of anxiety and stress among those at a workplace setting.

What is it about?

The research is designed to examine whether the ACT Companion app affects the level of anxiety and stress among those participants in the workforce. The app can be downloaded from the app store when provided with free code. The code will be used to fill in the activities and hence anonymity will be maintained. You will be asked to fill in some questionnaires only before you begin the app and at the end. A brief daily self-report questionnaire will be given which will have to be returned to the researcher at the end of each day till the end of the app. The activities within the app include completing some simple tasks and then attempting to explain your thoughts, feelings and emotions while doing those tasks as well as listening to a few mindfulness recordings that could help relax and calm yourself while learning to deal with any stressful events. After you have finished the app, the same set of questionnaires will be given to you to complete again.

This is a Master's thesis research project supervised by Drs. Rebecca Sargisson (rebeccas@waikato.ac.nz) and Maree Roche (maree.roche@waikato.co.nz). The researcher in this study is Deborah Lobo (dal19@ students.waikato.ac.nz).

How much of your time will participation involve?

At least once every day and just for a few minutes for about 6-8 weeks and about 20 minutes in the beginning and the end of the study for the questionnaires.

Will your participation in the project remain confidential?

If you agree to take part, you will be given codes to protect your identity. Your name will not be linked to any data that will be recorded. No information about you will be disclosed to other parties. You can be assured that if you take part in this project you will remain anonymous.

Questionnaire information will be collected through and stored in Qualtrics. Information from the questionnaires will be available to the researchers. The app developers will provide us information regarding the data on how often and for how long the participants used the app, the number of tasks completed, and frequency of use, but all personal information provided by the participants while using the app will remain anonymous. All the data will be password protected and stored in the computer. Following APA guidelines (Section 8.14), the data will be handed over to the supervisors for indefinite use once we complete the study and given to researchers interested in the study when requested.

What kind of materials and tasks will be involved in the process?

- Smartphone
- Questionnaires regarding anxiety and stress to be completed at the beginning and end of the project.
- A daily report questionnaire that will be sent to your email at the end of each day which has to be returned.
- Manoeuvre through the small tasks on the ACT App at any time through the day for a period of 6-8 weeks.

What are the benefits of participating in this research?

- It is a convenient app that can be used at anytime and anyplace.
- The activities within the app are simple yet will help you to relax in times of stress.
- You will gain lifetime access to the app.
- A chance to enter a draw to win a voucher.

- As you go along, if you are interested to know more about the studies of Acceptance and Commitment therapy, a list of references will be provided for your information.
- Please notice: participants can withdraw from the study at any time and still be eligible for the benefits.

What happens now?

If you agree to participate, I will ask you to sign a consent form and will provide further instructions.

This research project has been approved by the School of Psychology Research and Ethics Committee of the Faculty of Arts and Social Sciences, University of Waikato. Any questions about the ethical conduct of this research may be sent to the convenor of the Research and Ethics Committee (Dr. John Peronne
Email: jpnz@waikato.ac.nz)

Appendix C

Consent form



School of Psychology



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

A completed copy of this form should be retained by both the researcher and the participant. [Note: you may delete or reword any items that are not relevant to your research and add items that are relevant to your research. **please ensure that the crest and logo above appear on the top of the page**

Research Project: Investigating whether the ACT (Acceptance and Commitment Therapy) mobile app affects the level of anxiety and stress among those at a workplace setting

Please complete the following checklist. Tick (✓) the appropriate box for each point.	YES	NO
1. I have read the Participant Information Sheet (or it has been read to me) and I understand it.		
2. I have been given sufficient time to consider whether or not to participate in this study		
3. I am satisfied with the answers I have been given regarding the study and I have a copy of this consent form and information sheet		
4. I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without penalty		
5. I have the right to decline to participate in any part of the research activity		
6. I know who to contact if I have any questions about the study in general.		
7. I understand that my participation in this study is confidential and that no material, which could identify me personally, will be used in any reports on this study.		
8. I wish to receive a copy of the findings		
9. I wish to view the summary report of my interview		

Declaration by participant:

I agree to participate in this research project and I understand that I may withdraw at any time. If I have any concerns about this project, I may contact the convenor of the Psychology Research and Ethics Committee (Dr. John Peronne Email: jpnz@waikato.ac.nz)

Participant's name (Please print):

Signature:

Date:

Declaration by member of research team:

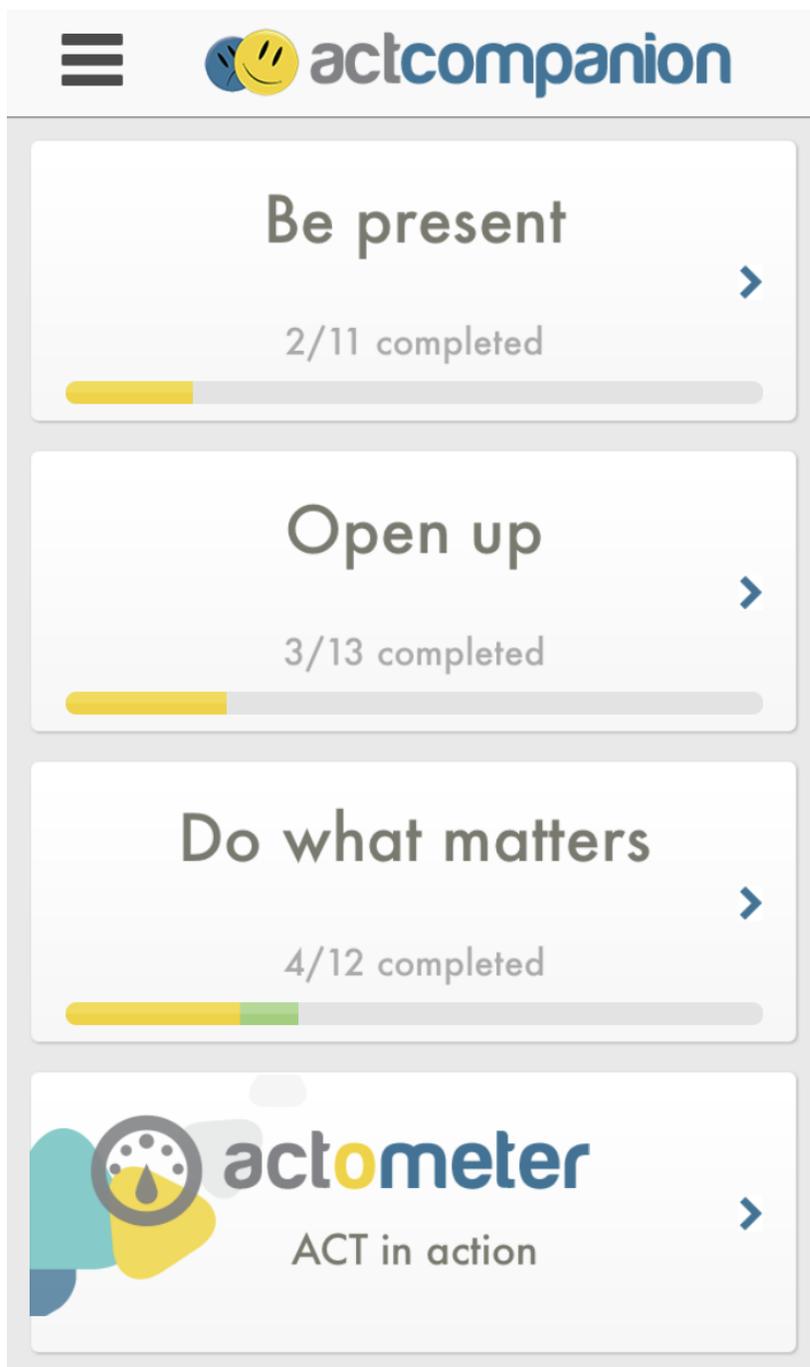
I have given a verbal explanation of the research project to the participant, and have answered the participant's questions about it. I believe that the participant understands the study and has given informed consent to participate.

Researcher's name (Please print):

Signature:

Date:

Appendix D
ACTcompanion app



Appendix E

Perceived Stress Scale

For each question choose from the following alternatives:

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

- _____ 1. In the last month, how often have you been upset because of something that happened unexpectedly?
- _____ 2. In the last month, how often have you felt that you were unable to control the important things in your life?
- _____ 3. In the last month, how often have you felt nervous and stressed?
- _____ 4. In the last month, how often have you felt confident about your ability to handle your personal problems?
- _____ 5. In the last month, how often have you felt that things were going your way?
- _____ 6. In the last month, how often have you found that you could not cope with all the things that you had to do?
- _____ 7. In the last month, how often have you been able to control irritations in your life?
- _____ 8. In the last month, how often have you felt that you were on top of things?
- _____ 9. In the last month, how often have you been angered because of things that happened that were outside of your control?
- _____ 10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

- Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress.
 - ▶ Scores ranging from 0-13 would be considered low stress.
 - ▶ Scores ranging from 14-26 would be considered moderate stress.
 - ▶ Scores ranging from 27-40 would be considered high perceived stress

Appendix F

The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988)

PANAS Questionnaire

This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below next to each word. **Indicate to what extent you feel this way right now, that is, at the present moment OR indicate the extent you have felt this way over the past week (circle the instructions you followed when taking this measure)**

1	2	3	4	5
Very Slightly or Not at All	A Little	Moderately	Quite a Bit	Extremely

_____ 1. Interested	_____ 11. Irritable
_____ 2. Distressed	_____ 12. Alert
_____ 3. Excited	_____ 13. Ashamed
_____ 4. Upset	_____ 14. Inspired
_____ 5. Strong	_____ 15. Nervous
_____ 6. Guilty	_____ 16. Determined
_____ 7. Scared	_____ 17. Attentive
_____ 8. Hostile	_____ 18. Jittery
_____ 9. Enthusiastic	_____ 19. Active
_____ 10. Proud	_____ 20. Afraid

Scoring Instructions:

Positive Affect Score: Add the scores on items 1, 3, 5, 9, 10, 12, 14, 16, 17, and 19. Scores can range from 10 – 50, with higher scores representing higher levels of positive affect. Mean Scores: Momentary = 29.7 ($SD = 7.9$); Weekly = 33.3 ($SD = 7.2$)

Negative Affect Score: Add the scores on items 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20. Scores can range from 10 – 50, with lower scores representing lower levels of negative affect. Mean Score: Momentary = 14.8 ($SD = 5.4$); Weekly = 17.4 ($SD = 6.2$)

Appendix G

Hospital Anxiety and Depression Scale (HADS)

Tick the box beside the reply that is closest to how you have been feeling in the past week.
Don't take too long over you replies: your immediate is best.

D	A		D	A	
		I feel tense or 'wound up':			I feel as if I am slowed down:
	3	Most of the time	3		Nearly all the time
	2	A lot of the time	2		Very often
	1	From time to time, occasionally	1		Sometimes
	0	Not at all	0		Not at all
		I still enjoy the things I used to enjoy:			I get a sort of frightened feeling like 'butterflies' in the stomach:
0		Definitely as much	0		Not at all
1		Not quite so much	1		Occasionally
2		Only a little	2		Quite Often
3		Hardly at all	3		Very Often
		I get a sort of frightened feeling as if something awful is about to happen:			I have lost interest in my appearance:
	3	Very definitely and quite badly	3		Definitely
	2	Yes, but not too badly	2		I don't take as much care as I should
	1	A little, but it doesn't worry me	1		I may not take quite as much care
	0	Not at all	0		I take just as much care as ever
		I can laugh and see the funny side of things:			I feel restless as I have to be on the move:
0		As much as I always could		3	Very much indeed
1		Not quite so much now		2	Quite a lot
2		Definitely not so much now		1	Not very much
3		Not at all		0	Not at all
		Worrying thoughts go through my mind:			I look forward with enjoyment to things:
	3	A great deal of the time	0		As much as I ever did
	2	A lot of the time	1		Rather less than I used to
	1	From time to time, but not too often	2		Definitely less than I used to
	0	Only occasionally	3		Hardly at all
		I feel cheerful:			I get sudden feelings of panic:
3		Not at all		3	Very often indeed
2		Not often		2	Quite often
1		Sometimes		1	Not very often
0		Most of the time		0	Not at all
		I can sit at ease and feel relaxed:			I can enjoy a good book or radio or TV program:
	0	Definitely	0		Often
	1	Usually	1		Sometimes
	2	Not Often	2		Not often
	3	Not at all	3		Very seldom

Please check you have answered all the questions

Scoring:

Total score: Depression (D) _____ Anxiety (A) _____

0-7 = Normal

8-10 = Borderline abnormal (borderline case)

11-21 = Abnormal (case)

Appendix H

State Trait Anxiety Inventory – Y 1

SELF-EVALUATION QUESTIONNAIRE STAI Form Y-1

Please provide the following information:

Name _____ Date _____ S _____

Age _____ Gender (Circle) M F T _____

DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right now*, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

NOT AT ALL
 SOMEWHAT
 MODERATELY SO
 VERY MUCH SO

- | | | | | |
|--|---|---|---|---|
| 1. I feel calm..... | 1 | 2 | 3 | 4 |
| 2. I feel secure | 1 | 2 | 3 | 4 |
| 3. I am tense | 1 | 2 | 3 | 4 |
| 4. I feel strained | 1 | 2 | 3 | 4 |
| 5. I feel at ease | 1 | 2 | 3 | 4 |
| 6. I feel upset | 1 | 2 | 3 | 4 |
| 7. I am presently worrying over possible misfortunes | 1 | 2 | 3 | 4 |
| 8. I feel satisfied | 1 | 2 | 3 | 4 |
| 9. I feel frightened | 1 | 2 | 3 | 4 |
| 10. I feel comfortable | 1 | 2 | 3 | 4 |
| 11. I feel self-confident..... | 1 | 2 | 3 | 4 |
| 12. I feel nervous | 1 | 2 | 3 | 4 |
| 13. I am jittery | 1 | 2 | 3 | 4 |
| 14. I feel indecisive..... | 1 | 2 | 3 | 4 |
| 15. I am relaxed | 1 | 2 | 3 | 4 |
| 16. I feel content | 1 | 2 | 3 | 4 |
| 17. I am worried | 1 | 2 | 3 | 4 |
| 18. I feel confused..... | 1 | 2 | 3 | 4 |
| 19. I feel steady..... | 1 | 2 | 3 | 4 |
| 20. I feel pleasant..... | 1 | 2 | 3 | 4 |

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Appendix I

State Trait Anxiety Inventory – Y 2

SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-2

Name _____ Date _____

DIRECTIONS

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

ALMOST NEVER
SOMETIMES
OFTEN
ALMOST ALWAYS

- | | | | | |
|--|---|---|---|---|
| 21. I feel pleasant..... | 1 | 2 | 3 | 4 |
| 22. I feel nervous and restless | 1 | 2 | 3 | 4 |
| 23. I feel satisfied with myself..... | 1 | 2 | 3 | 4 |
| 24. I wish I could be as happy as others seem to be | 1 | 2 | 3 | 4 |
| 25. I feel like a failure | 1 | 2 | 3 | 4 |
| 26. I feel rested | 1 | 2 | 3 | 4 |
| 27. I am "calm, cool, and collected" | 1 | 2 | 3 | 4 |
| 28. I feel that difficulties are piling up so that I cannot overcome them..... | 1 | 2 | 3 | 4 |
| 29. I worry too much over something that really doesn't matter..... | 1 | 2 | 3 | 4 |
| 30. I am happy | 1 | 2 | 3 | 4 |
| 31. I have disturbing thoughts | 1 | 2 | 3 | 4 |
| 32. I lack self-confidence..... | 1 | 2 | 3 | 4 |
| 33. I feel secure | 1 | 2 | 3 | 4 |
| 34. I make decisions easily | 1 | 2 | 3 | 4 |
| 35. I feel inadequate..... | 1 | 2 | 3 | 4 |
| 36. I am content | 1 | 2 | 3 | 4 |
| 37. Some unimportant thought runs through my mind and bothers me | 1 | 2 | 3 | 4 |
| 38. I take disappointments so keenly that I can't put them out of my mind..... | 1 | 2 | 3 | 4 |
| 39. I am a steady person..... | 1 | 2 | 3 | 4 |
| 40. I get in a state of tension or turmoil as I think over my recent concerns
and interests | 1 | 2 | 3 | 4 |

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Appendix J

Acceptance and Action Questionnaire (AAQ II)

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

1	2	3	4	5	6	7
never true	very seldom true	seldom true	sometimes true	frequently true	almost always true	always true

1. Its OK if I remember something unpleasant.	1	2	3	4	5	6	7
2. My painful experiences and memories make it difficult for me to live a life that I would value.	1	2	3	4	5	6	7
3. I'm afraid of my feelings.	1	2	3	4	5	6	7
4. I worry about not being able to control my worries and feelings.	1	2	3	4	5	6	7
5. My painful memories prevent me from having a fulfilling life.	1	2	3	4	5	6	7
6. I am in control of my life.	1	2	3	4	5	6	7
7. Emotions cause problems in my life.	1	2	3	4	5	6	7
8. It seems like most people are handling their lives better than I am.	1	2	3	4	5	6	7
9. Worries get in the way of my success.	1	2	3	4	5	6	7
10. My thoughts and feelings do not get in the way of how I want to live my life.	1	2	3	4	5	6	7

Appendix K

Mindfulness Attention Awareness Scale

Mindful Attention Awareness Scale (MAAS)

Please indicate the degree to which you agree with each of the following items using the scale below.		Almost always	Very frequently	Somewhat frequently	Somewhat infrequently	Very infrequently	Almost never
MAAS 1	I could be experiencing some emotion and not be conscious of it until some time later.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 2	I break or spill things because of carelessness, not paying attention, or thinking of something else.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 3	I find it difficult to stay focused on what's happening in the present.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 4	I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 5	I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 6	I forget a person's name almost as soon as I've been told it for the first time.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 7	It seems I am "running on automatic" without much awareness of what I'm doing.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 8	I rush through activities without being really attentive to them.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 9	I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 10	I do jobs or tasks automatically, without being aware of what I'm doing.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 11	I find myself listening to someone with one ear, doing something else at the same time.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 12	I drive places on "automatic pilot" and then wonder why I went there.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 13	I find myself preoccupied with the future or the past.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 14	I find myself doing things without paying attention.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
MAAS 15	I snack without being aware that I'm eating.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

Appendix L
Maslach Burnout Inventory

	Never	A few times a year	A few times a month	A few times a week	Always
Maslach, C. & Jackson, S. E. (1981). The measurement of experienced burnout. <i>Journal of Occupational Behaviour</i> , 2, 99-113.					
JOB BURNOUT – EMOTIONAL EXHAUSTION					
I feel emotionally drained from my work	1	2	3	4	5
I feel used up at the end of the workday	1	2	3	4	5
I feel tired when I get up in the morning and have to face another day on the job	1	2	3	4	5
Working all day is really a strain for me	1	2	3	4	5
I feel burned out from my work	1	2	3	4	5
JOB BURNOUT – CYNICISM					
I have become less interested in my work since I started this job	1	2	3	4	5
I have become less enthusiastic about my work	1	2	3	4	5
I have become more cynical about whether my work contributes anything	1	2	3	4	5
I doubt the significance of my work	1	2	3	4	5
I just want to do my job and not be bothered	1	2	3	4	5

