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MINT pilot study: a text message package as an adjunct to existing Mindfulness-Based Cognitive Therapy in an Early Intervention setting.

A thesis presented in partial fulfilment of the requirements of the degree of Doctor of Clinical Psychology at Massey University, Albany, New Zealand

Mary Miller (2018)

Abstract

Background: Mindfulness-Based Cognitive Therapy (MBCT) is being used in an increasing number of settings including Early Intervention (EI) for psychosis services. People with psychotic symptoms face difficulties including compliance problems with home-based practice, which may affect the utility of MBCT. This study aimed to examine whether text message technology could be used as an adjunct to support home-based practice. **Method:** A single case multiple baseline design was used to assess the mindfulness text message intervention (MINT) in 11 participants. **Results:** There was a statistically significant increase of group mean total practice time per week of 7.1 minutes from the baseline to post-intervention phase, with a medium effect size. There were no statistically significant results for change in mindfulness skills or depression and anxiety symptoms. **Discussion:** Text messages can be used as an adjunct to support home-based practice in an EI setting. The amount of home-based practice required to produce an improvement in clinical outcomes is unclear. Future studies may explore the variation between participants found and the use of MINT in other settings.

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Table of contents

Chapter 1 - Mindfulness Based Cognitive Therapy 3

The origins of Mindfulness Based Cognitive Therapy 3

Mindfulness Based Cognitive Therapy 5

Evidence for the efficacy of MBCT 14

Summary 19

Chapter 2 – Mindfulness Based Cognitive Therapy and clients with psychotic symptoms 20

Mindfulness and meditation 20

Mindfulness Based Cognitive Therapy and psychotic symptoms 21

Summary 31

Chapter 3 – Home-based practice 32

Defining 'home-based practice' 32

The theory of why home-based practice is important 33

Evidence that MBCT home-based practice improves outcomes 34

Compliance with home-based practice 38

Potential barriers to home-based practice compliance for clients with psychotic symptoms 43

Possible means of supporting home-based practice compliance for clients with psychotic symptoms 44

Summary 45

Chapter 4 - Text messages as a way of supporting home-based practice 47

Text messaging technology 47

Text messaging research 49

Mechanisms through which text messages may increase home-based practice compliance 57

Summary 61

Chapter 5 – The current study and intervention development 64

Rationale for the current study 64

Hypotheses 66

Development of the intervention 67

Chapter 6 – Method 71

Research design 71

Study design 75

Treatment context 75

Participants 76

Procedure 78

Measures 80

Data analysis strategy 84

Ethical considerations 91

Chapter 7 – Results 94

Section 1 - Group data 94

Section 2 - Individual data 107

Section 3 - Additional data 129

Chapter 8 - Discussion 132

Section 1 – Discussion of results compared to hypotheses 132

Section 2 – Areas of interest from the study 133

Section 3 – Strengths and limitations 146

Section 4 - Conclusions and future directions.....149

List of tables

Table 1. Demographic information 77

Table 2. Items on the PHQ-4 81

Table 3. Effect size percentiles for NAP 91

Table 4. Total practice group data 95

Table 5. Group CAMS-R data 101

Table 6. PHQ-4 group scores 103

Table 7. PC01 total practice 107

Table 8. PC01 PHQ-4 scores 109

Table 9. PC04 total practice 110

Table 10. PC04 PHQ-4 scores 112

Table 11. PC06 total practice 114

Table 12. PC06 PHQ-4 scores 115

Table 13. PC07 total practice 117

Table 14. PC07 PHQ-4 scores 118

Table 15. PC08 total practice 120

Table 16. PC08 PHQ-4 scores 121

Table 17. PC09 total practice 123

Table 18. PC09 PHQ-4 scores 124

Table 19. PC10 total practice 125

Table 20. PC10 PHQ-4 scores 127

Table 21. Participant ratings for MINT 129

Table 22. Participant survey responses 130

List of figures

Figure 1. Brinley plot graph. 86

Figure 2. Brinley Plot of A1B1 change for group total practice. Total practice in minutes is shown on both axes. A1 is shown on the x-axis and B1 on the y-axis. . 96

Figure 3. Brinley Plot of A1A2 change for group total practice. Total practice in minutes is shown on both axes. A1 is shown on the x-axis and A2 on the y-axis. . 96

Figure 4. Time series for group total practice. 100

Figure 5. Brinley plot of A1B1 change for the CAMS-R. The CAMS-R score is shown on both axes. A1 is shown on the x-axis and B1 on the y-axis. 102

Figure 6. Brinley plot of A1A2 change for the CAMS-R. The CAMS-R score is shown on both axes. A1 is shown on the x-axis and A2 on the y-axis. 103

Figure 7. Brinley plot of A1B1 change for the PHQ-4. PHQ-4 scores are shown on both axes. A1 is shown on the x-axis and B1 on the y-axis. 105

Figure 8. Brinley plot of A1A2 change for the PHQ-4. PHQ-4 scores are shown on both axes. A1 is shown on the x-axis and A2 on the y-axis. 105

Figure 9. PC01 total practice. 108

Figure 10. PC01 PHQ-4 scores. 109

Figure 11. PC04 total practice. 111

Figure 12. PC04 PHQ-4 scores. 113

Figure 13. PC06 total practice. 114

Figure 14. PC06 PHQ-4 scores. 116

Figure 15. PC07 total practice. 117

Figure 16. PC07 PHQ-4 scores. 119

Figure 17. PC08 total practice. 120

Figure 18. PC08 PHQ-4 scores. 122

Figure 19. PC09 total practice. 123

Figure 20. PC09 PHQ-4 scores. 125

Figure 21. PC10 total practice. 126

Figure 22. PC10 PHQ-4 scores. 128

MINT pilot study: a text message package as an adjunct to existing Mindfulness-Based Cognitive Therapy in an Early Intervention setting.

Mindfulness-Based Cognitive Therapy (MBCT) has become increasingly popular in recent years. Part of the 'third wave' of CBT approaches, MBCT is focused on using mindfulness approaches to develop an increased awareness of the present moment, acceptance of the present moment, and self-compassion. Developed to help prevent relapse in depression through reduced rumination, there is evidence that it can reduce relapse in those who have experienced more than three depressive episodes (H. S. Ma & Teasdale, 2004; Teasdale et al., 2000). Interest in the use of MBCT in different areas of mental health has been growing, but the evidence to support this expansion is currently only just emerging and somewhat tentative.

One area in which MBCT is now being used is the Early Intervention (EI) approach to treating young adults who have experienced psychosis. This population faces particular issues that are associated with their symptoms, which may affect the efficacy of MBCT. Specifically, home-based practice is theorised to be an important component of MBCT to achieve the greatest therapeutic gains. Those in EI settings may have difficulties completing home-based practice due to a variety of reasons, which is a particular problem in clinical practice where there is a lack of evidence to help clinicians use best practice with their clients.

It is possible that technology can be used as an adjunct to existing treatment. In particular, text messages may provide a means of communicating with clients receiving MBCT in an EI setting. Text messages have the benefit of being low cost to develop and low cost for the client to use.

The aim of the study is to establish whether text messages can be used as an adjunct to existing treatment in the EI setting, to help support clients to complete their home-based practice. Further aims include whether this increase in practice provides therapeutic gains in terms of either increased levels of mindfulness skills or decreased levels of anxiety or depression. A single case study with a multiple baseline design approach was taken to examine participants in clinical settings due to its benefits for small sample numbers.

Chapter 1 introduces the origins and theory of MBCT, exploring the mechanisms through which it may work, a description of the programme and evidence for the efficacy of its use. In **Chapter 2,** the use of MBCT for those who have experienced psychotic symptoms, the evidence for the efficacy of its use and EI services in New Zealand and potential difficulties with using MBCT are discussed. Home-based practice is then defined in **Chapter 3,** along with its importance in MBCT, evidence, compliance issues and specific barriers faced by those who have experienced psychotic symptoms are discussed. **Chapter 4** introduces the use of text message technology as an adjunct to support existing therapy, and research in health and mental health settings and mechanisms through which text messages may help increase home-based practice. This study's rationale, the hypotheses and the development of the intervention (MINdfulness Texts, MINT) are described in **Chapter 5**. **Chapter 6** describes the single case research design used, procedure, measures, data analysis and ethical considerations. **Chapter 7** reports the results at group and individual level as well as additional data from surveys. **Chapter 8** discusses how MINT did increase home-based practice, the areas of interest, strengths, and limitations of the study and concludes with suggestions for future studies.

Chapter 1 - Mindfulness Based Cognitive Therapy

Mindfulness Based Cognitive Therapy (MBCT) arose from Cognitive Behavioural Therapy (CBT) as part of the so-called third wave of CBT-based approaches (Hofmann, Sawyer, & Fang, 2010). This chapter will give a brief overview of CBT to contextualise the development of MBCT, and will then explore the inception of MBCT and its conceptual basis and practice. An overview of the evidence supporting the use of MBCT for preventing relapse in depression and other newer applications follows. An overview of evidence for its use for a range of symptoms will then be presented, including psychotic symptoms, which is the focus of this research. The use of MBCT has increased in clinical practice, despite the fact that research to support its use is only beginning to emerge (Farias & Wikholm, 2016). This study aims to add empirical information to the gap between research and practice.

The origins of Mindfulness Based Cognitive Therapy

The conceptualisation of Cognitive Behavioural Therapy. Cognitive Therapy was conceptualised by A. T. Beck, Rush, Shaw, and Emery (1979) as an approach that expanded upon behavioural therapy to include the effect of cognitions on mental wellbeing. Later, others combined cognitive and behavioural approaches to give rise to CBT (Early & Grady, 2017). The premise underlying CBT is that cognitions can affect both behaviour and mood, and that by altering cognitions, behaviour and mood can be changed. A. T. Beck (1964) postulated that people form schemas during their childhood development, which act as mental frameworks for how people subsequently view and interpret the world (Gotlib & Hammen, 1992). These schemas inform people's core beliefs, which are guiding conceptualisations about themselves, others, the future, and the world around us (Gotlib & Hammen, 1992). People may be unaware of these

cognitive processes that inform their interpretation of events, which can be positive or negative, and some core beliefs can lie dormant until a stressor triggers them. A. T. Beck (1964) hypothesised that these core beliefs and schemas could be involved in negative thought processes that lead to the development of mental distress. The automatic thoughts, which arise from core beliefs and schemas, follow rules and assumptions that then influence how a person views a situation (J. S. Beck, 1995). Through challenging negative and unhelpful thinking processes, these cognitions can be reduced or changed and more positive and helpful cognitions introduced (J. S. Beck, 1995). CBT uses a range of techniques and tools that challenge undesirable cognitive processes to improve wellbeing (Kazantzis & Ronan, 2006). For example, core beliefs involved in depression include negative beliefs about the self, the world and the future, such as, “I am unlovable” (Westbrook, Kennerley, & Kirk, 2011). These core beliefs can then be challenged using a range of techniques, including, but not limited to, decentering (developing an ability to view cognitions as passing events rather than a reflection of reality), weighing up the pros and cons of a cognition and problem solving worst-case scenarios (Westbrook et al., 2011).

Third wave approaches in CBT. Since its inception, the uses of CBT have expanded to treat a range of mental health disorders from post-traumatic stress disorder to schizophrenia (Butler, Chapman, Forman, & Beck, 2006). Recently, a so-called third wave of CBT-based approaches have emerged, including MBCT, acceptance and commitment therapy (ACT), and dialectical behavioural therapy (DBT) (Hofmann et al., 2010). There is some preliminary evidence that suggests that third wave approaches, such as ACT, operate through different mechanisms to CBT (Hayes, Luoma, Bond, Masuda, & Lillis, 2006), while others suggest that approaches like MBCT are simply further extensions within the family of established CBT based approaches (Hofmann &

Asmundson, 2008). Either way, MBCT originates from the bases of CBT and shares some common components with it, whilst also having a distinct theoretical approach, which is discussed in the subsequent section. MBCT has had a rapid rise in popularity in recent years, and yet, there is the need for more research in these areas to support their clinical application (Farias & Wikholm, 2016).

Mindfulness Based Cognitive Therapy

Conceptual basis. The MBCT approach was developed by Segal, Teasdale, Williams, and Gemar (2002) due to an initial desire to create a version of CBT to prevent relapse in clients with depression. Major depressive disorder (MDD) is a chronic condition, with one study showing that more than 80% of sufferers had repeated episodes of depression, with an average of four episodes of 20 weeks in length in a lifetime (Judd, 1997). Segal et al. (2002) initially considered traditional CBT components, but they then became interested in an approach used by Kabat-Zinn (1990) called Mindfulness Based Stress Reduction. Segal et al. (2002) combined elements of mindfulness into traditional CBT approaches, but they noticed that the success of this intervention was related to how much experience the therapist had in mindfulness skills. They immersed themselves in their own mindfulness practice, and subsequently developed a mindfulness therapy protocol to which they added elements of CBT, calling this approach MBCT.

There is a difference between CBT and MBCT in terms of how the link between cognition and mood is understood. An underlying assumption of CBT is that negative thinking can affect mood (A. T. Beck et al., 1979). Teasdale (1988) explored the opposite – could mood affect thinking? Those who have suffered depression in the past may differ cognitively from those who have not. People who have had depression may develop negative cognitive patterns, which can be triggered by low mood, and these

habitual ways of responding to low mood act to maintain and intensify low mood (Teasdale et al., 2000). Compared to those who have never suffered depression, individuals with a history of depression may find that mild low mood can trigger even lower mood, thereby increasing the risk of future episodes of depression (Teasdale et al., 2000). These cycles of ruminative cognitive-affective processing act to repeat and maintain depression in susceptible individuals (Teasdale, 1988, 1997). The "differential activation hypothesis" was proposed: that sad moods were likely to trigger negative thoughts associated with previous sad moods (Teasdale, 1988). Explaining the processes involved in relapse further, 'cognitive reactivity' was proposed to describe how small changes in mood can trigger large changes in negative thinking because of previous negative cognitive patterns associated with an earlier episode of depression (Segal, Williams, et al., 2002).

Ruminative negative thought patterns are thought to be an active component in triggering and maintaining depressive episodes (Nolen-Hoeksema, 1991). Rumination, in this context, is defined as "behavior and thoughts that focus one's attention on one's depressive symptoms and the implications of these symptoms" (Nolen-Hoeksema, 1991, p.569). It has been suggested that while people tend to engage in ruminative thought patterns with the aim of solving their problems, this ruminative style of thinking acts instead to maintain the symptoms of depression (Nolen-Hoeksema, 1991). This style of ruminative thinking is concerned with worry about symptoms and feelings without finding solutions that will be beneficial to the individual, and has been shown to reduce peoples' problem solving abilities in a number of studies (Carver, Scheier, & Weintraub, 1989; Nolen-Hoeksema, 1991; Nolen-Hoeksema & Morrow, 1991). Those with ruminative thinking styles hold positive beliefs about the effectiveness of rumination, while evidence shows that these positive beliefs are erroneous – they reduce

their ability to problem solve (Watkins & Moulds, 2005). The negative ruminative thinking patterns have been found to be similar to thinking patterns in an individual's previous episodes of depression (Segal, Williams, Teasdale, & Gemar, 1996; Teasdale, 1988; Teasdale, Segal, & Williams, 1995). Both cognitive reactivity and depressive ruminative thought patterns are hypothesized to trigger and maintain depressive episodes (Nolen-Hoeksema, 1991, 2000; Segal, Gemar, & Williams, 1999; Teasdale, 1999a; Watkins & Teasdale, 2004).

MBCT was developed to interrupt the repetitive cognitive-affecting patterns that could result in relapse in clients with depression. The significant difference between MBCT and CBT is that the focus of MBCT is on developing a mindful stance where states of mind are witnessed, as opposed to CBT where states of mind are challenged (Teasdale et al., 2000).

Mindfulness has been operationalized to include two main components: self-regulated focused attention on the present moment and a curious, open and accepting orientation (Bishop, 2004). The second component has been expanded upon to include non-judgement, compassion and a decentred stance. Components of mindfulness could be summarised as present moment awareness and non-judgement (decentering).

Mechanisms through which MBCT may work. There are several distinct but related components of MBCT through which it is hypothesized to work. These include intentional attention, focusing on the present moment, acceptance, non-judgmental stance, and compassion (Segal, Williams, & Teasdale, 2013). MBCT practice focuses on skills that strengthen these components, such as mindful breathing, body scan techniques and an accepting attitude (Segal et al., 2013). The following section will explore these areas, and how they relate to one another.

The importance of attention. MBCT seeks to bring awareness to the focus of one's attention (Allen et al., 2006). Through awareness and monitoring of one's attentional focus, thoughts, feelings and sensations can be observed. This ability to monitor thought processes is termed 'metacognition' (Teasdale, 1999a). Teasdale (1999a) proposed that thoughts could be experienced in two different ways, defined as metacognitive knowledge and metacognitive insight. In metacognitive knowledge the content of a thought can be understood as not necessarily being accurate. Individuals can have an intellectual understanding that a certain thought may not be true, and this concept of un-truthful thoughts is processed as information in an analytical fashion (Teasdale, 1999a). The development of metacognition can then lead onto metacognitive insight (Allen et al., 2006). Metacognitive insight is an experience of a thought at a more general and emotional level. Individuals experiencing metacognitive insight tend to have a 'lightbulb' moment of understanding that does not occur at an intellectual level of information processing. Thoughts are then experienced as events separate to the self, rather than as a reflection of reality. This ability to be the observer of experience is referred to as a 'decentered' perspective. Whereas cognitive therapy seeks to change the content of thoughts, MBCT acts to develop metacognitive insight, which is the ability to observe thoughts as passing events rather than reality.

Focusing attention on the present moment. The ability to focus one's attention to the present moment is thought to enhance metacognitive awareness of non-present moment attention (Allen et al., 2006). It is helpful to be able to recognize when attention is not focused on the present moment as this makes it easier to identify ruminative thought processes and unhelpful worries about the past or future, which may maintain psychopathology (Allen et al., 2006). The focus on the present moment has been described as intentional attention, which can be learnt through techniques such as

the body scan, mindful movement and mindful breath - learnt in the first three MBCT sessions (Kuyken et al., 2010). Other techniques commonly used in MBCT include 'noticing' and the 3-minute breathing space (Segal et al., 2002). The body scan refers to a mindfulness exercise where the individual brings their attention to parts of the body to become aware of sensations they are experiencing. Mindful movements refer to slow movements undertaken with an awareness of the breath and an attention to the detail of how the movement feels. Mindful breath is used to focus on the present moment by concentrating on breathing as an anchor for the mind to attend to. 'Noticing' occurs as a result of increased mindful awareness and relates to the ability to move to the 'being' state of mind to become aware of what is occurring in that moment. The 3-minute breathing space comprises of three exercises lasting approximately 1 minute each. Firstly, attention is brought to whatever the individual is experiencing at that moment with no attempt to change. Secondly, attention is narrowed to focus on the breath, and, lastly, attention is widened to the whole body, noticing any sensations that exist. Using these mindfulness exercises develops intentional attention, helping bring awareness to previous habitual patterns of thinking and aversion to thoughts, or judgement of them (Kuyken et al., 2010).

The way our brain functions given a specific context can be simplified into several categories of modes of mind (Segal et al., 2013). In their simplest form, these modes can be thought of as either 'being' or 'doing'. The 'doing' mode involves achieving particular goals that the mind has set (Segal et al., 2013). Our mind creates an ideal of how something should be, and then we work out a strategy to reduce the distance between our current realities and how we want things to be. This goal-oriented strategy is highly effective for problem solving, when the target problem exists in the external reality, such as getting a new job, or moving house. Failure to resolve external

problems can be coped with by moving on to different aspects of our lives and distracting ourselves from the distress. However, when a goal-oriented strategy is applied to internal problems, such as emotional reactions, it may not be easy to move on from these internal problems, as when problem-solving strategies fail to work, we can find ourselves engaging in depressive ruminative thinking. Hence, adopting a problem solving strategy for internal problems can lead to emotional distress. This thinking style can be referred to as 'driven-doing' and is related to unhappiness about being able to reduce the discrepancy between our desired goal and our reality (Segal et al., 2013). When in the 'doing' mode there is a need to travel forwards and backwards in time to evaluate the past and future to achieve the task. In the 'doing' mode events are typically judged as 'good' or 'bad' as they take us closer to, or further away from our goal.

The 'being' mode describes 'acceptance' and 'allowing' feelings that come from not having a pre-ordained goal (Segal et al., 2013). There is no tension between what is desired and the current reality. In 'being', the focus is on the present moment. In the 'being' mode there is no need for the judgment of thoughts and feelings as they are equal to other experiences such as sound and smell and are seen as passing events rather than reflections of reality. Therefore, the 'being' mode facilitates a decentered experience. Both 'doing' and 'being' modes are not necessarily related to activity, as one can be 'driven-doing' when there is no activity, and it is possible to be 'being' when completing an activity. It has been proposed that there is a limited space for information processing, that we can either be 'being' or 'doing' (Teasdale, 1999a). So, the 'being' mode fills the space for information processing, inhibiting unhelpful thought patterns found in the 'doing' mode of mind (Allen et al., 2006).

Depressive ruminative thinking patterns occur in the 'doing' mode of mind, but if the information processing space is otherwise occupied by a 'being' mode of mind it

eliminates the opportunity for rumination. MBCT aims to teach the skills to recognize the mental mode that we are currently in and to then choose to move to another mode (Segal et al., 2013). Part of the training of MBCT can be thought of as becoming more aware of the modes of mind that we experience and the necessary skills to engage with more helpful modes. There is a tendency to be frequently in the 'doing' mode, allowing plenty of opportunity for recognising and shifting out of this mode in practice sessions. By cultivating the 'being' mode, an alternative is offered, and with practice participants can chose to move from the 'driven-doing' mode to the 'being' mode. The modes are incompatible, and while the 'driven-doing' mode has a tendency to assert itself, growing the practice of 'being' allows the participant to choose their preferred state of mind. The concentration on the present moment allows space and perspective on observed thoughts, which can help individuals identify when habitual dysfunctional cognitive processes occur, such as depressive ruminative thinking (Piet & Hougaard, 2011).

The acceptance of unwanted experiences. When attention is focused on the present moment, it means attention, at times, is brought to unwanted experiences. There is a benefit in bringing attention to negative cognitions, affect, and sensations, as this disrupts habitual experiential avoidance (Allen et al., 2006). Experiential avoidance of negative experiences is thought to be maladaptive when used as a long-term strategy as it prolongs pain and distress (Allen et al., 2006). Through focusing on the present moment and exposure to unwanted experiences, it is possible to cultivate acceptance of these experiences (K. W. Brown & Ryan, 2003; Kabat-Zinn, 1982; Kabat-Zinn et al., 1992; Roemer & Orsillo, 2002; Teasdale, 1999a; Teasdale, Segal, & Williams, 2003; Teasdale et al., 1995). Cultivating the acceptance of unwanted experiences leads to a desensitisation of these negative events, which has been shown to decrease negative

affect and increase psychological health (Davidson et al., 2003; Shapiro, Schwartz, & Bonner, 1998).

A non-judgmental approach. As outlined above, the 'doing' mode of mind encourages an evaluation of experiences, typically as either 'good' or 'bad'. This may drive ruminative style thinking when there is a discrepancy between our desired goal and reality. MBCT has been shown to reduce the use of literal and evaluative language associated with judgment (Hayes & Shenk, 2004; Hayes & Wilson, 2003). The focus of MBCT is to notice thoughts, feelings and sensations, rather than to judge them (Allen et al., 2006). Interrupting the dichotomous good/bad judgment in response to experiences allows a broader range of cognitive and behavioral responses to become available (Hayes & Wilson, 2003). Engaging in broader ranges of cognitive and behavioural responses has been termed 'cognitive flexibility' (Roemer & Orsillo, 2003), which has been shown to increase openness to experiences, and to reduce the tendency of seeing a particular event as wholly negative (Allen et al., 2006). With increased openness to the way events are viewed, alternative perspectives are permitted. For instance, developing kindness, self-compassion, equanimity and patience are seen as integral to the process of change, and these qualities are markedly different to the negative ruminative thinking patterns associated with a previous episode of depression (C. Feldman & Kuyken, 2011). Developing compassion helps to decrease the authority of self-judgement that comes with negative thinking patterns (C. Feldman & Kuyken, 2011).

A description of the MBCT programme. MBCT skills are taught in eight weekly group sessions of 60 minutes, meaning it is a cost-effective approach (Teasdale et al., 2000). The core aims of MBCT are to become more aware of internal experiences, to develop a different way of relating to these experiences, and to be able to choose more skillful responses to thoughts, feelings and sensations (Segal et al.,

2013). The first four sessions focus on basic mindfulness skills, such as becoming aware of how much of the day is spent on automatic pilot, how quickly the mind can move from one topic to another, learning how to bring the mind back to a single focus in the body or breath, and how a wandering mind can lead to an escalation of negative thoughts. The next phase of the MBCT programme examines mood shifts. Negative thoughts or feelings are acknowledged and then attention is shifted to the breath and then the body as a whole. This is referred to as breathing space, and is practiced as a skill in its own right, which can then be applied to difficult thoughts and feelings in everyday life. The breathing space allows the selection of different skills that are taught in the second phase of treatment in response to a difficulty. The final stages of the MBCT programme focus on growing awareness of each participant's unique early warning signs for depression and on developing specific action plans. The core themes of MBCT include the acknowledgement that negative thoughts and mood happen – the aim is not to prevent them, but to stop these normal negative mood experiences escalating into depressive states. Stepping out of unhelpful cognitive habits is encouraged by letting go of the need for things to be different, with a perspective of kindness and curiosity underpinning the practice. It is necessary for instructors in MBCT to have had their own daily mindfulness practice for a least a year before beginning to teach MBCT (Segal et al., 2013). As problems and questions arise in therapy, it is essential that the instructors possess an embodied experience of the skills, not just theoretical knowledge. Experiential learning is key and repetition of the skills is essential since MBCT is not merely knowledge but a practice where participants are seen as the experts on themselves.

Evidence for the efficacy of MBCT

This section will review the evidence for the efficacy of MBCT; firstly, in the area it was developed to target – relapse in depression. There will then be a brief summary of the evidence for the use of MBCT in new areas of application. One of these new areas of application, clients with psychotic symptoms, is the focus of this study and the evidence in this area is reviewed in greater detail in a later chapter.

Evidence for the use of MBCT to prevent relapse in depression. There is evidence for the efficacy of MBCT for the purpose for which it was designed: the prevention of repeated episodes of depression. In the first randomised trial investigating the efficacy of MBCT, 145 participants were examined across multiple settings comparing treatment as usual (TAU) to TAU plus MBCT (Teasdale et al., 2000). They found that in participants with three or more previous episodes of depression, there were relapse rates of 66% in the TAU group compared with 37% in the TAU plus MBCT group, representing a 44% reduction in relapse for those who received MBCT. However, no effect was found for participants with up to two previous episodes of depression and postulated that this was due to different mechanisms being responsible for the relapse in those who experienced more than two episodes compared with those who experienced less than two episodes.

In a further investigation, participants were grouped prior to randomisation according to the number of previous episodes of depression and severity of the most recent episode of depression (H. S. Ma & Teasdale, 2004). Relapse rates of 78% for the TAU group and 36% for the TAU plus MBCT group were found. These results were comparable to those found by Teasdale et al. (2000), but Ma and Teasdale (2004) showed a large effect size compared to a medium effect size found by Teasdale et al. (2000). It has been suggested that those who have had a greater number of previous

episodes of depression may be more prone to ruminative thinking styles, and since those ruminative thinking styles are the target of MBCT, this may be why the intervention is particularly helpful in these cases (Teasdale et al., 2003). Supporting this idea, it was found that those with up to two previous episodes of depression were more likely to have had experienced less childhood adversity and less dysphoria-activated depressive rumination. Instead, they were more likely to have had experienced MDD related to a stressful life event (H. S. Ma & Teasdale, 2004). Therefore, MBCT may not be as effective for those with up to two previous episodes of depression, most likely triggered by a stressful life event as MBCT primarily targets depressive rumination (H. S. Ma & Teasdale, 2004). There are limitations with both studies and the results should be interpreted with caution. The sample sizes were small and the selection criteria of the studies could have obscured an effect. The selection criteria excluded many co-morbid disorders, and since co-morbidities are commonly experienced with depressive disorders, they limit the generalisability of the findings. Further, non-specific treatment factors such as time spent with a therapist and the benefit of group support were not assessed in either study. Since these non-specific factors could contribute to some or all of the treatment effect, it is not possible to conclude that the effect shown is due to specific MBCT factors. Nevertheless, these two randomised controlled trials do show evidence supporting the efficacy of MBCT, but further investigation is warranted.

Two further small studies also reported favourable results for MBCT for those with a history of recurrent depression. A study in the UK with 28 outpatient participants who had a current active major depressive disorder or residual depressive symptoms and a history of three of more episodes of recurrent depression found a significant drop in self-reported depression in the MBCT group (severe to mild) in comparison to the TAU group where depression levels remained unchanged (Barnhofer et al., 2009). This

trial did not use randomisation for allocation to the groups and the TAU group did not receive any psychotherapy during this time, and due to the small sample size the statistical analysis was likely to have been underpowered, suggesting that the results should be interpreted with caution. Another study explored the effect of MBCT on active depression and found a significant reduction in depressive symptoms pre to post-trial and that the changes were maintained at follow-up, but with no further gains (Mathew, Whitford, Kenny, & Denson, 2010). Thirty-nine participants, who had experienced three of more episodes of depression, were recruited from a public CBT clinic. There was a possible trend to relapse noted in those participants monitored for the longest time period (25 to 34 months), suggesting that it is possible that MBCT may delay relapse rather than prevent it. Like the previous study, the sample size was small and statistical analysis likely underpowered and there was no control comparison group, meaning results should be cautiously interpreted.

It has been claimed that RCT results place MBCT in the category of 'probably efficacious' according to American Psychological Association (APA) guidelines (H. S. Ma & Teasdale, 2004). MBCT has now been recommended in the NICE guidelines for the treatment of those prone to relapse in depression, who are currently well but who have experienced three previous episodes of depression (NICE, 2016). However, it should be noted that the guidelines only recommend MBCT for one condition under specific circumstances. Some researchers are concerned about the conceptual and methodological shortcomings of research in the area of MBCT, and the apparent movement in research and practice to view MBCT as a panacea despite a lack of evidence about its benefits (Farias & Wikholm, 2016). There are worries that practitioners without mental health qualifications are delivering MBCT and that the treatment has become popular due to the media conflating scientific results and hype

(Farias & Wikholm, 2016). A qualitative analysis found that the increased awareness associated with mindfulness may lead to an increased experience of difficult feelings, where symptoms become exacerbated (Lomas, Cartwright, Edginton, & Ridge, 2015). Therefore, while MBCT appears to be a therapeutic approach with some promise, there is much more research needed to understand the benefits in specific context and individual difference in response to the treatment. The following section will review the preliminary evidence for the use of MBCT in other conditions.

Evidence for the use of MBCT in new patient groups. While MBCT was designed to prevent relapse in those who had previously experienced depression, some research began to investigate the usefulness of MBCT for other types of depression and in other disorders. This section briefly highlights the emerging research indicating the effectiveness of MBCT in new areas.

A number of small-scale studies over the past decade have highlighted promising findings for the application of MBCT. A pilot study (*N*=19) in an outpatient service in Ireland examined the use of MBCT for the treatment of residual symptoms of depression after more than three recurrent depressive episodes (Kingston, Dooley, Bates, Lawlor, & Malone, 2007). Similarly to studies reviewed in the previous section, this research looked at those with recurrent depression, but the focus was on reducing residual symptoms rather than preventing relapse. A significant reduction in BDI scores was found for those receiving MBCT, with a large effect size of 1.07 (Cohen's d) compared to the TAU group. But the sample size was small; there was no randomisation of participants to condition and no placebo therapy offered in the TAU group. The use of MBCT has been examined for active depression compared to CBT in outpatient participants in Australia (Manicavasgar, Parker, & Perich, 2011). Pre to post test results showed MBCT (*N* = 19) to be as effective as group CBT (*N* = 26). This study also

highlighted that those who continued to engage in mindfulness practice were better at managing their depression. Two studies found a significant change in BDI scores for those receiving MBCT rather than TAU for treatment resistant depression (Eisendrath et al., 2008; Kenny & Williams, 2007). One of these studies (Eisendrath et al., 2008) did not randomise their participants (N = 51) and since MBCT was offered as an augmentation to TAU, with no control group, improvement may have been due to TAU. Another study found that MBCT was useful for those with bipolar disorder currently in remission (Williams et al., 2008). This study examined 68 participants, recruited from GP and community practitioners in the UK, who were randomly allocated to an MBCT or waitlist condition. A significant reduction in anxiety symptoms that was specific to the bipolar group receiving MBCT was found (Williams et al., 2008). One Danish study investigated MBCT and social phobia (Piet, Hougaard, Hecksher, & Rosenberg, 2010). Twenty-six participants aged between 18 and 25 years were randomly assigned to MBCT or CBT conditions. The results suggested that MBCT may be as effective as group CBT for the treatment of social phobia. This study was exploratory with small sample size and no control group, so results should be interpreted cautiously. Three studies examined MBCT for clients with psychotic symptoms with findings suggesting improvements in general functioning and mindfulness skills (Chadwick, Hughes, Russell, Russell, & Dagnan, 2009; Chadwick, Taylor, & Abba, 2005; Langer, Cangas, Salcedo, & Fuentes, 2012). These studies are discussed further in Chapter 2. Taken together, these findings suggest some positive results for the use of MBCT in a range of conditions. However, there are methodological limitations with most of the studies, including small sample sizes and lack of control groups, which mean that the results are suggestive rather than conclusive at this time.

Summary

MBCT was developed with the aim of helping to prevent relapse for those who have experienced depression, possibly through targeting ruminative thought patterns. MBCT is growing in acceptance for application by the likes of the APA and NICE. Interest has grown in a number of new areas of application, but the research supporting its use is still emerging. The use of MBCT appears to be running ahead of evidential support, and much more research is needed. This study aims to look at an area where MBCT is being used clinically, what possible difficulties or lack of evidence exist and to add to the research in this area.

Chapter 2 – Mindfulness Based Cognitive Therapy and clients with psychotic symptoms

This chapter will explore the use of MBCT in a new area of application: clients with psychotic symptoms. The first section will review previous research on meditative therapies and psychosis and then the emerging evidence for MBCT for clients with psychotic symptoms. The second section will examine the realities of using MBCT in a clinical setting for clients with psychotic symptoms and the potential difficulties that are encountered.

Mindfulness and meditation

Mindfulness-based approaches incorporate the practice of becoming aware of the present moment, often using the breath as a means of attaining such awareness (Segal et al., 2002). Mindfulness approaches use a broad range of techniques to attain this awareness, of which mindfulness meditation is one. It should be noted that meditation is a broad category that includes different techniques and philosophical approaches, such as transcendental meditation, and analytic meditations such as vipassana, Qigoing and mindfulness-based approaches (Shonin, Gordon, & Griffiths, 2014). Mindfulness-based approaches are a more gentle approach than some other meditation techniques, and focus on two key concepts: acceptance of the present moment, and intentional attention (Shonin et al., 2014). Mindfulness is the key component of MBCT, which is the modality that is the focus of this current research. In some studies reviewed below, the meditation experienced by participants was poorly defined. Such studies have been included because of the paucity of research in this area. To assist the reader, where the meditation component is known it is stated, and otherwise it is referred to as it was in the reported study. Studies relating to more broad

meditation practices are briefly reviewed first, followed by studies focusing on mindfulness-based approaches.

Mindfulness Based Cognitive Therapy and psychotic symptoms

Are mindfulness-based approaches dangerous for those with psychotic symptoms? This section will detail previous case studies that have raised concerns about the safety of mindfulness-based approaches for those with psychotic symptoms and examine the limitations of such reports. Three cases where individuals who had a history of schizophrenia developed acute psychotic episodes whilst participating in a meditation retreat were reported (Walsh & Roche, 1979). These cases involved intensive meditation and there were a combination of other factors posited to have precipitated the psychotic episode, including fasting, sleep deprivation and the discontinuation of medications. There were two cases where acute psychosis was reported to be triggered in those with schizotypal personality disorder by meditation (Garcia-Trujillo, Monterrey, & Gonzales de Rivera, 1992). Three cases have been described of psychotic symptoms in those with a psychiatric history involving meditation (Chan-Ob & Boonyanaruthee, 1999). All three cases came from individuals practising intensive meditation at the same religious temple, with two reporting appetite and sleep changes. One case of an individual who displayed delusional episodes, violent outbursts and inappropriate laughter after an intensive Zen meditation has been documented (Yorston, 2001). Two cases of psychotic episodes after intensive meditation in those with no history of psychiatric illness have been described (Sethi & Bhargava, 2003), although these cases included fasting and reduced sleep. One case of acute psychosis after a religious meditation retreat was reported (Kuijpers, van der Heijden, Tuinier, & Verhoeven, 2007), where the individual also had marked sleep disturbance. Taken together, these case studies appear to suggest the need for caution

when treating individuals with psychotic symptoms with mindfulness techniques that include a meditation component. There are also limitations with the studies that need to be understood. Case studies are uncontrolled designs, and, therefore, there may be other confounding factors that account for the psychotic symptoms observed, making it impossible to draw causal inference from case studies. Sleep deprivation, fasting and recent medication cessation were not controlled for in these case studies, and, therefore, may have been the causative factors (van der Valk, van de Waerdt, Meijer, van den Hout, & de Haan, 2013). Most of the case study participants were in a meditation retreat environment, which is typically much more intensive that a controlled clinical setting, meaning that the case studies' relevance to clinical clients may be limited. These case studies also fail to explain the mechanisms by which meditation may be dangerous to those with psychotic symptoms.

Mindfulness approaches for individuals with psychotic symptoms.

Mindfulness might increase the perceptual distance from cognitive and affective processes and decrease associated stress (Shonin, Van Gordon, & Griffiths, 2013a). Mindfulness may help individuals with psychotic symptoms to allow themselves to experience unpleasant psychotic experiences, which helps reduce avoidance, leading to the acceptance of the self and psychotic symptoms (Shonin et al., 2014). Some have suggested that mindfulness approaches need to be adapted for individuals with psychotic symptoms (Chadwick et al., 2005; Shonin et al., 2014). Because stress is thought to influence the onset of psychosis (L. F. Brown, Davis, LaRocco, & Strasburger, 2010), mindfulness approaches should be gentle. A more gentle approach to learning mindfulness is congruent with Buddhist traditions where extremes of meditation are discouraged (Shonin, Van Gordon, & Griffiths, 2013b).

It has been proposed that MBCT for psychosis should focus on alleviating the distress associated with psychotic symptoms rather than attempting to remove the psychotic symptoms themselves (Chadwick, Birchwood, & Trower, 1996). Those who have psychotic experiences tend to experience reality distortion, deficits in orientation (to circumstance, place and identity), and altered perceptual skills (Chadwick et al., 2005). Further, individuals experiencing psychotic symptoms tend to have high stress levels and a high risk of relapse (van der Valk et al., 2013). Distress in those with psychotic symptoms is caused by experiential avoidance, negative judgment of the self, and rumination, and these aspects of distress can be targeted by mindfulness. The core focus of the MBCT approach is the relief of distress associated with symptoms through the use of decentered perspective, and acceptance of thoughts, feelings and sensations. Therefore, the rationale for the use of MBCT with psychotic symptoms is the same as its use for the treatment of other symptoms. The main aim of MBCT is not to control or change the psychotic symptoms per se, but rather to relieve the distress associated with these symptoms (van der Valk et al., 2013).

Evidence supporting the use of MBCT for clients with psychotic symptoms. This section will review the preliminary evidence for the use of MBCT for clients with psychotic symptoms. The studies detailed tended to be small, exploratory studies, which have the limitations that are common to trials of this type detailed earlier. But, given that the use of MBCT for psychotic symptoms is a new area of research, these exploratory studies are a necessary stage in the research development, in order to provide some evidence on which to base further, larger trials.

One study examined the use of MBCT with patients experiencing current psychosis symptoms (N = 11), with a mean age of 33.1 years (SD = 8.90) (Chadwick et al., 2005). This study aimed to teach mindfulness skills specifically around psychotic

symptoms, rather than a broader introduction to mindfulness in every day life. Group MBCT was run for 6 weeks with 90-minute sessions. MBCT and Mindfulness Based Stress Reduction (MBSR) techniques were adapted; using short mindfulness techniques such as 10-minute mindfulness attention on the breath. Meditations included regular verbal guidance from instructors to prevent extended periods of silence. Their participants reported high levels of anxiety, paranoia and voices before and during the group therapy, and hence groups were restricted to six participants. Participants all received treatment as usual in addition to the mindfulness practice. The Clinical Outcomes in Routine Evaluation (Evans et al., 2000), a 34-item measure for subjective wellbeing, symptoms, life functioning and risk, and the Mindfulness Questionnaire a 16-item measure (Chadwick et al., 2005) were used. It was found that the mindfulness intervention and treatment as usual resulted in an overall improvement in functioning as measured on the CORE-34, with Wilcoxon pairwise analysis showing a significant reduction in CORE-34 score (Z = -2.655, p = .008) (Chadwick et al., 2005). Along with this significant improvement in general functioning, they also found that the ability of participants to respond mindfully to distressing thoughts and images improved by 36.6%.

A randomized control trial randomly allocated 22 participants to receive the mindfulness intervention or be waitlisted for the intervention (Chadwick et al., 2009). Participants had a mean age of 41.6 years (SD = 8.1) and were all over 18 years of age. They received twice weekly group sessions for 5 weeks, with home-based practice. The CORE-34 and Southampton Mindfulness Questionnaire (Chadwick et al., 2008) were used to assess change as well as the Psychiatric symptom rating scale (Haddock, McCarron, Tarrier, & Faragher, 1999), the Southampton mindfulness voices questionnaire (Chadwick, Barnbrook, & Newman-Taylor, 2007), Beliefs about voices

questionnaire revised (Chadwick, Lees, & Birchwood, 2000) and therapeutic factors. Comparing the intervention and control group, scores did improve in the expected direction, but did not reach significance. The effect sizes were medium for the CORE-34, Southampton Mindfulness Questionnaire and Southampton Mindfulness Voices Questionnaire, but small for the other measures. Changes in function scores for all participants, pre and post intervention, on the CORE-34, and Southampton Mindfulness Questionnaire reached significance.

A further study aimed to extend previous studies on mindfulness and psychosis (Langer et al., 2012). They randomly assigned 18 participants who had psychotic symptoms to the intervention (N=7, M = 34.7 years, SD = 8.2) or waitlist group (N=11, M = 33.9 years, SD = 10.7). They used the Acceptance and Action Scale (Hayes et al., 2004) to assess avoidance of internal events and the Southampton Mindfulness Questionnaire to assess mindfulness. Participants completed 8 weekly, 60 minutes sessions of group therapy, adhering to the schedule detailed by Segal et al. (2002), including homework. The focus of the intervention was to enable participants to respond to stressful internal events, and not the psychotic symptoms themselves. Their results showed a significant difference between the groups in being able to respond mindfully to stressful internal events, supporting previous findings.

The combined results from the above studies do not support the contention that mindfulness approaches are dangerous for individuals with psychotic symptoms. Indeed, they seem to suggest that there are benefits for those with psychotic symptoms using mindfulness-based interventions. However, the above studies are small and exploratory in nature and have a number of limitations. One study focused on mindfulness skills specifically for psychotic symptoms, rather than mindfulness skills for everyday life (Chadwick et al., 2005). Given that the underlying assumption of

MBCT is that it targets the distress caused by psychotic symptoms rather than those symptoms per se, it is not clear why this study chose to focus on mindfulness skills for psychotic symptoms only. Possible benefits of mindfulness skills on more generalized symptoms such as rumination may have been overlooked by this study. This study also had no comparison group and it is possible that any gains may have been solely due to treatment as usual. A further study was randomized, allowing a control group comparison, but with only 22 participants the study was underpowered (Chadwick et al., 2009). The participants in this study were experiencing long-standing and treatment resistant psychosis, and, therefore, their results are not generalisable to any individual who has experienced psychotic symptoms. This study also changed the protocol for the delivery of the mindfulness skills from one 90-minute group session per week for 6 weeks in the 2005 trial to two 60-minute group sessions per week for 5 weeks (Chadwick et al., 2009). Since these trials are preliminary, no examination of the intensity of the intervention has yet been made. The standard MBCT approach is one weekly session for 8 weeks, and so this trial may be unable to show an effect if too brief a time period for the intervention was selected. Another study did use an 8-week long intervention, including homework (Langer et al., 2012). But the adherence to homework was not monitored, and, therefore, it is not possible to comment on the effect of homework as part of the intervention. In general, the studies included small samples sizes and were exploratory. The samples examined may not be truly representative of individuals with psychotic symptoms and, hence, caution is needed in generalizing the results from these studies. However, they do provide preliminary evidence for possible benefits of MBCT for those with psychotic symptoms, and provide a basis for further, larger research in this area.

Mindfulness Based Cognitive Therapy and Early Intervention settings.

While the preceding section explored the evidence for the use of MBCT for patients with psychotic symptoms, this next section explores the introduction of MBCT in a practical clinical setting. In New Zealand, an Early Intervention (EI) approach has been adopted for those who have experienced their first psychotic symptoms (Turner, Smith-Hamel, Nightingale, & Mulder, 2004). The types of patients who are admitted to early intervention settings, the rationale behind the early intervention approach, and what EI treatment consists of are discussed. Then, the adaptation of MBCT for the EI setting is described, and the typical difficulties within this population and setting are highlighted.

Clients with psychotic symptoms. Psychotic symptoms are defined as disturbances in thinking (particularly in perception – hallucinations), in beliefs and the interpretation of the environment (delusions) and disorganised speech (Turner et al., 2004). General practitioners are commonly the first contact for people experiencing psychotic symptoms, and these doctors typically refer patients on for more specialised mental health treatment (Simon, Roth, Zmilacher, Isler, & Umbricht, 2007; Skeate, Jackson, Birchwood, & Jones, 2002). Psychotic symptoms can be experienced due to a range of possible disorders such as schizophrenia and schizophreniform disorder, drug induced psychosis, affective psychosis, or psychosis not otherwise specified (Turner, Smith-Hamel, & Mulder, 2006).

The Early Intervention approach. It is hypothesised that early intervention for people experiencing their first psychotic symptoms may help prevent these clients developing a chronic disorder (Turner et al., 2006). The first few years of the illness are thought to present a critical opportunity to minimise long-term effects (McGlashan & Johannessen, 1996). EI generally encompasses a broad spectrum of psychotic illnesses,

which enables earlier intervention, rather than possible delays in the confirmation of diagnoses such as schizophrenia (Mcgorry, Killackey, & Yung, 2008). Those with psychotic symptoms generally experience a range of positive symptoms (delusions and hallucinations), comorbidities and negative symptoms (such as apathy, reduced emotional response, social withdrawal, anhedonia and reduced speech). (Mcgorry et al., 2008) Effective early intervention treatment may reduce psychotic and negative symptoms, which helps to prevent psychosocial deterioration (Birchwood & Macmillan, 1996; Harrison et al., 2001; Wyatt, 1991). The early intervention approach is used internationally and New Zealand has adopted early intervention targeting young people aged 18 to 30 years who have experienced their first psychotic symptoms (Turner et al., 2006).

Currently, most young people in New Zealand who have experienced their first episode of psychotic symptoms are referred to an EI programme. New Zealand EI admits patients from a broad range of disorders, compared to other countries whose EI services focus on schizophrenia and schizophreniform disorders (Turner et al., 2006). While early intervention is seen as critical in preventing deterioration after exhibiting psychotic symptoms, patients may wait as long as 1 to 2 years after their first symptoms before they begin EI treatment (Turner et al., 2006). One New Zealand study reported the demographics of people in EI services and found that 72.5% of patients were male, 63.7% New Zealand European, 15.9% Māori, 90% were single, 60.2% were living in their parental home, 60% were beneficiaries and the average age of entry into EI services was 22.4 years (Turner et al., 2006).

The main aim of EI is to reintegrate those who have experienced their first episode of psychosis back into society, through decreasing their psychopathology, increasing levels of employment, increasing their quality of life, increasing their social

functioning and decreasing co-morbidities such as alcohol and drug use (Turner, Boden, Smith-Hamel, & Mulder, 2009). There is limited research on the outcomes of EI intervention, but one study found a significant improvement in general functioning, an increase in quality of life, a decrease in unemployment, but no decrease in psychopathology or alcohol and drug use (Turner et al., 2009). Other studies have shown a reduction in substance abuse (Addington & Addington, 2007; Petersen et al., 2007) and psychopathology (Petersen et al., 2005). The EI approach should eventually lead to a decrease in the incidence of psychosis.

EI services typically consist of multidisciplinary teams that provide intensive treatment during the early phases of psychosis, with the treatment typically lasting 2 years (in New Zealand) (Turner et al., 2004). Services included in EI settings include: early detection programmes; the use of anti-psychotic and other medications; psychoeducation; family interventions; CBT; motivational interviewing for substance abuse; social interventions; and assertive outreach (Turner et al., 2004).

How MBCT is adapted in the EI setting, and potential associated difficulties. The intensive treatment offered by EI teams often consists of long periods of engagement and rapport building, followed by the introduction of MBCT and Acceptance and Commitment Therapy (ACT) based skills (J. Clark, personal communication, May 8, 2015). Three recommendations for the use of MBCT with patients with psychotic symptoms have been made: practice length of 10 minutes compared to the traditional 40 minutes; giving guidance during meditation every 30 to 60 seconds, and that guidance should specifically refer to psychotic sensations (Chadwick, 2014). The rationale for these adaptations is to minimise any possible harm caused by the patients focusing on their psychotic sensations for prolonged periods, and also to contextualise psychotic sensations as equal to (and therefore not more important

than) other more normative experienced sensations. Other recommendations for the use of mindfulness with patients with psychotic symptoms include: guided meditations should be less than 15 minutes; prolonged periods of silence should be avoided; anchoring techniques should be increased (counting breath, scanning body); group size should be less than 10 with one on one attention when necessary; facilitators should have more than 3 years of mindfulness practice and teaching experience; and the treatment period should be extended to more than 12 weeks (Shonin et al., 2014).

Difficulties in using MBCT with this group are that termination and non-adherence rates are high. It is common for those receiving EI treatment to drop out of treatment, with one study finding drop out rates of 24.6% (Turner, Smith-Hamel, & Mulder, 2007). Patients also tend to have poor adherence (Coldham, Addington, & Addington, 2002; Malla et al., 2006; Novak-Grubic & Tavcar, 2002; Robinson, Woerner, & Alvir, 1999; Verdoux et al., 2000) and treatment discontinuation (Gitlin et al., 2001). Factors thought to influence whether a patient drops out of treatment include: lack of insight; positive symptoms; younger age; male gender; history of substance abuse; low social functioning; unemployment and being Māori (Fenton, Blyler, & Heinssen, 1997; Lacro, Dunn, Dolder, Leckband, & Jeste, 2002; Nosé, Barbui, & Tansella, 2003). To increase rates of continuing attendance to the EI service, Turner et al. (2007) recommends attention to drugs and alcohol problems and increasing patient insight.

MBCT is hypothesised to increase patient awareness of their symptoms, thoughts, feelings and sensations and reaction to these experiences. Increasing patient insight is a desirable outcome for EI, which MBCT approaches may target. To maximise gains from MBCT it is desirable that patients are practicing the skills learnt in therapy at home – as discussed previously, MBCT is an experiential therapy that

requires practice. However, adherence to home-based practice is known to be difficult in EI settings due to the disordered general functioning in many patients' lives and this is discussed further in Chapter 4.

Summary

It was feared that mindfulness practices may be dangerous for those with psychotic symptoms, but there is emerging evidence of the utility of MBCT in this population and recommendations of appropriate modifications to minimise risk. EI approaches in New Zealand incorporate MBCT approaches with adaptations. However, there are difficulties faced by those who experience psychotic symptoms that may effect whether the maximum benefit of MBCT is realised. Home-based practice is theorised as an important component of MBCT, but there are particular difficulties faced in EI settings (discussed further in Chapter 3). This research looks at this real-world application of MBCT, what difficulties are faced and what adjuncts to existing therapy are available to maximise therapeutic gains.

Chapter 3 – Home-based practice

MBCT is an experiential type therapy and as such the importance of practice was discussed in Chapter 1. Chapter 2 examined the use of MBCT with clients with a history of psychotic symptoms, and pointed to some potential difficulties in working with this population. In Chapter 3, the importance of 'home-based practice' is explored in more detail. 'Home-based practice' in general is espoused as an important component of CBT-based therapies, of which MBCT is one. Because of the lack of research in this area, this chapter will explore 'home-based practice' in general, but will also refer specifically to 'home-based practice' of mindfulness skills where research exists. The evidence supporting the use of 'home-based practice' for clients, rates of non-compliance, possible barriers to clients completing 'home-based practice', and the use of interventions that aim to increase compliance are discussed.

Defining 'home-based practice'

Previous studies use different words or phrases to refer to work undertaken by clients inbetween therapy sessions (Kazantzis, Deane, Ronan, & L'Abate, 2005). This work has been defined as "assignments that are planned therapeutic activities undertaken by clients between sessions" (Kazantzis, et al., 2005, p.2). The variation in phrases used may in part be explained as an attempt to avoid the term 'homework', which can have negative connotations for clients. In this study the work clients completed between sessions is referred to as 'home-based practice'. To aid the readability of the literature review all instances of between session work are referred to as home-based practice. It should be noted that the focus of this research is specifically on the home-based practice of mindfulness skills that have been learnt in therapy sessions.

The theory of why home-based practice is important

Home-based practice is conceptualised as an important component in both MBCT and its related modality of CBT. Right back at the inception of CBT, Beck et al. (1979) introduced the importance of home-based practice to CBT in the original manualised CBT description. In therapeutic CBT sessions, many skills and tools are introduced to clients, but further practice and exploration of what has been learnt in therapy is an important part of the treatment approach. Home-based practice provides an opportunity to practice what has been experienced during the therapy session, thereby extending the therapeutic experience for clients, and allowing them to generalise and experiment with what they have learnt.

MBCT, like its related modality CBT, places a large emphasis on the importance of home-based practice because this is conceptualised as necessary to maximise possible benefits of the therapy (Vettese, Toneatto, Stea, Nguyen, & Wang, 2009) . Kabat-Zinn (1990) emphasised regular daily practice as a core aspect of mindfulness-based approaches, and likened it to building a muscle through daily physical exercise. MBCT protocol for home-based practice is 30 to 60 minutes per day during the 8-week course, with on-going practice emphasised (Segal et al., 2002). Others have spoken of the need to modify this regime depending on the specific clinical disorders that are the focus of treatment (Chadwick et al., 2005; Samuelson, Carmody, Kabat-Zinn, & Bratt, 2007). As discussed in Chapter 1, both proposed mechanisms through which MBCT are thought to work have regular practice at their core; metacognitive insight is something attained through experience, not knowledge, and, therefore, the skills necessary to develop metacognitive insight must be practised (Teasdale, 1999b); the ability to switch between different modes of mind in order to regulate information processing is also an ability that must be practised in order to develop the skill (Segal et al., 2002).

It has been noted that what constitutes mindfulness practice is itself varied and includes a diverse range of activities, such as listening to guided meditations, focusing on scanning the body for sensations and 3-minute breathing spaces (Crane et al., 2014). Also, there is no consensus whether it is the frequency or duration of mindfulness practice (or both) that is important for producing therapeutic gain (Crane et al., 2014). Further, it is not known whether there is a linear relationship between increased home-based practice and clinical outcome or if there is a threshold necessary to achieve clinical improvements (Crane et al., 2014). Given this wide variation in what constitutes mindfulness practice, it follows that measuring and assessing it may be fraught with difficulty.

It appears that home-based practice is a desirable, if not essential, component of MBCT in theory. The next section will examine the evidence regarding the proposition that home-based practice is important.

Evidence that MBCT home-based practice improves outcomes

A meta analysis of 98 studies involving therapeutic mindfulness interventions aimed to evaluate whether home-based practice had an effect on clinical outcomes (Vettese et al., 2009). The studies sampled included those where mindfulness was the primary component of the therapy, such as Mindfulness Based-Stress Reduction, and MBCT, as well as other counselling programmes where mindfulness was the focus. It excluded studies where other factors as well as mindfulness were components of therapy, such as Acceptance and Commitment Therapy, and Dialectical Behavioural Therapy. The 98 studies were reviewed to analyse how home-based practice was measured and to report compliance rates with home-based practice. Twenty-four of the 98 studies were further examined as they reported the relationship between home-based practice and clinical outcomes.

Results from the meta-analysis were mixed. Of the 24 studies examined eight found a positive association between home-based practice and outcomes, and a further five found mixed results - positive associations on some of the measures but non-significance on others. Overall, 13 (54%) studies showed some kind of positive relationship between home-based practice and outcomes. However, 11 studies did not find a positive association between home-based practice and outcomes, with two of these reporting negative associations.

Studies included in the meta-analysis used a wide range of methodological approaches, including the way that home-based practice was reported and whether compliance with home-based practice was reported and these issues are discussed below. Additionally, for most of the studies reviewed, home-based practice was not the primary focus of the studies. It is unclear whether the lack of methodological focus on home-based practice meant that results were less robust (Vettese et al., 2009).

Home-based practice was monitored in a number of ways in the 98 studies, including daily or weekly self-reports and retrospective reports. Of those studies that reported how home-based practice was measured, 15 studies used self-report logs or diaries, 11 studies used retrospective reports, two used weekly self-reports and one used a daily self-report in conjunction with daily monitoring of home-based practice over the telephone. Because the studies used different methods of reporting, it is not possible to determine whether differences found in frequency of reported home-based practice reflect genuine differences or effects caused by the measurement methods themselves. No studies reported the psychometric properties of the tracking methods.

In addition to how home-based practice was monitored, there was the issue of whether participants completed the measures. Only two studies reported completion rates of the self-report logs. Completion rates varied between 69.5% (Carmody & Baer,

2008) and 97% (Carson, Carson, Gil, & Baucom, 2004). Given the discrepancy between these two studies that reported completion rates of self-report logs it can be hypothesised that there is a range of completion rates across the studies. Failure of participants to complete the self-report of home-based practice may, therefore, result in an over or under estimation of home-based practice rates.

Of the 45.8% of studies that reported showing no positive relationship, only two studies showed an inverse relationship between levels of practice and positive outcomes. One study that found negative results also had the smallest sample size of this meta-analysis, and, therefore, the results may be less meaningful. The other study that showed a negative relationship between practice and outcomes reviewed a 10-day intensive retreat-type of mindfulness therapy rather than the weekly programme advocated in MBCT. Since MBCT is the focus of this study this study may have little bearing on this current research.

Given the broad mindfulness inclusion criteria for this meta-analysis, the conclusions should be taken with caution when applied to the current research, which focuses exclusively on MBCT. Both the differences in method of collecting data on home-based practice and variable completion rates of self-report logs present issues.

Three recent studies found that increased levels of formal mindfulness practice were related to lower depression scores following an 8 week MBCT course (Crane et al., 2014; Hawley et al., 2014; Perich, Manicavasgar, Mitchell, & Ball, 2013). The studies were conducted in different countries - the US (Hawley et al., 2014), UK (Crane et al., 2014) and Australia (Perich et al., 2013) - and involved different populations from which the sample was drawn; two with Major Depression Disorder in remission (Crane et al., 2014; Hawley et al., 2014) and one with participants with Bipolar Disorder (Perich et al., 2013). Two studies found significant results at 12-month follow up, with

one reporting a negative correlation between days of formal mindfulness practice and depression scores (Perich et al., 2013), and the other reporting that formal home-based practice reduced the hazard of depression relapse (Crane et al., 2014). The second study did not find a direct effect, but found that increased mindfulness practice was associated with decreased rumination, which in turn was associated with decreased depressive symptoms (Hawley et al., 2014). All of these studies drew a distinction between formal and informal mindfulness practice. Formal mindfulness was defined as following guided mediations on CD lasting 40 minutes, or self-directed meditation lasting for 30-40 minutes. Informal mindfulness was described as including mindfulness during normal routine activities and 'noticing' (see Chapter 1, page 9).

Each study collected self-report logs of home-based practice, which assessed formal practice using a binary yes/no response as to whether the participant had completed a 40 minute guided (or self-directed) mindfulness meditation. It is possible that this choice of measuring home-based practice may have resulted in over or underestimates. Those who attempted the 40-minute mindfulness practice, but who did not complete it, may have scored themselves as either having completed or not completed this mindfulness practice. As the studies did not account for partial completion of formal mindfulness practice, accuracy of the data would have been affected. It was not reported in any of the studies whether these incomplete formal practice sessions were monitored. Thus, it is not clear how much impact this may have had on the study.

Completion of home-based practice logs appears to be sporadic. One study reported that 67% of participants completed the self-report logs for home-based practice (Perich et al., 2013), while another reported 75% completed some practice data on each weekly practice questionnaire for 5 out of 7 weeks of measures. It is not clear whether

this lack of reporting reflected a lack of practice or simply logs not being completed by participants. This may have influenced results in a similar way to the binary choice of responding to home-based practice completion, discussed above. Additionally, those participants who complete home-based practice logs may have other traits that affected log completion behaviour, such as the ability to self-initiate directed behaviour or higher levels of motivation. These types of factors may explain the clinical outcomes noted in the studies rather than the effects of home-based practice per se.

Home-based practice is theorised to be important to gain therapeutic effects from MBCT, but there is currently limited evidence to support this assertion, although some studies indicate a positive relationship. More research is necessary to explore the relationship between home-based practice and positive outcomes. It should be noted that the above studies did not focus on samples from populations of individuals with psychotic symptoms, which are the focus of the current research. Issues affecting these particular individuals will be discussed below.

Compliance with home-based practice

Home-based practice has been theorised as an important component of MBCT. The evidence is still unclear as to whether levels of home-based practice affect clinical outcomes. If the theorised importance of home-based practice in MBCT is correct, then it is useful to know whether clients actually complete their home-based practice. This section will explore the rates of compliance with home-based practice. Since there is limited information in the specific area of compliance with home-based practice for MBCT with clients with psychotic symptoms, a broader range of studies will be examined. Firstly, compliance with home-based practice rates in CBT will be reviewed because of the theoretical relationship between MBCT and CBT. Then, compliance with

home-based practice rates for MBCT will be discussed. Finally, compliance with home-based practice in populations with psychotic symptoms will be explored.

Levels of compliance with home-based practice for clients using CBT. While home-based practice has been conceptualised as an important component in CBT-based therapies, since the development of CBT, it has been noted that non-adherence to home-based practice protocol is a problem (Beck et al., 1979). It has been suggested that there are three forms of evidence that support the proposition that there are low levels of compliance with home-based practice in CBT (Kazantzis & Shinkfield, 2007). Firstly, research on how levels of practice affect clinical outcomes implies that levels of practice vary within clinical populations. Secondly, practitioner surveys show variable rates of compliance with home-based practice, from 20% to 97% (Kazantzis, Lampropoulos, & Deane, 2005). Thirdly, terminology exists within the CBT framework for discussing the phenomenon of low compliance with home-based practice: 'resistance' (Leahy, 2012), ' obstacles' (Beck, 1995), and 'roadblocks' (Leahy, 2003). Compliance with home-based practice is an issue that has been identified in CBT. The following section will examine whether compliance with home-based practice has also been highlighted as an issue with MBCT.

Research examining non-compliance with home-based practice in CBT suggests that patient motivation is subject to a cost/benefit analysis of the activity (Kazantzis & Shinkfield, 2007). The benefit or gain expected from the home-based practice activity is evaluated against the possible difficulty or distress that the home-based practice may cause. Cost and benefit may also be affected by the clients' levels of confidence or self-efficacy, and thus others have suggested that these client characteristics also influence whether home-based practice is completed (Bandura, 1989a; Conner & Heywood-Everett, 1998).

Levels of compliance with home-based practice for clients using MBCT. A meta-analysis of MBCT and home-based practice found the mean length of daily practice was reported in 11 studies (31.8 minutes per day, with a range of 5 to 58 minutes), mean weekly practice was reported by two studies (55.9 to 84 minutes), and total practice for the duration of the programme was reported by three studies (5.3, 15.8 and 30.3 hours), while 13 studies did not report length of daily practice (Vettese et al., 2009). Reporting the means of practice can obscure the variability in the group, so while it is true that some individuals may practice for more than half an hour every day, others may practice for only a few minutes, if at all.

The trajectory of change of home-based practice compliance; that is, the way change occurs over time, is not known. For instance, do all participants begin home-based practice in the first week of an MBCT programme and maintain these levels until post-intervention? Do participants incrementally increase their levels of home-based practice during the intervention, or is the trajectory of change of home-based practice erratic? These questions are significant for the design and implementation of a programme; understanding the trajectory of change can reveal useful information about the necessary length of the intervention.

Compliance with home-based practice for clients with psychotic symptoms. Rates of home-based practice may be different for individuals with psychotic symptoms. A literature search found no research in the area of home-based practice compliance, psychotic symptoms and MBCT.

There is research on the use of home-based practice for clients with psychotic symptoms and the related modality of CBT. Due to the lack of research on home-based practice compliance in clients with psychotic symptoms and MBCT, the research for CBT is reviewed. A survey of registered clinical psychologists working in a variety of

settings in New Zealand examined their administration of home-based practice (Kazantzis & Deane, 1999). The results of this survey highlighted that psychologists viewed home-based practice as of least importance for symptoms such as hallucinations and delusions, with 52% rating home-based practice of little or moderate importance, and only 23% rating it as of great importance. The potential barriers to clients with psychotic symptoms completing home-based practice (see section below) may also act as a deterrent to psychologists prescribing home-based practice due to expectations of low compliance. For example, the use of home-based practice for clients is characterised as impractical: “in our clinical experience we have found that attempting to work with thought diaries and home-based practice assignments is generally not productive. This is partly because our patients are mostly unwilling/unable to do written home-based practice assignments, but also because they find it difficult to work at the abstract level of thinking about thinking” (Nelson, 1997, p.14).

A survey of 19 practicing psychologists working with clients with schizophrenia in Australia found that 61% of clients (*N*=38) were receiving some form of home-based practice (Deane, Glaser, Oades, & Kazantzis, 2005). Of these, 26% did not attempt the home-based practice. The other 39% of clients were not given home-based practice due to previous issues with non-compliance with home-based practice or other barriers to completion. Systematic administration has been posited as a method of increasing motivation and therefore home-based practice compliance. Despite this, only in 23% of the cases were psychologists found to be administrating the home-based practice in a systematic manner. If 26% of clients are not completing home-based practice, then in fact 74% are at least partially completing their home-based practice (Deane et al., 2005). Only 61% of clients were issued home-based practice due to the expectation of non-compliance by the other 39% of clients (Deane et al., 2005). Thus, the rate of

partial compliance of 74% reported is likely to be an over-estimation as only those who were anticipated to complete home-based practice were given it. Expectations by psychologists that their clients with psychotic symptoms may not comply with home-based practice may reduce the amount of home-based practice issued.

One study explored patient satisfaction with CBT for psychotic symptoms (Peters & Kulpers, 2006). They surveyed 65 patients with psychotic symptoms who had received CBT and asked one question specifically about home-based practice. To the question "how helpful were tasks you did between therapy?" the mean response was a score of 4.1 (out of 5, *N*=65, *SD*=0.7, range 2-5) at the end of treatment and 4.4 (out of 5, *N*=40, *SD*=0.7, range=3-5) at a 3-month follow-up. These results suggest that clients do find home-based practice a valuable part of their treatment, but it should be noted that since only 40% of original referrals completed therapy the reported results are likely to be an overestimation.

A study examined clients with psychotic symptoms and their relationship to home-based practice using Grounded Theory (Dunn, Morrison, & Bentall, 2002). Two groups were examined: low compliers, and high compliers. The low compliers group reported finding the home-based practice irrelevant, had low motivation to complete the tasks, and complained of memory difficulties, despite the fact that the home-based practice had been agreed upon in a collaborative manner with their therapist. High compliers were found to perceive home-based practice tasks as relevant, were motivated and did not report memory difficulties. While clients may understand home-based practice when it is collaboratively issued, the most important factor is that the client accepts the underlying rationale for issuing home-based practice (Dunn et al., 2002).

Potential barriers to home-based practice compliance for clients with psychotic symptoms

Research suggests the reasons why people with psychotic symptoms may struggle to complete their home-based practice assignments relate to the negative symptoms of the disorder (see Chapter 2, page 29). Home-based practice compliance has been found to be a larger concern in clients with severe negative symptoms due to low levels of motivation (Hogg & Hall, 1992). Australian psychologists surveyed about their patients with schizophrenia stated that low motivation was the most prominent obstacle to their participation in home-based practice (Deane et al., 2005). Three factors have been proposed involving low home-based practice completion that are psychotic disorder specific: low motivation; trouble taking initiative; and lack of energy (Rector, 2007). Others have proposed that five factors act as barriers to home-based practice completion in patients with schizophrenia: low motivation; ineffective decision making; social withdrawal; distractibility; and difficulty initiating activities (Deane et al., 2005). Patients with schizophrenia have been found to typically have difficulties with planning and decision making, which impacts on their ability to successfully complete their home-based practice (Fallon, 1984). It is interesting to note that the negative symptoms shown in patients with psychotic symptoms may act as maintaining factors for these conditions as they prevent the clients engaging in the home-based practice that may help their recovery. Making progress in home-based practice itself can help increase motivation through positive feedback of completing a task and reinforcement from the clinician. It is hypothesised that acting to increase motivation can also start to increase home-based practice compliance, and, thus, home-based practice and motivation may have a positive synergistic effect.

Possible means of supporting home-based practice compliance for clients with psychotic symptoms

It is recommended that patients with psychotic symptoms are helped to achieve their home-based practice goals through adapting their home-based practice (Rector, 2007). The home-based practice goals should be manageable for the client, small enough so that they can be achieved, and completion dates should be made clear. It is important that home-based practice is reviewed so that all efforts can be praised to encourage further completion through building confidence. Instructions for the home-based practice need to be clear and preferably in written or audio recorded form, and reminder cues can be useful. Limiting the amount of written response required in a home-based activity is appropriate and involving caregivers to provide home-based practice support can be helpful. Glaser, Kazantzis, Deane, and Oades (2000) also recommend that therapists should design and adapt home-based practice to their clients' abilities in order to increase home-based practice compliance. Increasing the perceived benefit of the home-based practice in order to increase motivation is recommended, as the client tends to make a cost/benefit analysis of the home-based practice when deciding whether to undertake it or not (Glaser et al., 2000). The difficulty of the home-based practice should be reduced so that the perceived cost to the client is minimised, and successful completion helps to increase confidence and therefore future motivation. Successful completion can be maximised through positive reinforcement of home-based practice by the therapist. It has been suggested that providing written copies of the home-based practice is also important, and that using reminders to encourage the completion of home-based practice is important (Dunn et al., 2002). A lack of training in the administration of home-based practice during psychologists' training may explain why activities may be poorly issued by practitioners (Deane et al., 2005). It has been

acknowledged that there is a need for further research in the area of home-based practice for clients with psychotic symptoms and suggestions made that systematic administration of home-based practice, increasing motivation, keeping tasks to a minimal length and providing a written copy of home-based practice may be helpful (Deane et al., 2005).

Summary

This chapter explored the theoretical importance of home-based practice in MBCT. Currently, there is a discrepancy between the hypothesised importance of home-based practice for the efficacy of MBCT and the literature supporting this proposition. The research supporting home-based practice in MBCT is still emerging. The paucity of data and the equivocal nature of the results suggest this is an important area for further investigation. The effect on clinical outcomes of different types of home-based practice, the frequency and duration of practice and the trajectory of change relating to quantity of home-based practice are unclear. These variables add significant complexity to the investigation of clinical outcomes relating to home-based practice.

Home-based practice for MBCT is theorised to be central to clients learning the necessary skills from in-session therapy, but rates of compliance may be low. There is no current evidence for rates of compliance with home-based practice for MBCT with clients with psychotic symptoms. Studies in related areas suggest that rates of compliance may be low. There are unique barriers to completing home-based practice within this particular population. Understanding the barriers and seeking ways to support compliance with home-based practice may lead to gains in clinical outcomes.

Clients with psychotic symptoms may be supported by increasing clients' understanding of the rationale for giving home-based practice, increasing motivation, offering specific and systematic details of the home-based practice and providing

reminders to aid home-based practice completion. It is desirable to support clients to complete their home-based practice of skills learnt during MBCT, and the next chapter will explore a possible method of providing this support. The gaps in the literature make it important to establish if support can increase levels of home-based practice, and a possible method of support using technology is explored in Chapter 4.

Chapter 4 - Text messages as a way of supporting home-based practice

Technology has become an omnipresent factor in modern everyday life (International Telecommunication Union, 2011). This chapter explores the possible application of technology, specifically text messages sent from mobile phones, as a way of supporting therapeutic treatment. The emerging research on the use of text messages in health and psychological research is reviewed and how text messages may support home-based practice is detailed. This research proposes that text messages are a viable method of supporting the completion of home-based practice for clients with psychotic symptoms who are receiving MBCT as part of their treatment.

Text messaging technology

Mobile phones have become an essential part of modern day living, used for calling, text messaging, internet access and an ever increasing number of 'apps' for functions as varied as managing bank transactions to finding a romantic partner. Globally, mobile phone ownership is high, with 94% of adults owning a mobile phone in the US, 97% in the UK and 86% in Australia (Nielsen, 2013). In New Zealand, smartphones are owned by 90% of the population, in comparison to 88% in the US, and 91% in the UK and Australia (Kantar TNS, 2017). As the data shows, mobile phones are increasingly prevalent across society, and they are also used across different levels of socioeconomic status (Lenhart, Ling, Campbell, & Purcell, 2010). The use of smart phones and apps are a rapidly growing area of the mobile phone market (Aguilera & Muñoz, 2011), but these technologies require more expensive handsets and data.

Text messaging has proven to be a durable technological development; despite text messaging being 20 years old the number of text messages sent per day is still increasing. In 2011 in the UK over 150 billion texts were sent every day, with

consumers averaging 50 texts per week, compared to 51 billion texts in 2006 (Ofcom, 2012). Many people text message everyday and use instant messaging (through apps). As many as 93% of people in New Zealand use text messages, 66% on a daily basis and most (78%) do so on their mobile phone (Kantar TNS, 2017). The low cost and ease of access make it useful for studying diverse and low socioeconomic status populations, as text messages do not require a smart phone or for the mobile phone to have credit, or data allowance, as text messages can be received free of charge. Receiving text messages on phones may also be a non-stigmatising way of a client receiving a reminder related to their mental health challenges, as they are a common part of everyday life. The pervasive and increasing usage and the low cost of text messaging makes it an ideal target for research as published results are likely to still be relevant for clinical practice due to the high likelihood that text messaging will be a popular form of communication by the time research is published.

This section summarises current narratives about technology and mobile phones in psychological therapy, which range from warning of the dangers imparted by these new devices to heralding a change in the way therapy is conducted. There are fears that mobile phones are negatively impacting on face-to-face relationships (Przybylski & Weinstein, 2013), that text reminders are not effective (Clough & Casey, 2014), that confidentiality may be compromised and that the boundaries between therapist and client may become blurred (Sude, 2013). Conversely, there are expectations that mobile phones could prove a more transformative innovation in psychology than the introduction of the personal computer or brain imaging technology (Miller, 2012), that text reminders can reduce missed psychiatric appointments by a quarter (Sims et al., 2012), and that mobile phones may provide unique access to health information and deliver personalised interventions (Proudfoot, 2013).

Text messaging research

This section reviews a selection of relevant research on text messages used in general health settings and mental health settings. Studies range from those aiming to encourage smoking cessation, increase compliance with medication, increase appointment attendance, help motivate participants to achieve their goals, and complete home-based practice. The mechanisms through which text messages may create behavioural change are discussed and related to the current study.

Creating behaviour change: smoking cessation. Three studies (Bramley et al., 2005; Free et al., 2009; Rodgers et al., 2005) explored the use of text messaging to support participants attempting to stop smoking. The studies found that the text message package significantly increased the number of participants who were able to quit smoking over a 4 to 6 week period, with comparable results. One study (*N*=200) found at the 4-week follow up that quitting rates doubled when compared to the control group (12% compared to 26%) RR 2.08, 95% CI [1.11, 3.89] (Free et al., 2009). Another study (*N*=1705) found the number of participants who had quit smoking at 6 weeks follow-up were higher in the intervention group than in the control group (28% compared to 13%) RR 2.20, 95% CI [1.79, 2.70] (Rodgers et al., 2005). A further study examined quit rates for a specific cultural group: Māori participants (*N*=335) were more likely to have quit in the intervention group (26.1%) compared to the non-Māori control group (*N*=1350, 11.2%) RR 2.34, 95% CI [1.44, 3.79] (Bramley et al., 2005). None of these studies were able to demonstrate whether these increased quit rates were sustained at 6-month follow up. All three studies included participants aged over 16 years. Two studies were conducted in New Zealand (Bramley et al., 2005; Rodgers et al., 2005), while the other was conducted in the United Kingdom (Free et al., 2009). Two of the studies used a text message package called ‘STOMP’ (STOp smoking with Mobile

Phones) (Bramley et al., 2005; Rodgers et al., 2005), while the other developed a new package called ‘txt2stop’. ‘Txt2stop’ was a modified version of ‘STOMP’ where text messages had been reviewed by focus groups consisting of professionals and potential participants, and it did not include a month of free texting as ‘STOMP’ did. The frequency and volume of text messages sent was the same for each package - daily text messages until the quit day, then five messages daily for 4 weeks after the quit day and finally three messages a week for 26 weeks for maintenance (Bramley et al., 2005; Free et al., 2009; Rodgers et al., 2005). The text package was altered for Māori participants to include general support messages in Māori and English, and information on Māori customs and traditions (Bramley et al., 2005).

In two trials participants were offered a free month of texting; it is not certain whether this incentive added to the efficacy of the intervention or whether the active component lay in the text messages themselves (Bramley et al., 2005; Rodgers et al., 2005). It is possible that the free month of text became an active component for the intervention group as participants may have sought additional support through texts from friends and family. However, since the other study still showed a significant increase in quit rate with no free month of texting, it suggests that the text package does contain some active element that creates the behavioural change.

The control groups used in the studies received far fewer texts overall, one text per fortnight. It is not clear whether the active component that created behavioural change was in the text message content or whether it was the result of an increased number of texts per day.

One study reported on the acceptability of the package, finding that some found it “motivating”, while others thought it was “too intense”, and some complained that text message abbreviations were hard to understand (Free et al., 2009 p.90). While

participant feedback suggests that increasing motivation may be responsible for the behavioural change, none of the studies hypothesised what the active component of the text message packages was that might have created the behavioural change. Since none of the studies were able to demonstrate that the effect from the intervention could be sustained at the 6-month follow up, it suggests that the intervention needs to be maintained for longer, or perhaps indefinitely in order to sustain the change.

The smoking cessation studies suggest that text messaging can be a way of supporting participants to achieve a goal that requires behavioural change. The current research proposes that text messages may be a tool to support participants attempting the behavioural change of increased home-based mindfulness practice. From participant feedback, it is clear that the frequency and language used in the package is important for acceptability.

Creating behaviour change: Increasing medication adherence. Two studies looked at text message packages to increase medication adherence to asthma prevention medication (Petrie, Perry, Broadbent, & Weinman, 2011), and insulin therapy (Franklin, Waller, Pagliari, & Greene, 2006). One study (*N*=147) aimed to increase insight into the illness, changing beliefs about the illness and the medication, and, therefore, changing prevention medication adherence (Petrie et al., 2011). The other (*N*=92) used the text message package ‘Sweet Talk’ to provide social support, setting and achieving goals, with the aim of educating and motivating participants to create insulin regime compliance (Franklin et al., 2006). Both studies found increased compliance with medication regimes. Text messaging was found to increase the perceived necessity for, and improved the adherence to, asthma prevention medication when compared to control groups that did not receive text messages (Petrie et al., 2011). Adherence to goals in both intervention groups that received ‘Sweet Talk’, as compared to the control

group, suggested the text messaging system could be used to support insulin therapy (Franklin et al., 2006).

Although both studies found increased adherence to medication from using a text message package, there were differences between the studies. One focused on younger participants aged 8 to 18 years, while the participants in the other study were older, aged 16 to 45 years. This suggests gains from using text message support to increase medication compliance occur across a broad age range.

Each study tailored the text message packages for their participants by either regarding their beliefs about their illness or medication (Petrie et al., 2011), or relating to the participant's age, gender and insulin regime (Franklin et al., 2006). Both studies used a control group that received treatment as usual with no text messages. Because the control group did not receive any text messages, it is difficult to determine whether improvements in adherence were due to a content component of the text messages, or from more generalized benefits of increased social communication from receiving text messages.

Petrie et al. (2012) report that there was a significant change in beliefs towards asthma preventer medication at 18 weeks of the text message intervention and associated increased compliance with taking these medications; it is not clear how the length of time that participants received text messages affected their compliance. Because Petrie et al. (2012) did not report changes over time, it is not certain whether participants' beliefs changed quickly (for instance, after two weeks of text messages), or whether participants required the full 18 weeks of text messages to affect change in their beliefs. This is a limitation of the research as the minimal number of text messages required to produce belief and behaviour changes is not known, and is an area for future

study.

The studies sent between one and three text messages per day for the duration of the intervention, and one study reported 97% liked the frequency of one-to-two text messages per day (Franklin et al., 2006). The review of the smoking cessation studies suggested that an increase in the duration of the text message package might help sustain gains made. Ninety per cent of participants reported that they wanted to continue with the 'Sweet Talk' package after the trial had finished, which suggests that longer interventions might be acceptable to participants and possibly necessary to create lasting change.

Creating behavioural change: Increasing mental health appointment attendance. A large trial examined whether text message reminders could increase the number of scheduled mental health appointments that are attended (Sims et al., 2012). Text message reminders were sent to patients at four community mental health clinics in London over a period of 3 years. In 2008 no text message reminders were sent (N=648) and this served as a baseline measure. In 2009 text message reminders were sent out 7 and 5 days before the scheduled appointment (N=1081), and in 2010 reminders were sent 7 and 3 days before the appointment (N=1008). The baseline rate of non-attendance to appointments was 36%, compared to the rates during the intervention in 2009 (26%) and 2010 (27%). An overall relative risk reduction in failed attendance rates of between 25 and 28% was reported (Sims et al., 2012). It was estimated that if this text message reminder service was used nationally across the UK, it would bring savings of £150 million a year from patients not missing appointments, as well as the clinical benefits of increased attendance. It should be noted that while this was a large trial participants were not randomised to conditions.

Achieving therapeutic goals. Two studies assessed the use of text message packages to support therapeutic goals. One study (*N*=11) used text messaging to assess the recall of therapeutic goals after treatment for brain injury (Culley & Evans, 2010). Free and cued recall of goals was found to be significantly better at 7 and 14 days of the intervention than during the baseline phase ($z = 2.12$, $p = .034$; $z = -2.38$, $p = 0.17$), with effect sizes ($r = .64$, $r = .71$). Another study (*N*=62) examined the use of text messages to support clients who had schizophrenia related disorders achieve their therapeutic goals (Pijnenborg et al., 2010). It was found that the text message prompts significantly increased the number of goals achieved compared to the baseline phase. Text message prompts increased the number of goals achieved compared to the control group, where no change was detected. During the intervention, the mean success rate (62%, *SD*=20.1) was higher than the baseline rate (47%, *SD*=27.9).

Both studies used a within subjects design, with participants acting as their own control through an initial baseline phase to which subsequent results were compared. One study included an additional study design element - one group of participants also had a waitlist condition added, with the aim of controlling for the effects of time passing. That significant results were found for small sample sizes suggests that a within subjects design may be suitable for research in clinical settings with potentially small numbers of participants.

One study found that the increase in success rate did not continue once the intervention was withdrawn (Pijnenborg et al., 2010), while the other study found that most improvement was made in the first 7 days of the intervention, with no further gains at 14 days (Culley & Evans, 2010). However, since this study did not include follow-up data after the intervention had been removed it is not known whether improvements were sustained.

Both studies showed that the text message interventions were generally well received. Feedback showed participants remembered therapeutic goals better, they felt alert and motivated by messages, and this resulted in an increase in goal-related activity (Culley & Evans, 2010). Participants reported overall positive feelings about receiving the text messages, with 70% reporting positive feelings, 20% being neutral and 10% having negative feelings (Pijnenborg et al., 2010).

One study used individualised goals (Pijnenborg et al., 2010) and how relevant the participant found their goals may have impacted on how useful the text message package was. Other factors such as difficulty in achieving the goal, or issues such as possible medication side effects may have impacted on whether the text messages could support participants to achieve their goal. The current study proposes examining whether text messages can increase the frequency or duration of home-based practice. Increasing home-based practice is a more focused goal and so may more clearly reveal the utility of text messages as a support to existing therapy. Text messages may help participants' recall of goals set in therapy (Culley & Evans, 2010), which may be a factor in increasing home-based practice of mindfulness skills.

Home-based practice compliance. One study has investigated text messaging as a means to support home-based practice. A text message package was given as an adjunct to CBT for depression with the aim of increasing home-based practice adherence, improving self-awareness and assisting tracking patient progress (Aguilera & Muñoz, 2011). Participants (N=12) received two to three text messages a day relating to mood and inquiring about thought tracking, tracking of pleasant activities, tracking of positive and negative contacts, and physical wellbeing. Participants' average age was 52.3 years (SD=8.13); they were of low SES background and represented a range of ethnicities. Response rates to text messages were tracked and at the end of the

intervention a questionnaire containing forced-choice and interpretative questions was administered. The primary outcome was the response rate to text messages, which they reported as 64.88% (*SD*=24.85, range=27-99). This shows that on average almost two-thirds of text messages were responded to. In the post-intervention questionnaire 60% of participants reported that two to three texts per day was the right amount, while 40% wanted more and none wanted fewer texts. Findings indicated that the majority of participants found the text message package acceptable. The Patient Health Questionnaire-9 (Kroenke, Spitzer, & Williams, 2001) was used to provide baseline and monthly monitoring of symptoms. This research was a pilot study with a small sample size, with no control group and results did not reach significance. However, a decrease in depression symptoms between baseline and one or two months into treatment showed a change in PHQ-9 score from 10.1 to 8.5. While this score was not statistically significant (p=0.15) it is not clear whether the authors attempted to assess whether the change was clinically significant. Participants did move from the 'moderate' to 'mild' range on the PHQ-9. Further clinical significance could have been investigated using reliable change index calculations (Jacobson & Truax, 1991) (see Chapter 6, page 84). The research suggests that text-messaging interventions can be used as an adjunct to therapy, increasing participation in therapy and sustaining treatment gains after the face-to-face sessions have ended. The intervention was deemed acceptable based on the number of texts per day and the response rate from participants.

Summary. The research reviewed suggests that text messages can be used to create behavioural change in participants, with between one and five messages sent per day. Participants generally reported receiving text messages as motivating, which suggests that they may be a useful medium for supporting mental health users. Some found the frequency too intense or the language employed difficult, meaning that

consideration should be given to the development of a text message package to ensure its acceptability. Improvements due to text message interventions were seen across a broad age range, which may be useful for clinical applications. It is not clear how long text message packages should last to create behaviour change, with one study reporting improvement after 7 days, while most studies failed to show maintenance of gains after the intervention ceased. In mental health settings, text messages have been shown to change behaviour with more mental health appointments attended, to increase recall and achievement of therapeutic goals and that they can help support home-based practice compliance. Most participants reported positive feelings about the text messages they received, including those from a sample of participants with psychotic symptoms. This review of research suggests that text messages are an appropriate method of supporting clients in addition to their existing therapy to help achieve therapeutic goals such as increased home-based practice compliance. While no study specifically analysed the ways in which text messages packages produced therapeutic change, it is possible to hypothesise about the possible mechanisms involved and this is discussed in the following section.

Mechanisms through which text messages may increase home-based practice compliance

This section explores the specific way that text messages may act to support participants' compliance with home-based practice that has been given as part of their existing therapy. How the text messages might support home-based practice is explored in the context of potential barriers to the completion of home-based practice, which were raised in Chapter 3. Clients are thought to undertake a cost/benefit analysis when they decide to undertake home-based practice. Therefore, anything that either reduces a perceived cost or increases a perceived benefit may increase compliance with home-

based practice. The following areas are explored below: overcoming cognitive difficulties, increasing motivation, overcoming initiation difficulties, increasing insight and improving therapeutic alliance.

Cognitive difficulties. After a person has suffered a brain injury they frequently experience difficulties with memory, attention, executive function and may display poor insight into their condition. These difficulties may result in problems recalling goals set in therapy, and, therefore, poorer adherence to goals. Three main areas have shown improvement after receiving the text messages support; improved subjective memory related to goals, participants feeling alert and motivated by the text messages and an increase in behaviours related to successful completion of goals (Culley & Evans, 2010).

The improvements found after receiving text message support may be relevant for this current study, as patients with psychotic symptoms may experience similar cognitive difficulties as those related to TBI (Pijnenborg et al., 2010). Areas of cognition that are affected include speed processing, attention, working memory, verbal and visual learning, reasoning and problem solving, verbal comprehension and social cognition (Pijnenborg et al., 2010). Impairments such as these have wide-ranging effects impacting on everyday life and specifically on goal-related behaviour (Pijnenborg et al., 2009).Whilst there is research into cognitive rehabilitation for patients with TBI showing the efficacy of memory aids, there is a lack of investigation into the possible role of memory aids for those with psychotic symptoms, and this may be a “significant omission” (Pijnenborg et al., 2010, p.260). Mobile phones are a potentially useful memory aid for patients with psychotic symptoms as they are non-stigmatising due to their proliferation in modern day life. Gains found during text message interventions may not be sustained during the post-intervention stage, as the

memory aid is still required to produce behavioural change (Pijnenborg et al., 2010). Text message reminders may not target any underlying causes of the low achievement of goals, but rather serve as a memory replacement. The current study, however, aims to increase home-based practice, and as this is a learned skill, the effects of increased practice may continue after the intervention has finished as new skills have been established and practiced.

Sims et al. (2012) demonstrated in their trial that text message reminders could increase attendance at scheduled mental health appointments. Text message reminders were hypothesised to work because the most common reason given for missing appointments is 'forgetting' (Sims et al., 2012). The text message reminder service is a cost effective, fast, non-intrusive, low effort method for increasing attendance through acting as a memory aid.

Motivation/ difficulties initiating activities. Text messages offer an opportunity for the client to reinforce skills learnt in the therapy session, increasing the number of times that the skill is practiced (Aguilera & Muñoz, 2011). Smoking cessation text message packages (Bramley et al., 2005; Free et al., 2009; Rodgers et al., 2005) were hypothesised to increase participants' motivation to quit through goal setting, encouraging social engagement, problem solving, offering advice, support and distraction.

The use of mobile technology may help overcome difficulties with self-initiation, which is often required for the completion of paper-and-pencil home-based practice (Aguilera & Muñoz, 2011). Home-based practice reminders, prompts and questions can come straight to the mobile phone via text messages and may be the catalyst for action by the client, removing the necessity for them to initiate their own home-based practice.

Motivation is often a barrier to home-based practice, and therapeutic text messages may help overcome this obstacle through increased adherence. Since successful completion of home-based practice can help increase motivation, the therapeutic text message providing the initial impetus for practice may start off a positive spiral of compliance and increased motivation leading to increased compliance.

Increasing insight. Lack of insight of the self and symptoms can be an impediment to the completion of home-based practice. Because text messages are received at a non-self initiated time (for the client), they provide an opportunity for the client to tune in to their mood state at that moment (Aguilera & Muñoz, 2011). This stimulus to assess mood state is a means to increase insight, which itself may lead to increased home-based practice compliance. The fact that text messages bring the clients' attention to the present moment is nicely congruent with the core aims of MBCT of present moment awareness. The qualitative feedback suggests that text messages do provide a means for increasing patient awareness and insight into their current mood state (Aguilera & Muñoz, 2011). Statements from participants included "help (sic) me check in on myself", "It makes me check in with myself, it's the best thing I've done besides the group", and "we do have control over our mood" (Aguilera & Muñoz, 2011, p.7).

Low adherence to medication has been associated with patient beliefs about the nature of their illness (Kaptein, Klok, Moss-Morris, & Brand, 2010). Beliefs associated with the chronic nature of the illness have been shown to correlate with increased compliance with medication (Byer & Myers, 2000; Jessop & Rutter, 2003). Targeting changes in beliefs through the use of text messages is a useful way to increase compliance to medication (Petrie et al., 2011). It is not known whether trying to change

beliefs around the usefulness of home-based practice using text messages will lead to an increase in home-based practice.

Text message packages have been used to support, educate and motivate the participants to increase compliance with their medication regime (Franklin et al., 2006). Increasing self-efficacy was hypothesised to promote adherence to medication regimes, and, therefore, improve biological outcomes (glycaemic control). 'Sweet Talk' was based on Social Cognitive Theory that postulates that health behaviours are related to increased self-efficacy, setting and achieving personal goals and social support (Bandura, 1977, 1989b; Bryan & Locke, 1967; Cobb, 2002; Janz, Becker, & Hartman, 1984).

Therapeutic alliance. Text messages offer a way to extend the connection between the client and therapist outside of the normal therapy sessions. Text messages related to the therapy help to keep the therapeutic work current in the client's mind while they are at home, and even automated text messages may have the effect of strengthening the therapeutic alliance because of the extended therapy connection beyond face-to-face contact (Aguilera & Muñoz, 2011). There are health disparities related to SES, and the use of text messaging as a low cost adjunct to existing therapy may ensure that those health disparities do not widen further through the use of high expense technologies in the mental health setting (Aguilera & Muñoz, 2011).

Summary

The use of technology has been steadily increasing in everyday life. Many people now own mobile phones and use them for a range of functions. The number of text messages sent everyday continues to rise. Research suggests that text messages can be used to create behaviour change from smoking cessation to medication compliance and appointment attendance. Text messages may be used to help clients with their goals

and compliance with home-based practice. It appears that text message support packages are acceptable to participants and therefore a viable way of supporting clients in existing therapy. To date, the research on text message technology as an adjunct to existing services is still emerging, and there is a need to expand this research into mental health settings (Aguilera & Muñoz, 2011).

The concept of using adjuncts to support existing therapy as a way to maximise health benefits has been around for a long time (Christensen, Miller, & Munoz, 1978). Technologies such as mobile phones are a possible new tool that clinicians can use to provide an adjunct to their existing therapeutic service (Muñoz, 2010). Increasing motivation and adherence to home-based practice has been promoted as a way to increase therapeutic gains, and mobile phones offer a cost and time efficient way of achieving this compared to an increase in face-to-face therapist contact, which is often not feasible (Aguilera & Muñoz, 2011). The fact that text message technology can be used in diverse settings and across SES means it is a practical and useful tool that can be used for increasing the therapeutic connection and maximising the possible benefits of the treatment plan (Boschen & Casey, 2008). Militello, Kelly, and Melnyk (2012) suggest that mobile phones offer a unique opportunity to engage with clients across a range of demographics and texts may serve as an effective reminder service to clients.

A key component of MBCT is home practice, but adherence to home practice can be challenging for clients. Mindfulness techniques may be able to be delivered to clients via text messaging with the aim of increasing engagement with the therapy and adherence to home practice, thus making the existing treatment more effective. Texting may provide increased engagement with services and possibilities for enriching existing therapeutic relationships. Aguilera and Muñoz (2011) comment that because this is an emerging field of research usability and feasibility studies are appropriate and necessary

in order to ascertain the useful aspects of therapeutic text messages on which future large scale RCTs can be based.

Chapter 5 – The current study and intervention development

This chapter outlines the rationale, purpose and hypotheses of the current study. The benefits of evaluating an intervention in a real life setting are then discussed. The development of the intervention is then explained.

Rationale for the current study

Chapter 1 introduced MBCT as part of the third wave of therapies to come from the CBT conceptual basis. MBCT was originally developed to treat treatment resistant depression, but more recently has been applied to a growing number of mental health areas. Research has been lagging behind the clinical application of MBCT. Chapter 2 explores one of the newer areas of MBCT application for clients with psychotic symptoms. There are a few studies in this area (Chadwick et al., 2009, 2005; Langer et al., 2012). Clients with psychotic symptoms may experience difficulties that prevent them making the most gains possible from MBCT. For example, high drop out rates (Turner et al., 2007), poor adherence (Coldham et al., 2002; Malla et al., 2006; Novak-Grubic & Tavcar, 2002; Robinson et al., 1999; Verdoux et al., 2000), treatment discontinuation (Gitlin et al., 2001); and lack of insight; positive symptoms, younger age, male gender, history of substance abuse, low social functioning, unemployment and being Māori (Fenton et al., 1997; Lacro et al., 2002; Nosé et al., 2003). Chapter 3 explains that home-based practice is an important theoretical component of MBCT and examines why home-based practice may be especially difficult for clients with psychotic symptoms. Chapter 4 proposes that technology, specifically text messages, may be useful to support clients involved in EI with their MBCT home-based practice. This study aims to evaluate the application of a text message intervention to see if it is capable of creating a change in home-based practice behaviour for clients who are involved in EI.

Rationale for the measurement of mindfulness

Due to the differences in conceptualising mindfulness, there are at least eight self-report questionnaires that aim to measure mindfulness the Freiburg Mindfulness Inventory (FMI; Buchheld, Grossman and Walach, 2001; Walach, Buchheld, Buttenmuller, Kleinknecht, & Schmidt, 2006), the Mindful Attention Awareness Scale (MAAS; Brown and Ryan, 2003), the Cognitive and Affective Mindfulness Scale – Revised (CAMS-R; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007; Hayes and Feldman, 2004), the Southampton Mindfulness Questionnaire (SMQ; Chadwick et al., 2008), the Kentucky Inventory of Mindfulness Scale (KIMS, Baer, Smith, & Allen, 2004), the Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006); the Philadelphia Mindfulness Scale (PHLMS; Cardaciotto, Herbert, Forman, Moitra, & Farrow (2008); and the Toronto Mindfulness Scale (TMS; Lau et al., 2006). There are differences between state and trait mindfulness, with the TMS measuring state mindfulness during meditation. Nine components of mindfulness are measured by the existing eight self-report questionnaires, each has a different subset and none cover all subsets. Components include 1) observing, attending to experience, 2) acting with awareness, 3) non-judgement, 4) self-acceptance, 5) willingness and readiness to expose oneself to experience/non-avoidance, 6) non-reactivity to experience, 7) non-identification with own experiences, 8) insightful understanding, 10) labelling, describing.

The CAMS-R was developed as a self-report measure of mindfulness (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007). Mindfulness appears to be a two-dimensional construct that examines “presence” and “acceptance” (Kohls, Sauer, & Walach, 2009), and the CAMS-R measures both of these dimensions of mindfulness. The dimension of “acceptance” has been shown to negatively correlated with anxiety

and depression (Kohls et al., 2009). The CAMS-R differs from other scales in trying to capture a capacity and willingness to be mindful "I try to notice my thoughts without judging them" (Which might be useful to measure a willingness to be mindful in those learning MBCT skills). The developer's intention was to measure a kind of mindfulness that could be useful in the treatment of depression. Two studies showed that the CAMS-R was more related to psychological distress than the MAAS, MFI, KIMS, and SMQ. It has been suggested that the CAMS-R would be useful for clinical studies (Bergoni, et al., 2013). A recent review of mindfulness scales suggests that there are differences between the CAMS-R and the SMQ (Bergomi, Tschacher, & Kupper, 2013). The SMQ in comparison assesses how one relates to "distressing thoughts and images, which are important phenomena in all mental health problems and the cornerstone of cognitive theory and therapy" (Chadwick et al., 2008, p. 452).

Bergomi et al. (2013) suggest that the SMQ is useful for assessing mental health problems and mindfulness. The SMQ was longer at 16-items, which was critical in this study with such limited space for questions. It was suggested that the SMQ only had a one-factor structure – how one relates mindfully to distressing thoughts and images, and that it was suited to the effects of a mindful attitude to distressing inner experiences.

Feldman et al. (2007) propose the CAMS-R as a suitable measure for assessing response to treatment, but more examination of test-retest reliability of the measure would be desirable and its sensitivity to change is unknown at this time. The CAMS-R appeared to be a reliable and valid measure for the construct of mindfulness and was suitable for this study because of the necessity for brief measures.

Hypotheses

1) The intervention will increase the frequency and/or duration of daily home-based mindfulness practice.

2) The intervention will increase participants' levels of mindfulness skills reported by participants, including an awareness of emotions without the need to act on those emotions, and acceptance of emotions and thoughts as passing events.

3) The intervention will reduce anxiety and depression symptoms reported by participants.

In addition, the participants' and clinical psychologists' experiences of using the text message package will be explored at the end of the trial, using a questionnaire specifically designed for this purpose.

Development of the intervention

The development of the intervention is outlined below to aid future researchers in this evolving area of technology research. The format and content of the intervention is discussed as well as practical considerations for its delivery and assessment.

Format.

Number of text messages per day. Previous research on the use of text messages in a health or mental health setting shows that the frequency of text messages typically sent as part of the package ranges between one and five texts per day (Aguilera & Muñoz, 2011; Franklin et al., 2006; Free et al., 2009; Rodgers et al., 2005). While the upper range of five text messages a day may seem like a lot, this should be put in the context of the average number of text messages received per day. US adults between 18 and 45 years of age send and receive an average of 85 texts per day (Experian, 2012). Reliable data on the volume of text messages sent in New Zealand is not available, but research suggests that the increase in Smartphone ownership from 48% in 2013 to 70% in 2015 (Research New Zealand, 2015) is similar to that of other countries around the world. The smoking cessation packages, reported previously, were at the higher end of the range, where in parts of their intervention five text messages were sent per day (Free

et al., 2009; Rodgers et al., 2005). In an American study participants received two to three text messages per day and 100% of their participants reported that this frequency was acceptable to them or that the number received could have been higher (Aguilera & Muñoz, 2011). Another study sent one or two text messages per day and 97% of their respondents liked this frequency of messaging (Franklin et al., 2006). Based on these previous studies it was decided that two text messages a day was a suitable frequency. Given there are high volumes of text messages sent and received everyday, the frequency of the text messages sent during the intervention must be sufficient not to be obscured by the sheer volume of other text messages participants may be receiving.

Duration of the text message package. The decision about the duration of the text message package took into account previous research on text message packages, as well as the MBCT protocol and special considerations for the use with patients with psychotic symptoms. Length of the text message package in previous research ranged from 14 days (Culley & Evans, 2010) to 30 weeks (Free et al., 2009). The typical length of an MBCT group programme lasts for 8 weeks (Segal, Williams, et al., 2002). Adaptations of MBCT for patients with psychotic symptoms include individualised treatment, shorter mindfulness practices and extending the length of the programme (Chadwick et al., 2005; Shonin et al., 2014). The initial proposed duration for the current study's text message package was 12 weeks, which fits into the range used in previous research and adheres to the diagnosis-specific recommendations for MBCT. However, after discussion with the EI clinicians involved in the research it was decided to reduce the text message package to 8 weeks. This decision took into consideration the demands placed upon participants, who are part of a vulnerable mental health population, and it was felt that 8 weeks provided an opportunity to assess potential change due to the intervention whilst not overly taxing the participants.

Content. The text message package was based on MBCT. Content for the text messages was developed by the researcher, drawing on MBCT protocol in Segal et al. (2003). To provide an appealing and easy to recognise name for the text message package, ‘Mindfulness’ and ‘Text messages’ were amalgamated to give the name ‘MINT’. Text messages were limited to 160 characters (including spaces), and included the identifier ‘MINT’ at the beginning of each message so that it was clear that the text message was associated with MINT. Two text messages a day were sent, and drawing on the literature it was decided that the first message of the day should be information about MBCT or motivation for home-based practice. The second message of the day was a suggested mindfulness practice. Therefore, the text messages aimed to increase motivation and insight as well as to prompt the action of mindfulness practice. Small practices are recommended for patients with psychotic symptoms (Chadwick et al., 2005; Shonin et al., 2014), and so the recommended practices followed these guidelines to suggest quick and easily achievable mindfulness exercises. These easily achievable goals are ideal for patients with psychotic symptoms, as they provide an opportunity for participants to experience success and mastery, which in turn may encourage later participation in home-based practice. Because text messages arrive in a person’s mobile handset with a notification sound, they provide the perfect opportunity for the recipient to focus on the present moment. Further, the text message suggesting a mindfulness action that can be instantly performed reinforces this present moment focus, which is congruent with the overall aims of MBCT.

Development. Once all 112 text messages were developed, a further four messages were added for 2 days leading up to the start of the intervention in order to introduce MINT to the participants and to remind the participants of key information such as how to withdraw from the trial, and that the service was automated. The

acceptability (face validity) of MINT was then tested in two ways. Firstly, a copy of the entire MINT package was given to age-matched university student volunteers who read the text messages. These volunteers gave feedback on how understandable the text messages were, which was then used to refine the messages. Secondly, a copy of the entire MINT package was given to the clinicians participating in the trial. The clinicians also provided feedback on the acceptability of the text messages to their clients based on their clinical experience. For instance, they suggested to change the text message that asked participants to place a flower next to their bed to asking them to place a piece of fruit next to their bed, as this was felt to be more gender neutral; an important point considering that the majority of their clients were male. For a copy of the MINT package see Appendix A.

Chapter 6 – Method

This chapter describes the methods used to assess the efficacy of the mindfulness text message intervention (MINT) for clients in an Early Intervention (EI) for psychosis setting in Auckland, New Zealand. The research design, which followed a single case research design with multiple baselines, is described. The study design, treatment context, and participants are described. The procedure for the study, measures selected and the data analysis approach are reported. Ethical considerations associated with the study are then addressed.

Research design

This section outlines the theoretical approach taken to the research design. A quantitative single case design approach, with ABA phases and non-concurrent multi-baseline features, was used to analyse the intervention. Single case design studies can be a useful approach when examining participants in real life settings, such as the EI in this study, where it is not possible to recruit the large number of participants required for group analysis.

The suitability of small-n research for emerging areas of interest within the MBCT framework. There are benefits and limitations of using small-scale research approaches compared to more extensive studies such as randomised control trials (RCT). RCTs are expensive and time consuming; the time required to go from trial conception to the publication of the results can be between 5 and 10 years (Riley, Glasgow, Etheredge, & Abernethy, 2013). Time delays in the research process are compounded by the time it takes for research findings to be brought into practice. Riley et al. (2013) call for ‘rapid-learning research systems’ to make research design rapid, responsive and relevant, with the aim of maintaining scientific rigor while speeding the research process so that findings are relevant. A flexible iterative intervention testing

and optimisation approach is recommended, with emphasis on failing early in order to succeed later (Gary et al., 2011). Pilot studies are a feasible way of exploring new research areas, where both positive and null results can add useful information to the research base.

Most clinical psychology research is based on the null hypothesis statistical testing (NHST) approach, which is based on the work of Fisher (1890-1962) (Blampied, 2001). Large samples of subjects are used, from which inferences are drawn about the effects of the independent variable (Blampied, 2001). Clinical psychology research has been plagued by the misinterpretation of NHST since it became the favoured approach to psychological research (Balluerka, Gómez, & Hidalgo, 2005; Cohen, 1990, 1994; Fidler et al., 2005; Nickerson, 2000). Frequent problems are the incorrect interpretation of *p* results and failure to consider effect sizes. But, despite these difficulties, not using NHST can be a barrier to publication (Blampied, 2001).

There are difficulties in drawing inferences about individuals based on group mean data, as means may obscure individual variability (Blampied, 2001). Clinical psychology is interested in particular problems located in the individual and therefore studies of large group means may have limited clinical application. For instance, in the current study the clinical population of interest are clients involved in EI treatment. Defining a group of EI clients as a ‘group’ implies a homogeneity that denies the large within-group variance of such factors such as diagnosis, medication, age and gender. While statistical significance may be achieved by defining such a population as a sample, there is a difference between statistical significance and clinical significance. This research argues that the use of single case research design and the Reliable Change Index (Jacobson & Truax, 1991) are more useful for examining individual change, and therefore produces more clinically relevant results. There has been a movement toward

research design approaches that refocus attention on the individual and this research focuses on the quantitative approach of single case research. Single case research allows causal inference from the effects of the independent variable by interpretation of repeated observations over a period of time. This type of approach is particularly useful for the initial stages of testing a new intervention, as it allows rigorous investigation whilst avoiding the time, cost and risk associated with larger trials, as well as embracing individual change, which is more suited to clinical research (Blampied, 2013).

Single case design. A single case design approach focuses on the analysis of individuals to demonstrate change over a period of time due to an intervention (Engel & Schutt, 2012). It differs from the analysis of groups of participants where individual differences can be obscured (Engel & Schutt, 2012). The single case design is frequently used in clinical psychology and education settings to establish casual inference (Kratochwill et al., 2010). The underlying principle in the single case design approach is that it is possible to observe change caused by the intervention over time, when comparing a pre-intervention baseline to during intervention and post-intervention phases (Engel & Schutt, 2012). The type of question that the single case design can answer is whether the intervention is more effective than the baseline condition (Kratochwill et al., 2010). The goal of this research is to answer whether the intervention is more effective than treatment as usual, and, therefore, the single case design approach is suitable for this study.

Multiple baseline. A basic multiple baseline approach examines at least three participants at the same time, but with differing lengths of baseline to control for the effects of history (Engel & Schutt, 2012). In applied research settings clients are not usually available to participate in research at one given point in time. Researchers have proposed a non-current across-individuals design where participants begin the trial at

different points in time (Watson & Workman, 1981). A non-concurrent approach gives the advantage of flexibility in applied research settings but retains the design elements necessary to rule out relationships between extraneous variables compared to the measured behaviour (Watson & Workman, 1981). The same authors suggest varying the length of baseline to control for history as a threat to external validity, but concede that details of how the research is designed will vary depending on the research setting (Watson & Workman, 1981). It would be difficult to explain changes in measured behaviour occurring at the same point in treatment if these happen at different times as being caused by external events, as it would be highly unlikely for an extraneous event to occur at the same treatment point for multiple participants (Watson & Workman, 1981).

The pattern of measurement scores that emerges during the treatment phase can be compared to the pattern during the baseline phase to analyse the results. Measurements collected in the pre-intervention baseline phase perform two important functions. The baseline measures provide a pattern of scoring that is used to compare change due to the intervention; this is similar to the function of a control group with the individual acting as their own control (Engel & Schutt, 2012). The baseline measure also helps control for most threats to internal validity, similar to random assignment in group designs (Engel & Schutt, 2012). Because the research in this study is highly novel the effectiveness of the intervention is hard to predict, collecting multiple measures for individuals may offer the most detailed information about change in the dependent variables due to the intervention.

Study design

Repeated measurements were used to observe changes in the dependent variable over time, and were then collected prior to the intervention commencing, in a baseline phase denoted as “A1”. During the treatment phase, denoted as “B1” in this study, the same measurement of the dependent variables continued. In an ABA single case design approach after the intervention has been applied it is withdrawn for a further phase of post-intervention measurements, denoted as “A2”. This research did not adopt a varying length of baseline approach, as participants would be starting at different points in time, which in itself helped to separate out any observed changes in behaviour from external (history) events. As recommend in the literature, the type of assessment was kept consistent across all the measurement occasions to ensure changes in monitored behaviour were not due to changes in assessment measures themselves (Nock, Michel, & Photos, 2007). A number of approaches were used to increase the validity of the single case design approach in this study, including the use of multiple participants, non-concurrent start points and the consistency of measures.

Treatment context

The EI provides intensive outpatient care for patients aged 18 to 34 years, who have experienced at least one psychotic symptom. The treatment offered by the EI often consists of long periods of engagement and rapport building, followed by the introduction of MBCT and Acceptance and Commitment Therapy (ACT) based skills, with therapy typically lasting for 2 to 3 years (J. Clark, personal communication, May 8, 2015). The EI provides its own crisis management team, and monitors the risk of their patients on a weekly basis. In cases of elevated risk, monitoring is increased and appropriate interventions applied. The intensive therapy environment is suited to clinical research, as the care the clients already receive helps to mitigate possible risk

imposed by the intervention. The EI experiences low levels of attrition, due to the intensive follow-up procedures.

Participants

Nine participants (eight males, one female) aged between 19 and 31 years old were recruited from the EI service in Auckland, New Zealand, to take part in this study. Three EI clinical psychologists were responsible for recruiting participants for the study, based on their clinical evaluation of their patients' suitability for inclusion. The nine participants received MINT in addition to treatment as usual (TAU). EI patients typically have a range of mental health symptoms, varying diagnoses and different treatment regimes. The EI clinical psychologists monitored risk as part of TAU, and, hence, for any risk that occurred during the study. EI clinical psychologists could terminate their patients' inclusion at any point in the trial if they felt that the risk to that participant was at an unacceptable level. Participants could choose to withdraw at any time but no participants were withdrawn from the trial.

The demographic information is displayed in Table 1 (for demographic questionnaire see Appendix D). Participants had been receiving MBCT for different periods of time before beginning the study. The number of measures completed out of the total number of measures possible was also calculated. The number of measures completed and how many weeks taken to complete each phase were recorded.

Table 1

Demographic information

Participant	PC01	PC04	PC06	PC07	PC08	PC09	PC10	PC11	PC12
Gender	Male	Male	Male	Female	Male	Male	Male	Male	Male
Age	n/a	23	28	22	27	29	19	31	24
Ethnicity	NZE	NZE	NZE	NZE	NZE	NZE	Indian	NZE	Maori
MBCT before baseline	< 6 months	<1 week	> 1 year	<1 year	<6 months	< 6 months	< 1 month	< 1 year	< 1 week
Completion of measures	64%	79%	64%	57%	79%	86%	57%	7%	29%
A1 measures,weeks	3,4	3,3	4,8	3,3	3,3	3,3	3,4	1,3	3,6
B1 measures,weeks	4,8	3,9	4,8	3,9	5,8	8,8	4,8	0,8	1,8
A2 measures,weeks	3,4	2,2	3,6	2,2	3,4	4,5	1,3	0,3	0,3

Note. The data from the two participants who were not included in the analysis due to insufficient data are shown in grey.

Seven participants identified as New Zealand European, one as Indian and one as Maori. Participants had been receiving MBCT for different periods of time before starting the current trial, with a range of less that 1 week to more than 1 year. Two participants failed to complete sufficient measures for analysis and they were excluded from the analysis, leaving a sample size of seven. The completion rate for those seven participants was 63%.

Procedure

This section details the way in which the trial was conducted, with information about the recruitment of participants, delivery of the intervention, and administration and scoring of measures.

Recruitment. Potential participants were approached in the first instance by their therapist. To be eligible, the participants must have had a New Zealand based mobile phone capable of sending and receiving text messages. Interested participants were given an information sheet about the study, and informed consent was obtained in writing by their clinician (see Appendices B and C). The participants were anonymous to the researcher, identified only by mobile phone number. The mobile phone numbers were passed to the researcher under conditions of confidentiality. There were no specific exclusion criteria other than clinician's judgment.

Delivery of the intervention. The text messages were delivered using a semi-automated text system supplied by text message provider Modica (NZ). Text messages were sent at 11am and 3pm each day for the duration of the intervention. There was no charge for participants to receive this service, and their text message replies (to assess the weekly acceptability of the text messages) were also free of charge.

Administration of the measures. The self-report questionnaire with questions regarding the frequency and duration of mindfulness practice, level of mindfulness skill,

and symptoms of depression and anxiety were administered to the participants by their clinicians (measures are discussed in more detail in the section below). Since participants were seeing their clinical psychologist on a weekly basis in this study, one week was selected as the interval between measurements to keep the demands on participants and their therapists to a minimum. Measures of a brief nature were required as reducing the strain on participants and participating therapists was a key consideration. It was decided that the weekly self-report form should be approximately 10 to 15 questions and fit on one side of A4 paper.

To establish baseline functioning, the self-report form was administered three times by the participant's therapist, for a minimum of 3 weeks. A minimum of three measurements was taken in the baseline phase to ensure sufficient confidence in the nature of the pattern of scoring. This was "A1" in the research design. The duration of the baseline phase varied for each participant according to how long it took them to complete the minimum of three measures.

The intervention for each participant started (within one day) once the researcher received the participant's baseline data. The intervention was then administered for 8 weeks, and the self-report form was given weekly during this time. This was the "B1" in the research design. During the intervention phase participants were asked to rate the acceptability of the text message package once a week, by text message where they sent a numerical rating response. The researcher stored the data collected by text message for later analysis.

Once the participants completed the intervention their therapists collected a maximum of three post-intervention outcome measures. The self-report form was administered three times over a 2-month period after the intervention. This was the "A2" in the research design. The results of the research were disseminated to the

therapists involved and to the participants. Participants were thanked for their time with a $40 supermarket voucher on completion of the trial.

M**easures**

Weekly self report measure. Three questions were used to assess the number of days of mindfulness practice each week, the average number of times of practice per day and the average duration of practice:

- How many days in the last week did you manage mindfulness practice? (0 to 7)
- How many times a day did you normally do mindfulness practice (0 to 3+)
- How long did you normally spend practicing mindfulness each day (<1, 1 to 5, 5 to 10, >10 minutes)

See Appendix E for the weekly questionnaire.

Cognitive and Affective Mindfulness Scale – Revised. The CAMS-R is available as a 10- or 12-item measure; two items have possible construct contamination with rumination, worry, depression and anxiety symptoms and these were removed to develop the 10-items, which the authors recommend and this version was used in this study.

Participants were asked 10 questions and rated their answers on a 4-point scale (rarely/not at all, sometimes, often, almost always). Total scores ranged between 10 and 40 points. Questions were written in everyday language and included the items “I try to notice my thoughts without judging them” and “I can tolerate emotional pain”. The CAMS-R is a freely available scale and is detailed in Appendix M.

Acceptable internal consistency ($\alpha = .76$) has been demonstrated (Feldman et al., 2007). Total scores on the CAMS-R 12-item were strongly correlated with total scores on another mindfulness measure, the Freigburg Mindfulness Inventory, demonstrating

convergent validity. Both the FMI and CAMS-R 12-item examine acceptance as a dimension of mindfulness (Feldman et al., 2007). Due to the associations found with emotional regulation and cognitive flexibility, the CAMS-R has acceptable discriminant and convergent validity (Feldman et al., 2007). The CAMS-R 10-item strongly correlates with the 12-item measure and has acceptable psychometric properties of internal consistency, and concurrent and discriminant validity (Feldman et al., 2007).

Patient Health Questionnaire–4. This study required a brief, well-validated screening measure for depression and anxiety, and the Patient Health Questionnaire–4 (PHQ-4) was selected (Kroenke, Spitzer, Williams, & Löwe, 2009).

The PHQ-4 has a total score range from 0 to 12 with higher scores indicating higher levels of depressive and anxious symptoms. Participants rate the frequency of symptoms on a 4-point scale (0 to 3), ranging from *not at all, to nearly every day* (Kroenke et al., 2009). Recommended cut-offs are ≥3 on the PHQ-2 questions, and ≥3 on the GAD-2 questions (Kroenke et al., 2009). Scores of ≥6 indicate a "yellow flag" for the presence of anxiety or depression, and scores of ≥9 as a "red flag" have been recommended (Löwe et al., 2010). The PHQ-4 is a freely available measure and the questions are shown on Table 2 below.

Table 2

Items on the PHQ-4

Depression items (PHQ-2)
Little interest or pleasure in doing things
Feeling down, depressed, or hopeless
Anxiety items (GAD-2)
Feeling nervous anxious or on edge
Not being able to stop or control worrying

The PHQ-4 can be used to assess individuals with anxiety or depression or both of these disorders (Kroenke et al., 2009). High scores on the PHQ-4 were found to be related to increasing functional impairment in the patients' mental and social health (Kroenke et al., 2009). The two questions making up the anxiety subscale have an independent effect on functioning, and this effect increases with co-morbid depression (Kroenke et al., 2009). The PHQ-4 overall score indicates overall psychological distress and it is, therefore, valuable as a composite along with the PHQ-2 and GAD-2 subscales (Kroenke et al., 2009). As a screening tool the PHQ-4 is not diagnostic but indicates the need for further examination (Kroenke et al., 2009).

The PHQ-4 combines the Patient Health Questionnaire-2 (PHQ-2) and the Generalised Anxiety Disorder-2 (GAD-2) as an ultra brief assessment of depression and anxiety (Kroenke et al., 2009). The PHQ-2 and GAD-2 consist of the core criteria questions for these disorders taken from the longer versions of the scales, namely the Patient Health Questionnaire-9 and the Generalised Anxiety Disorder-7 scales (Kroenke et al., 2009). The PHQ-2 has shown to be an excellent screening tool for major depressive disorder with a cut-off of ≥3 on the PHQ-2, showing sensitivity of 83% and specificity of 90% (Kroenke et al., 2009). The GAD-2 has shown to be a good screening tool with a cut-off of ≥3 for generalised anxiety disorder (sensitivity 88%), panic disorder (sensitivity 76%) and social anxiety disorder (sensitivity 70%) (Kroenke et al., 2009). Factor analysis of the PHQ-4 showed that 84% of the total variance found could be explained by the two factors: depression and anxiety (Kroenke et al., 2009). The PHQ-4 was found to be a two dimensional measure of anxiety and depression (Löwe et al., 2010). One study used a large sample from a diverse range of clinical settings, which supports the use of their findings for primary care settings (Kroenke et al., 2009). Another study with 5000 subjects supports the use of the PHQ-4 in the general

population as a reliable and valid measure of depression and anxiety (Löwe et al., 2010).

The internal reliability, construct validity and the factorial validity of the PHQ-4 have been established (Kroenke et al., 2009). Construct validity was shown through association of higher PHQ-4 scores with functional impairment (Kroenke et al., 2009). Construct validity has been demonstrated through the correlations of the PHQ-4 with other measures and known risk factors for anxiety and depression (Löwe et al., 2010). Scores in primary care samples were also found to be lower than those in the general population, supporting the construct validity of the PHQ-4 (Löwe et al., 2010). Previous studies have shown the reliability, criterion, construct and procedural validity of the PHQ-2 and GAD-2 (Kroenke, Spitzer, & Williams, 2003; Kroenke, Spitzer, Williams, Monahan, & Löwe, 2007; Löwe, Kroenke, & Gräfe, 2005; Spitzer, Kroenke, Williams, & Löwe, 2006). Taken together these results show that the PHQ-4 is a well-validated and reliable screening measure for anxiety and depression.

Assessing weekly modules of the text message package. A quantitative question was asked of the participants at the end of each week via text message: *How useful did you find the text messages this week on a scale of 0-10?*

End of study participant and therapist questionnaires. The questionnaire used a quantitative format to gather information on participant experiences of using the MBCT text package (see Appendix G). Forced-choice format questions asked participants to respond on a visual analogue scale. The visual analogue scale was chosen because of its utility in measuring subjective phenomena (Wewers & Lowe, 1990), and because it is convenient and easy for participants to use (McCormack, Horne, & Sheather, 1988), making it suitable for the use with potentially vulnerable

participants. The visual line was set at 10 centimetres, in a unipolar format, and was scored in half centimetre increments to give a score of between 0 and 20.

Forced choice questions:

Rate how useful you found MINT (0-10)

How often did you read the text messages (0-10)?

How often did you do the activity suggested in the text message (0-10)?

Open-ended questions:

Was there anything you didn't like about MINT?

How would you improve MINT?

A separate questionnaire was administered to the participant's therapist with the aim of gathering their subjective observation of their client (see Appendix F).

Questions included:

What did you notice about your client's ability to practise mindfulness skills between therapy sessions?

Were there any questions that arose during therapy with regards to the text support package? If so, what were they?

Was there anything significant that you noticed about the way the client responded to mindfulness components in therapy?

Was there anything significant that you noticed about the client's levels of engagement in the therapeutic process?

Data analysis strategy

Analysing changes in the frequency and duration of home-based practice was the primary analysis of this research. Secondary analysis was conducted for the measures of mindfulness skill and anxiety and depression symptoms. Analysis at both group level and individual level was conducted. This section details the types of analysis used,

including statistical significance tests, visual analyses and effect sizes. Referring to the literature the Wilcoxon matched pairs signed rank test had been used in previous analysis. This test was included in this study to aid comparison to previous research.

Wilcoxon matched pairs signed rank test. Because the distribution of data could not be assumed to be normal a non-parametric test of difference was selected. The Wilcoxon matched pairs signed ranks test was selected as it is used for related data, for instance, baseline and post-intervention measurements. The null hypothesis for the Wilcoxon test is that there is no difference in medians between two samples. The Wilcoxon test was used for the group data results baseline to post-intervention comparison for the three measures in this study - total practice, CAMS-R and PHQ-4 - to assess whether there were statistical differences in scores.

Brinley plots. Brinley plots were developed as a visual interpretation method for cognitive psychology experiments (Brinley, 1965). Co-ordinates are plotted on the graph, for the same experiment in different conditions, such as baseline and post-intervention data. Where there is no change, data points lie on the 45-degree diagonal line. While this type of visual analysis is not widely used in psychology, Blampied (2017) championed the use of modified Brinley plots in single case research design because of their ability to show both group effect and individual change. Change can be shown in a positive or negative direction when data points move away from the line of no change, and arrows can be added on the graph to indicate the direction of hypothesised change. Where available, clinical cut offs can be added to the graph to aid interpretation of the clinical meaning of the change (see Figure 1).

Data for each individual was analysed for baseline to intervention and baseline to post-intervention change using the individuals' mean scores for each of those phases. Thus

for each hypothesis the group change could be visually interpreted using modified Brinley plots, while the ability to detect individual variation was retained.

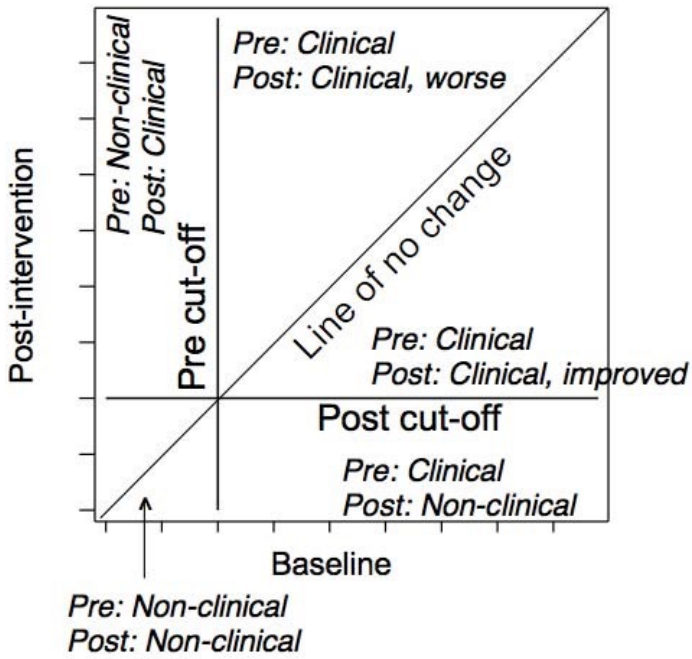


Figure 1. Brinley plot graph (Blampied, 2017, p.120).

Reliable change index. Statistical significance is different from clinical significance. Clinical significance involves moving from being more like a clinical population to being more like a non-clinical population. The use of the Reliable Change Index (RCI) has been recommended, as this allows individual change to be assessed as to whether it is clinically meaningful, rather than assessing group statistical change (Zahra & Hedge, 2010). RCI is most useful for small 'n' research; for example, when working with specific populations with rare disorders or where participants are difficult to recruit. There are reasons why RCI may not be a more popular approach in analysis – that popular statistical packages do not calculate it, and that it requires comparison population means, standard deviations and measurement reliability (Zahra & Hedge,

2010). There are three other methods to assess clinically significant change where psychometric data is not available to calculate the RCI (Jacobson & Truax, 1991). This study uses method (b), which defines clinical significance as a return to normal functioning where post-test measurements fall within two standard deviations of the normal population mean for that measure.

Multiple baseline. The pattern of measurement scores that emerges during the treatment phase can then be compared to the pattern during the baseline phase to analyse the results from this study. The differences in pattern are visually analysed, in graphical form.

Visual analysis. Visual analysis can be conducted by examining six variables (Kratochwill et al., 2010). The data can be reported for 'within phase' as mean and range, and 'between phases' as improving or deteriorating. The trend of the data can be reported 'within phase' as 'accelerating or decelerating' (improving or deterioration), 'zero change' or 'combination' and can be reported as 'therapeutic' or 'contra-therapeutic'. 'Between phase' trend can be reported as change or no change. Stability is reported as the percentage of data points within an '80/20 stability envelope' as 'variable' or 'stable' as described below. Ten per cent of the mean is marked above and below the trend line to create the 'stability envelope'. The number of data points that fall within this 'stability envelope' are then counted and divided by the total number of data points in the phase. If more than 80% of the data points fall within the 'stability envelope' the result is considered 'stable'. Trend shows the hypothesised direction of change if the measures continued beyond the phase. If the trend is for negative therapeutic change it is described as 'decelerating' or 'contra-therapeutic'. 'Decelerating' or 'stable' trend in the baseline phase is acceptable as any positive change can then be clearly seen. 'Accelerating' or 'therapeutic trend' (therapeutic

improvement) is not desirable for the baseline phase as it suggests improvement would occur without intervention. The way in which data overlaps between phases can be examined in a number of ways (discussed further in the section below on non-overlap analysis). Change can be examined to determine the immediacy of effects after introduction of the intervention and whether there is consistency across similar phases.

Non-overlap analysis. There have been recent improvements in single case research analysis including multilevel modelling (Noortgate & Onghena, 2008), advanced regression models (Allison & Gorman, 1993; Huitema & Mckean, 2000) and data non-overlap between phases (H. H. Ma, 2006; Parker & Vannest, 2009; Parker, Vannest, & Brown, 2009). Advantages of non–overlap of data analysis are that it does not require parametric assumptions about data and scales, it is suitable for small sample sizes and that it is easy to use. Historical criticisms of this approach are that they had low statistical power and were unable to account for trend. It has been suggested that more recent innovations for these methods have overcome these limitations (Parker, Vannest, & Davis, 2011). Non-overlapping indices are useful for single case research as they do not make assumptions about the data distribution and they are easy to interpret (Parker et al., 2011). There are nine types of non-overlap indices, which have their own strengths and weaknesses. Two approaches; the non-overlap of all pairs (NAP) and non-overlap of all pairs taking into account positive baseline trend (TauU), were used in the current research and are discussed below. Non-overlap indices compare one group of data (a 'data cloud') to another. A limitation of this approach is that once the two data clouds (groups of data) are totally separate (exceed 1.00, or 100%), they are unable to quantify to any further degree of how separate the two 'data clouds' are. Other effect size tests such as Cohen's *d* and Hedges' *g* were considered. Cohen's *d* requires equal numbers of observations in each phase, making it unsuitable for this single case

research. Cohen's *d* also uses standard deviations to estimate how far apart the data phases are and is therefore not always suitable if the distribution of the data is not normal. Hedges' *g* can account for unequal numbers of observations in each phase, but as the other concerns still remain its use was rejected.

Non-overlap of all pairs. It has been suggested that non-overlap methods of analysis are useful in single case research where an even distribution cannot be assumed, as opposed to analysis involving the mean and median that rely on even distribution of data (Parker et al., 2009). The non-overlap of all pairs (NAP) was selected for analysis in this research as it considers all data points equally in the comparison. Other methods such as percentage exceeding median (PEM) or percentage of non-overlapping data (PND), which rely on a median or highest data point in the phase, may produce skewed results when there are outliers or variable distribution. NAP compares all data points in one phase (A1) with all data points in a second phase (B1), to produce a percentage of the data that do not overlap. NAP shows the separateness of the two 'data clouds' of each phase. The NAP score is calculated by scoring 1 point for each data comparison where the phase B data is higher than phase A, 0.5 points where the comparison is tied and 0 points where phase A is larger than phase B, this is, NAP = ([pos + 0.5 ties]/ pairs). The results are then totalled and divided by the number of comparisons, with the result scaled from 50 to 100% where 50% represents no change. The NAP is then rescaled to give a 0 to 100% score with the calculation NAP 0-100 = 1 – (NAP 50-100/0.5). The resulting NAP 0 to 100 score can then be used as an effect size allowing comparison with other studies in meta-analysis. Non-overlapping indices such as the NAP offer strong statistical non-parametric analysis (Acion, Peterson, Temple, & Arndt, 2006).

Tau. There are two forms of Tau, Tau novlap and TauU, (Parker et al., 2011). Tau novlap is a more conservative estimation of the separation of data points than NAP when comparing two phases as it subtracts the number of overlapping data points from the number of non-overlapping data points, divided by the number of comparisons. TauU takes into account monotonic positive baseline data trend, that is, not only linear improvement. TauU first uses a non-parametric rank test, Kendall's rank correlation. For this computation the phases are coded differently: Phase A data is put in reverse time sequence and Phase B data is the first data value repeated. The KRC S value is computed and then used in the following equation TauU = S/pairs. Another non-overlapping pairs method, ECL, also controls for positive baseline trend, but it only controls for linear trend. Because of the variability in single case research design, which may affect baseline trend, TauU was used to estimate effect size, whilst taking into account any monotonic positive baseline trend.

A table of effect sizes for seven different non-overlap indices has been compiled to indicate the percentiles for NAP (see Table 3) (Parker et al., 2011). In this current study NAP values less that 0.38 were reported as small, values 0.38 to 0.96 were reported as medium and values over 0.96 were reported as large effect sizes. Typical values were taken from 200 AB comparisons across 60 studies. ECL and TauU were not included in their analysis as these measures take into account positive baseline trend, which makes comparison to other indices difficult. As a result, both NAP and TauU were reported for this study, as NAP effect sizes could be assessed compared to previous research and used in meta-analyses, while TauU gives an effect size that takes monotonic positive baseline trend into account. Recent meta-analyses using this type of analysis include Bowman-Perrott et al. (2013); Bowman-Perrott, Burke, Marin, Zhang

and Davis (2015); Bowman-Perrott, Burke, Zhang and Zaini (2014); and Bowman-Perrott, Herrera and Murry (2010).

Table 3

Effect size percentiles for NAP

Indices	10th	25th	50th	75th	90th
NAP	0.00	0.38	0.68	0.96	1.00

Ethical considerations

The current study was conducted under the New Zealand Code of Ethics for Psychologists (The New Zealand Psychologists Board, 2012). Ethical approval was given by the Health and Disability Ethics Committee (ref: 15/NTB/201), and the Auckland District Health Board (ref: 6990). Participants of the research were users of health services and were deemed vulnerable due to the mental health issues that they were facing including potential psychotic symptoms. Ethical considerations were identified and minimised where possible, and are detailed below.

Participants. Potential participants were identified by their EI Clinical Psychologist. The Clinical Psychologist gave them information about the trial, including the brochure. The Clinical Psychologist was bound by ethical guidelines and as such would not unduly influence their clients to participate. Clinical Psychologists informed their clients that participation or non-participation would in no way effect their treatment by the EI. The researcher was separate from the EI service, and as such the EI service had no vested interest in recruiting participants, other than offering their clients the opportunity to participate.

A detailed information sheet was given to the potential participant and read through by the Clinical Psychologist to check participants understood the content. The information sheet reached a satisfactory standard of ease of reading with a Flesch Reading Ease score of 61. Informed consent was then obtained in writing. Participants

were informed that the Clinical Psychologist could cancel their participation in the trial if they deemed the client to be at risk, and participants were told that they could withdraw from the trial at any point. Participants were identified in the trial by a participant code, rather than by their name. Information from the trial was stored in a locked cabinet.

Risk management. The intervention was not thought to constitute a high risk to participants, as it was an adjunct to existing therapy that was taking place. The EI continually monitor risk as part of normal treatment, and any possible increase in risk due to participation in this study was minimised by the frequent and intensive therapy that participants were receiving. Any unidentified risk caused by participation in this study was minimised by the participants' therapeutic treatment with the EI service as per treatment as usual. EI clients were in regular contact with the EI service and mental state and risk was continually monitored. Once every four weeks, the client's risk was reviewed within the EI. They were reviewed more frequently if risk was identified, as often as daily if it was necessary. Participants were informed in the information sheet that in case of crisis they should contact their EI therapist. They were informed that the text service is automated, and that on texting a key word "CRISIS" they would receive an automated response prompting contact with appropriate services: "During business hours please call your key worker or Early Intervention Team. Outside business hours call the urgent response service on 0800800717".

Acknowledgement of participation. Participants received a $40 supermarket voucher to thank them for their time in this research at the end of the trail delivered by their clinician. The EI clinicians considered this voucher to be of an appropriate type and amount, and it was designed to acknowledge their effort and time in participation.

Cultural issues. Due to the preliminary nature of this study it does not have a specific focus on any particular culture or ethnicity. It was expected that participants would come from a wide range of cultural backgrounds, including Māori. Māori were not actively recruited, nor excluded from this study. This exploratory study will examine the effectiveness of the intervention delivered in English. The lack of Te Reo Māori in this initial study may have been a cultural issue for Māori participants. However, all participants were explicitly informed that the text package was offered in English and, therefore, those who did not wish to participate could choose not to consent. While Māori were not the focus of this feasibility study, since there were potential Māori participants, consultation was undertaken in person with Mr Nephi Skipworth, the Kaumatua for the Massey School of Psychology (Albany). Potential cultural issues associated with the research were discussed. Mr Skipworth was satisfied that both the design and data collection methods were culturally appropriate. Mr Skipworth also provided ongoing cultural support as necessary throughout the study.

Conclusion. The participants were recruited from the population that the intervention was aimed at. Any results from this study may be of direct benefit to the population that the sample was derived from. The risks of the intervention were thought to be low, as it was an adjunct to an existing therapeutic treatment. Any risks that did occur were managed by the EI. The low level of risk was balanced with the potential benefits of this intervention to this population group.

Chapter 7 – Results

The results chapter is divided into three sections. The first section reports the group data by hypotheses - that MINT (a) will increase home-based practice; (b) increase mindfulness skills as measured on the CAMS-R; and (c) decrease anxiety and depression symptoms as measured on the PHQ-4. The second section reports individual data and the third section reports qualitative data from participants and clinicians.

Section 1 - Group data

Hypothesis 1 - The intervention will increase the frequency of daily home-based mindfulness practice. Seven participants had sufficient data to be included in the group analysis (PC01, PC04, PC06, PC07, PC08, PC09, PC10). Home-based mindfulness practice was assessed on a weekly basis by three questions (see Chapter 6, page 78). Total practice was calculated from the number of times of practice per week multiplied by the duration of practice per day. Since data for the duration of practice was gathered in categories the average of each category was used. Where the number of times per week was 0, the score was changed to 1 for calculation purposes, as it was illogical to have a score of 0 if the average time of practice per day was to be reported. Total practice is reported in nominal minutes. For example, 1 (how many days practiced in the past week) x 10 (duration of practice per day in nominal minutes) = 10 nominal minutes total practice.

Four different methods of analysis were completed for this measure (see Chapter 6, page 83). Data was assumed to be of non-parametric distribution and hence, non-parametric tests were used in the statistical analysis. A non-parametric test, the Wilcoxon Signed-Ranks Test for Paired Samples, was used to test the hypothesis that there was a difference between baseline and post-intervention. NAP and Tau-U scores

for the group were calculated to assess effect size. Brinley Plots and time series graphs were used to visually assess the group data.

Wilcoxon Signed-Ranks Test. A Wilcoxon Signed-Ranks Test indicated that post-intervention group total practice scores (*Mdn* = 9.0) were statistically significantly higher than pre-intervention group total practice (*Mdn* = 7.5) scores Z =-2.159, $p<.031$.

NAP and Tau-U. Results for group total practice are reported in Table 4 below. Level refers to the mean score for that phase for the group, and between phases indicates the direction of change.

Table 4

Total practice group data

Phase	Level	NAP	Tau-U
A1	9.32	n/a	n/a
B1	13.77	n/a	n/a
A2	16.42	n/a	n/a
A1B1	Improving	0.64	0.29
A1A2	Improving	0.71	0.53

Note. A1B1 and A1A2 refer to the between phase change.

NAP. There was a medium effect size for the difference between baseline and intervention phases, .64 and a medium effect size for the difference between baseline and post-intervention phases, .71.

Tau-U. The Tau-U value that takes into account positive baseline trend showed an effect size of .29 for the group total practice from baseline to intervention and an effect size of .53 for baseline to post-intervention.

Brinley plots. Brinley plots show the group data compared to the line of no change. Movement into the upper half of the chart showed positive change. Clinical change could not be examined, as there was no data on sufficient amounts of mindfulness practice required for clinical change and, hence, clinical cut off scores were

not available for these scores. Four participants showed positive change across baseline to intervention phases, see *Figure 2*. Six participants showed positive change in the baseline to post-intervention phase, see *Figure 3*.

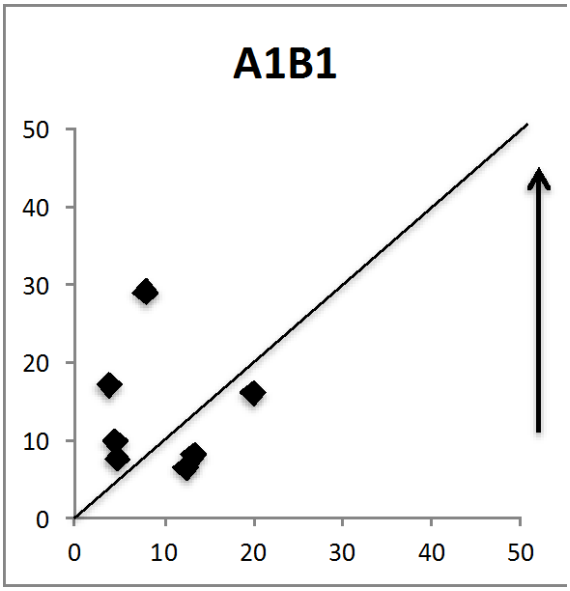


Figure 2. Brinley Plot of A1B1 change for group total practice. Total practice in minutes is shown on both axes. A1 is shown on the *x*-axis and B1 on the *y*-axis.

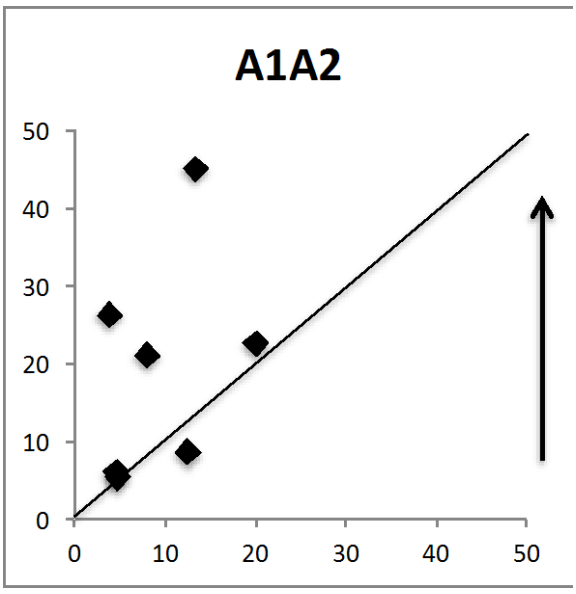
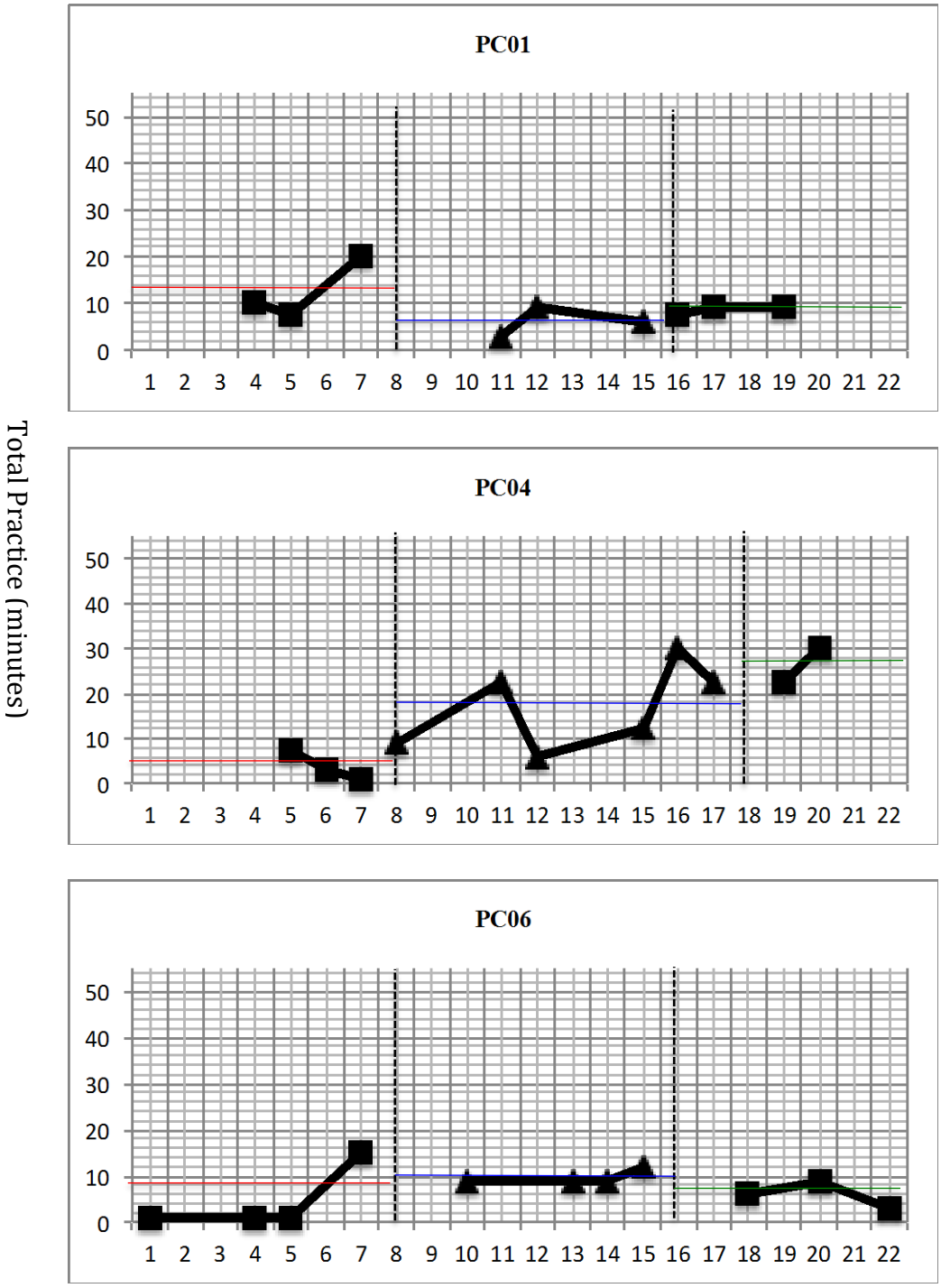


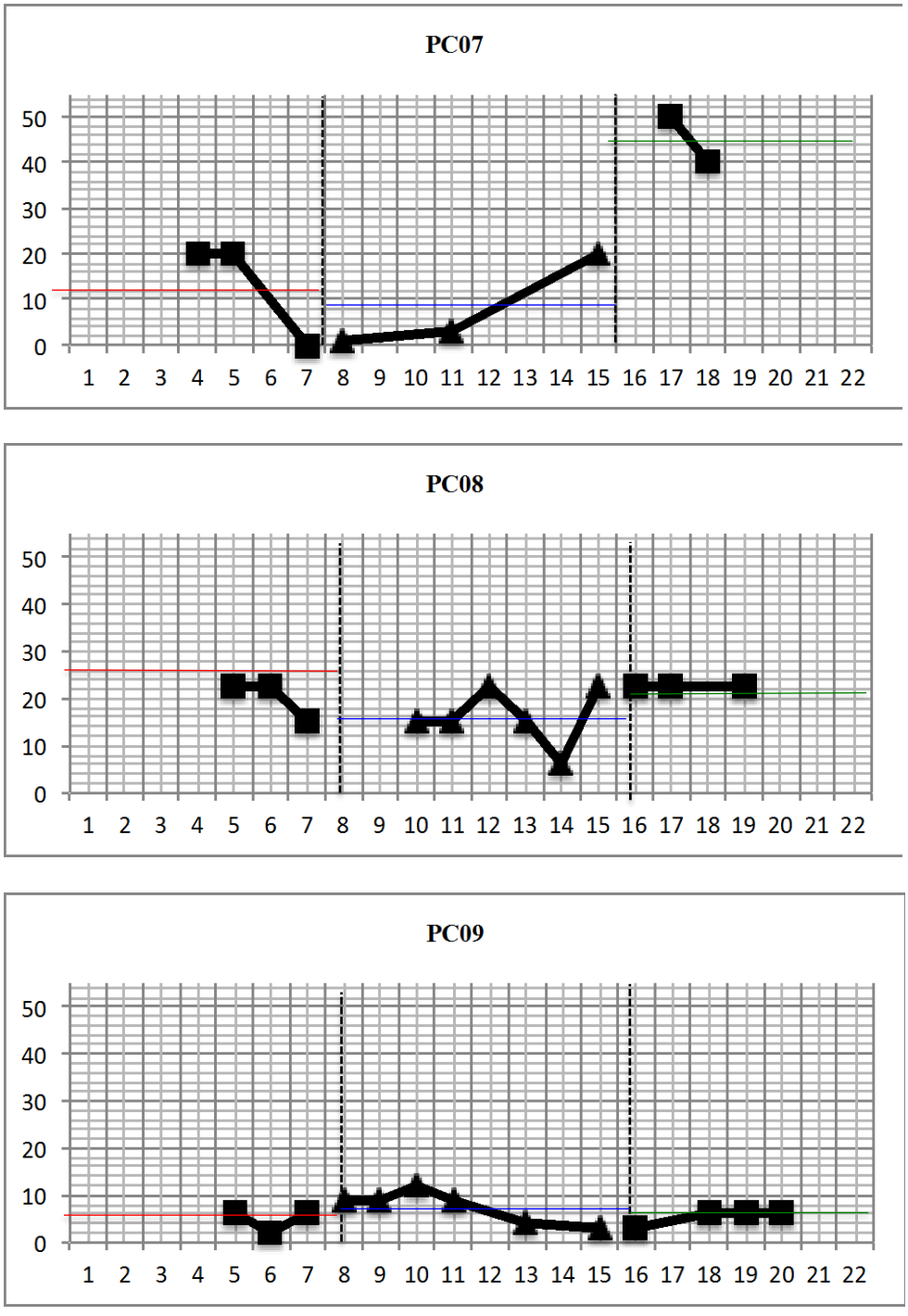
Figure 3. Brinley Plot of A1A2 change for group total practice. Total practice in minutes is shown on both axes. A1 is shown on the *x*-axis and A2 on the *y*-axis.

Clinical significance. To assess clinical significance requires comparison of population means and standard deviations and measurement reliability, which are not available for total practice scores (see Chapter 6, page 84). Therefore, clinical significance was not assessed for this measure.

Time series. Visual analysis was completed for the group data using time series graphs (see *Figure 4*). The time at which participants began the intervention and the post-intervention phases was standardised at 8 and 16 weeks to aid visual comparison, except for one participant (PC04) whose post-intervention phase started at 18 weeks due to a two week technical malfunction during the intervention phase where they received no MINT. The figures depict the change in total practice for each participant with the means for each phase added to aid interpretation. Data regarding level, stability and trend are reported in Appendix H. It was notable how much variability there was during the baseline phase, with only three participants (PC04, PC08, PC10) achieving over the 80% stability rating desirable for a baseline phase. Three participants (PC04, PC07, PC10) completed fewer than three data points in the post-intervention phase, meaning the results for this phase should be interpreted with caution.

Four participants (PC04, PC06, PC09, PC10) showed increases in total practice compared to the baseline in the intervention phase, but there was no clear increase as soon as the intervention began. Of these four, three (PC09, PC06, PC08) had lower post-intervention scores than during the intervention. Six participants (PC04, PC06, PC07, PC08, PC09, PC10) showed increases in total practice comparing baseline and post-intervention phases. One participant (PC01) showed a decrease in total practice score from baseline to intervention, and baseline to post-intervention. Full visual analysis is discussed in the Individual Analysis section below.


PC01
PC04
PC06
Total Practice (minutes)
0
10
20
30
40
50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
Weeks


PC07
PC08
PC09
Total Practice (minutes)
0
10
20
30
40
50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
Weeks

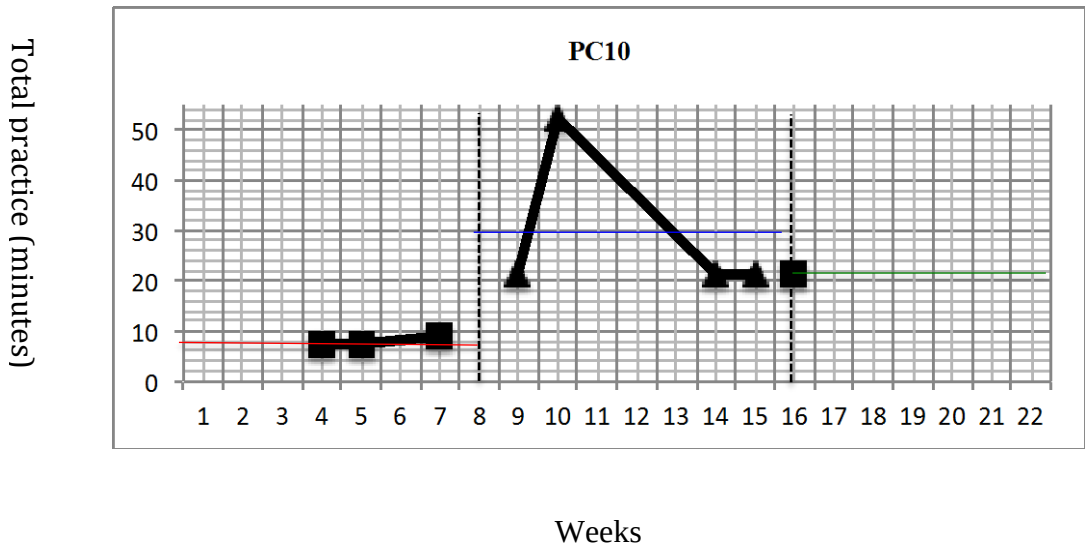


Figure 4. Time series for group total practice.

Summary. The group analysis showed a statistically significant baseline to post-intervention phase with a medium effect size. The clinical significance of this change could not be assessed due to a lack of psychometric data on mindfulness practice. Visual analysis using Brinley plots and time series analysis showed that four participants improved from baseline to intervention phase, and six improved from baseline to post-intervention phase for total home-based practice. There were high levels of variability in data for total practice meaning that visual analysis from the time series should be interpreted with caution. Three participants showed larger improvements in the baseline to intervention comparison than in the baseline to post-intervention comparison. One participant showed deterioration in total practice from baseline to post-intervention. Overall, the majority of participants showed improvement after the intervention.

Hypothesis 2 - The intervention will improve participants' mindfulness skills. It was hypothesised that increasing mindfulness home-based practice would increase participants' levels of mindfulness skills. The self-report measure CAMS-R

was used to assess the participants' levels of mindfulness during baseline, intervention and post-intervention on a weekly basis (see Chapter 6, page 78).

Four different methods of analysis were completed for this measure. As for hypothesis 1, the Wilcoxon, NAP, TauU and Brinley plots were used.

Wilcoxon Signed-Ranks Test. There was no statistically significant difference for the group results on the CAMS-R for either baseline to intervention or baseline to post-intervention phases.

NAP and Tau-U. Results for CAMS-R group scores are reported in Table 5.

Table 5

Group CAMS-R data

Phase	Level	NAP	Tau-U
A1	25.08	n/a	n/a
B1	25.26	n/a	n/a
A2	23.65	n/a	n/a
A1B1	Improving	0.54	0.07
A1A2	Deteriorating	0.47	-0.06

There was an increase in the group mean CAMS-R score per week from 25.08 (*SD* = 4.53) in the baseline to 25.26 (*SD* = 4.62) in the intervention phase, and deterioration from baseline to 23.65 in the post-intervention phase, representing a negligible change of 0.18 and –1.43 CAMS-R score respectively.

NAP. The baseline to intervention phase change for the group showed an effect size of .54 and for baseline to post-intervention .47.

Tau-U. The baseline to intervention phase change for the group showed an effect size of .07 and for baseline to post-intervention -.06.

Clinical significance. Calculating the clinical significance of the change on the CAMS-R was considered, but was not completed due to the lack of psychometric data for this measure and the lack of change on the measure.

Brinley Plots. Brinley plots show the group data compared to the line of no change. Movement into the upper half of the chart showed positive change. The Brinley plots showed there was little movement away from the line of no change in either baseline to intervention or baseline to post-intervention comparison (see Figure 5 and *Figure 6*). It was not possible to calculate clinical cut-off scores for the CAMS-R due to lack of psychometric data for this measure.

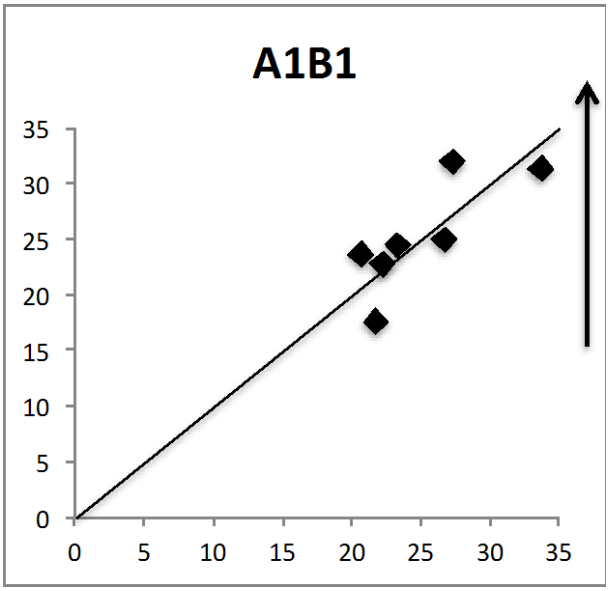


Figure 5. Brinley plot of A1B1 change for the CAMS-R. The CAMS-R score is shown on both axes. A1 is shown on the *x*-axis and B1 on the *y*-axis.

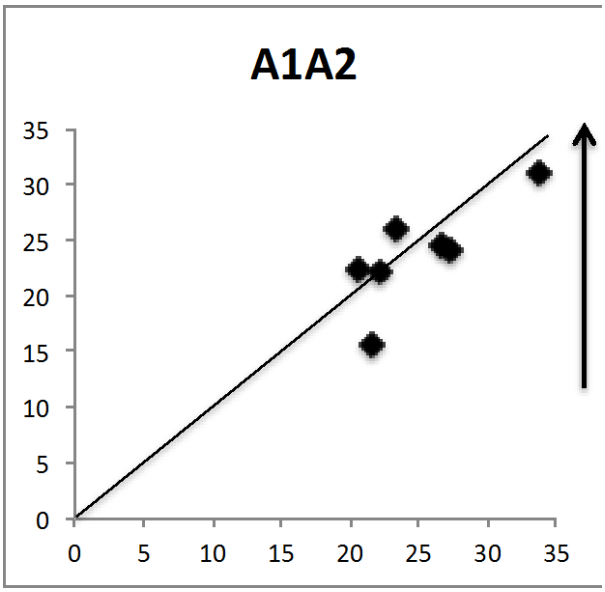


Figure 6. Brinley plot of A1A2 change for the CAMS-R. The CAMS-R score is shown on both axes. A1 is shown on the *x*-axis and A2 on the *y*-axis.

Time series. Time series analysis was not conducted due to the lack of change over the course of the trial as shown on the Brinley Plots.

Summary. Little change in either direction was observed across all the participants during this study.

Hypothesis 3 - The intervention will reduce anxiety and depression symptoms reported by participants. It was hypothesised that as participants increased their mindfulness home-based practice their anxiety and depression symptoms would reduce. The PHQ-4 was used as an ultra brief screening tool, administered weekly throughout the baseline, intervention and post-intervention phases. The PHQ-4 has a score range of 0 to 12. A decrease in score on the PHQ-4 indicated positive change.

The data was analysed with Wilcoxon Signed-Ranks Test to assess any statistical differences for the PHQ-4 scores. NAP and Tau-U were used to calculate effect size and clinical significance was assessed. The data was visually assessed using Brinley Plots to detect any group level changes.

Wilcoxon Signed-Ranks test. There was no statistically significant difference for the group results on the PHQ-4 for either baseline to intervention or baseline to post-intervention phases.

NAP and Tau-U. Results for the PHQ-4 group scores are reported in Table 6.

Table 6

PHQ-4 group scores

Phase	Level	NAP	Tau-U
A1	6.34	n/a	n/a
B1	5.69	n/a	n/a
A2	5.12	n/a	n/a
A1B1	Improving	0.58	0.15
A1A2	Improving	0.62	0.25

There was a decrease in the group mean PHQ-4 score per week from 6.34 minutes in the baseline to 5.69 minutes in the intervention phase, and to 5.12 minutes in the post-intervention phase, representing a decrease of 0.65 and 1.22 points on the PHQ-4, respectively.

NAP. There was an effect size for the difference between baseline and intervention phases of .58, and an effect size for the difference between baseline and post-intervention phases of .62.

Tau-U. The Tau-U effect size for baseline to intervention was .15, with an effect size of .25 for baseline to post-intervention.

Clinical significance. Jacobson and Truax's (1991) criterion (b) (see Chapter 6, page 84) was used to assess clinical change. Four male participants (PC09, PC06, PC04, PC10) fell below the range of the normal population (Löwe et al., 2010) (2*SD* above mean = 5.45), and one female participant (PC07) fell below the range of the normal population (2*SD* above mean = 6.16) for post-intervention scores. However, three of these participants' baseline scores were also in the normative range, and, therefore, their score change was not clinically significant. Two participants met Jacobson and Truax's (1999) criterion b for clinically significant change pre to post intervention: PC04 and PC07. Using Jacobson and Truax (1991) reliable change index, three participants experienced clinically significant change: PC01 (-2.50), PC04 (-7.94) and PC07 (-2.80). Group mean change baseline to post-intervention score on the PHQ-4 did not reach clinical significance (-1.14). It should be noted that, because a *decrease* in score on the PHQ-4 indicates clinically significant change the cut off score of 1.96 was converted into the negative, that is -1.96.

Brinley Plots. Brinley plots show the group data compared to the line of no change. Movement into the lower half of the chart showed positive change. The clinical

range of ‘normal’ on the PHQ-4 is a score of 2 (Löwe et al., 2010) and this is depicted on the graph using horizontal and vertical bars.

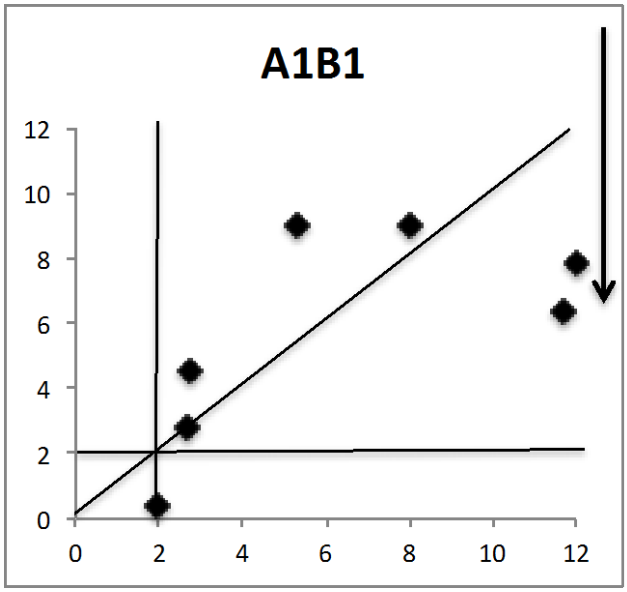


Figure 7. Brinley plot of A1B1 change for the PHQ-4. PHQ-4 scores are shown on both axes. A1 is shown on the *x*-axis and B1 on the *y*-axis.

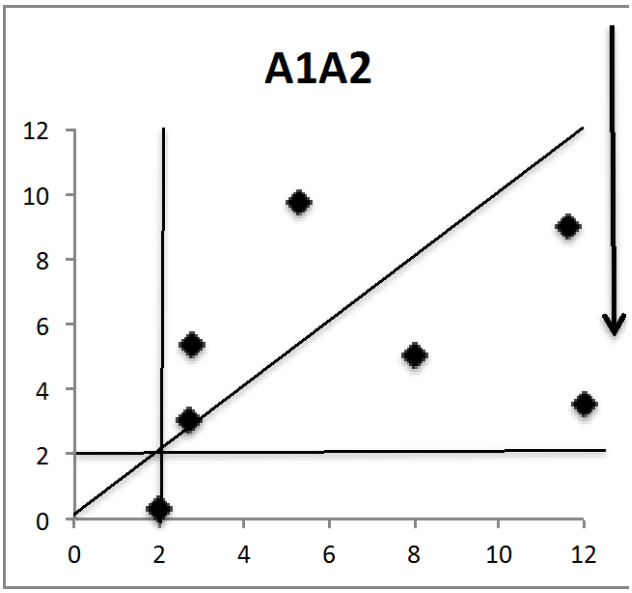


Figure 8. Brinley plot of A1A2 change for the PHQ-4. PHQ-4 scores are shown on both axes. A1 is shown on the *x*-axis and A2 on the *y*-axis.

In the baseline to intervention comparison one participant moved in the positive direction of change, but the change score of 2 to 0 remained in the 'normal' category of functioning, and likely did not represent clinically significant change. Two participants moved in the positive direction of change with their scores moving from the 'severe' category to the 'moderate' category. In the baseline to post-intervention comparison one participant moved in the positive direction of change, but the change score of 2 to 0 remained in the "normal" category of functioning, and likely did not represent clinically significant change. Three participants moved in the positive direction of change, one from 'severe' to 'mild' category; one from 'severe' to 'moderate' and one from 'moderate' to 'mild'.

Summary. Statistical analysis with the Wilcoxon signed rank test revealed no significant difference on PHQ-4 scores over the course of the trial. NAP and Tau-U effect size scores were very small for baseline to post intervention. While visual analysis revealed some change in the direction hypothesised for some individuals, no coherent pattern of change was found at the group level. Clinically significant change, as measured by Jacobson and Truax's (1999) criterion b, was observed for two participants (PC04, PC07), and the reliable change index was significant for three participants (PC04, PC07, PC01).

Group data summary. Statistically significant change was observed for group level change in Total Practice scores from baseline to post-intervention phases using the Wilcoxon Signed-Ranks Test ($p<.031$). The CAMS-R measure of mindfulness skills did not show any consistent change at the group level. The PHQ-4 measure for anxiety and depression symptoms did not show any consistent change at the group level, but there were three participants that experienced clinically significant change using the reliable change index.

Section 2 - Individual data

Data from each participant were analysed individually to examine differences that may have been obscured by group analysis. Single case research methods of visual analysis were conducted, including 'level', 'stability' and 'trend', as well as effect size tests such as NAP and Tau-U. 'Level' refers to the mean of the data from each phase and the range reported in brackets. 'Stability' is reported according to the 80/20 stability envelope discussed in Chapter 6, where scores of >80% are stable, and <80% are variable. Results were reported for each participant for the hypotheses that MINT will increase home-based practice and decrease anxiety and depression symptoms as measured on the PHQ-4. The results for the hypothesis that there will be an increase in mindfulness skills as measured on the CAMS-R was excluded due to lack of change found at the group level and at the individual level. Individual analysis of CAMS-R results can be found in Appendix I.

Participant PC01.

Total practice. The summary of data for participant PC01's total practice is shown in Table 7, and graphically displayed in *Figure 9*.

Table 7

PC01 total practice

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	12.5	7.5-20	33%	Acc/thera	n/a	n/a
B1	6.4	3-9	0%	Acc/thera	n/a	n/a
A2	8.5	7.5-9	100%	Acc/thera	n/a	n/a
A1-B1	Deteriorating	n/a	n/a	n/a	0.11	-0.78
A1-A2	Deteriorating	n/a	n/a	n/a	0.28	-0.44

Note. Acc = accelerating. Thera = therapeutic. A1-B1 and A1-A2 refer to between phase changes.

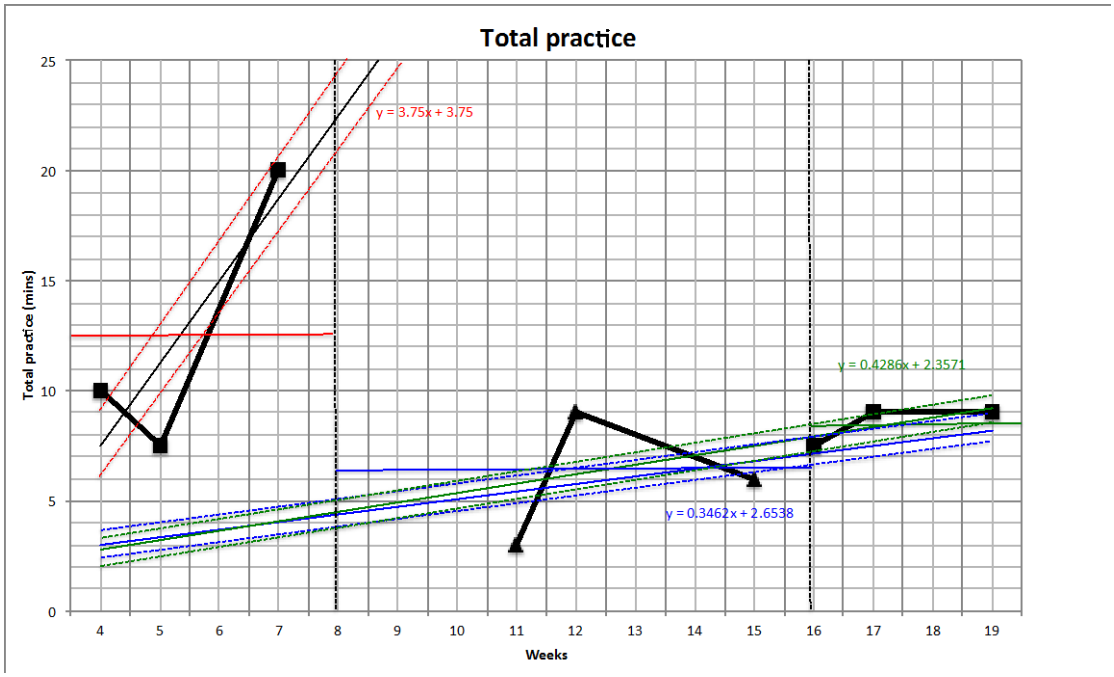


Figure 9. PC01 total practice.

The trend for the baseline was accelerating and therapeutic, which is not what is desirable in the baseline phase, because it suggests that without an intervention the participant's score would have increased over time. The baseline was variable (33%) and, therefore, any conclusions about trend are tentative. The intervention phase was variable (0%), which makes drawing conclusions about trend difficult.

There was deterioration of the mean total practice score between the baseline phase (A1) and intervention phase (B1). The mean between the phases decreased by 6.1 minutes of total practice per week from 12.5 minutes per week to 6.4 minutes per week. Analysis of non-overlap of all pairs (NAP) showed an effect size of .11 and Tau-U = -.78.

Participant PC01's total practice time decreased 4 minutes per week, from 12.5 minutes to 8.5 minutes per week when comparing the baseline (A1) and post-intervention (A2) phases. The NAP effect size for this phase comparison was .28 and Tau-U = -.44.

PHQ-4. The summary of data for participant PC01's PHQ-4 is shown in Table 8, and graphically displayed in *Figure 10*.

Table 8

PC01 PHQ-4 scores

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	11.67	11-12	100%	Dec/thera	n/a	n/a
B1	6.33	6-7	100%	Acc/contra	n/a	n/a
A2	9.00	6-11	0%	Zero change	n/a	n/a
A1-B1	Deteriorating	n/a	n/a	n/a	1.00	1.00
A1 - A2	Deteriorating	n/a	n/a	n/a	0.94	0.89

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. A1-B1 and A1-A2 refer to between phase changes.

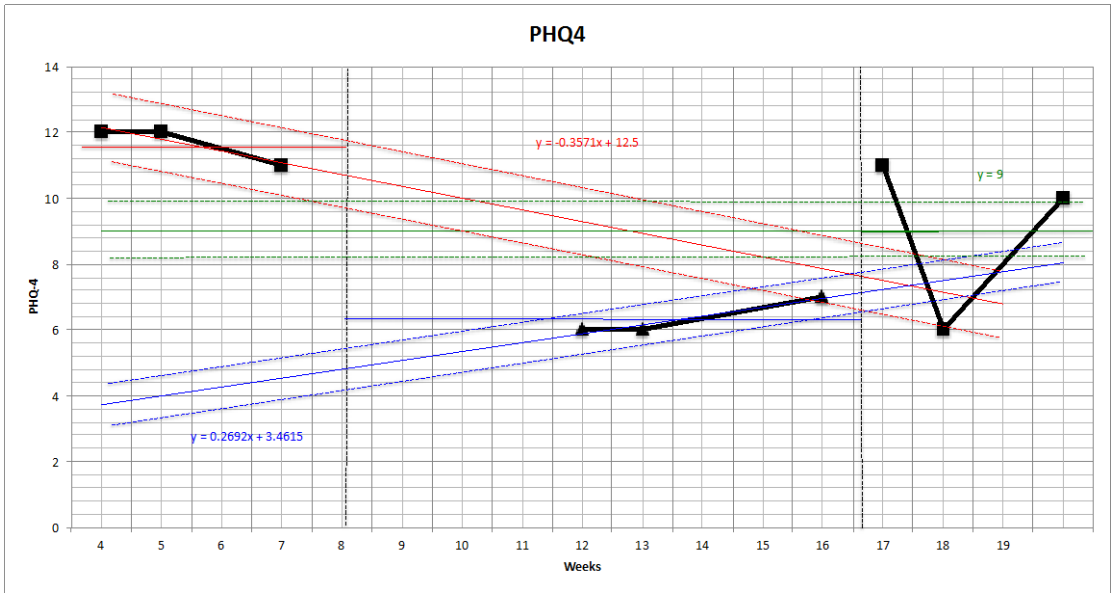


Figure 10. PC01 PHQ-4 scores.

There was a high level of stability of 100%, and a decelerating trend, which for the PHQ-4 is therapeutic. This was not ideal for the baseline phase as it suggested the participant would have improved over time without intervention. Therefore, the Tau-U score may have been a more accurate estimate of effect size. The participant's PHQ-4 score put him in the severe category. However, it is likely that with the first two data

points of 12, the highest possible on the PHQ-4, there would have been a reduction in the score regardless, due to regression toward the mean.

Between the baseline phase (A1) and the intervention phase (B1) there was a decrease in score on the PHQ-4 of 5.34, from 11.67 to 6.33. The NAP effect size for this change was 1.00 and Tau-U = 1.00. Clinically, the participant moved from the severe category to the moderate category. There was an overall improvement from baseline (A1) to post-intervention (A2), from 11.67 to 9 points. The effect size was medium with NAP = .94 and TauU = .89, but the change was not large enough to move the participant out of the severe category and was therefore unlikely to be clinically significant.

Summary. PC01's data showed an overall deterioration in total practice score from A1 to A2 phases. PC01's PHQ-4 score showed an improvement from A1 to A2 phase, but this was unlikely to be a clinically significant change as it did not move the score out of the severe category.

Participant PC04.

Total practice. The summary of data for PC04's total practice is shown in Table 9, and graphically displayed in *Figure 11*.

Table 9

PC04 total practice

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	3.83	1 - 7.5	100%	Dec/contra	n/a	n/a
B1	17.00	6 - 30	33%	Acc/thera	n/a	n/a
A2	26.25	22.5 - 30	100%	Acc/thera	n/a	n/a
A1-B1	Improving	n/a	n/a	n/a	0.94	1.06
A1-A2	Improving	n/a	n/a	n/a	1.00	1.50

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. A1-B1 and A1-A2 refer to between phase changes.

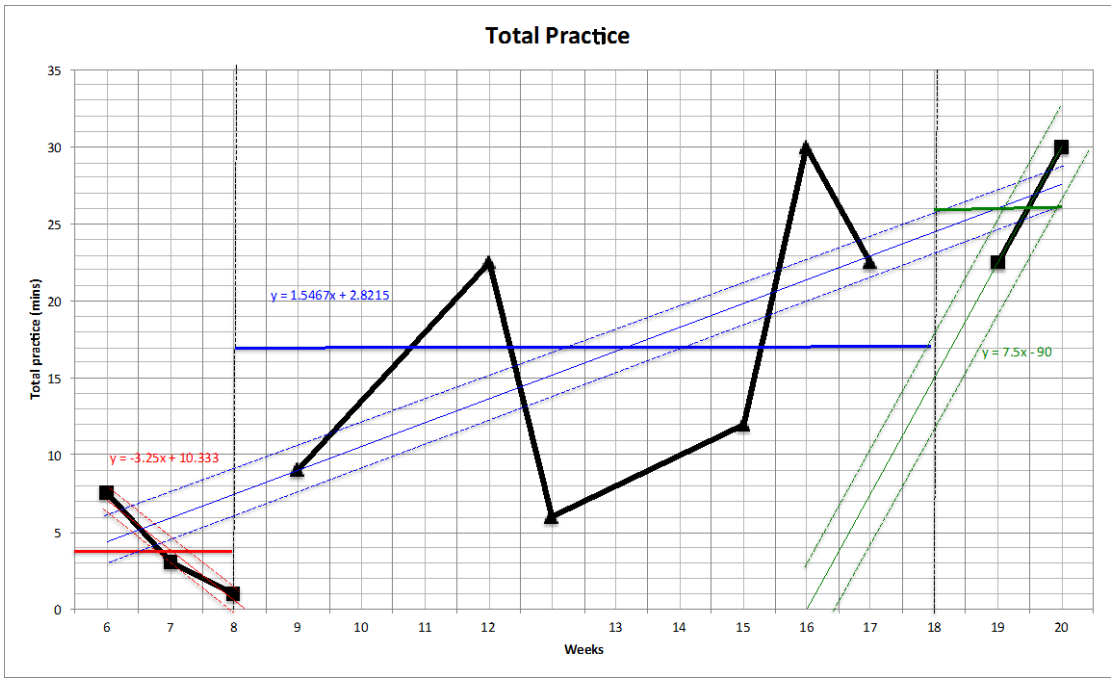


Figure 11. PC04 total practice.

The baseline phase was stable (100%) and trend was decelerating/contra-therapeutic; the mean total practice showed a tendency to decrease over time. There were two data points within week 12 as the participant came to therapy six calendar days between appointments. Since there were no data points in week 13, the data point for week 12 plus 6 days was taken to be the data point for week 13. The intervention phase spanned 11 weeks instead of the usual 8 weeks, as there was a 3-week period where the participant received no text messages due to a technical error. Data points five and six were collected during the period where no texts were received. The stability for the intervention phase was variable (17%).

There were two data points out of a possible three for the post-intervention phase (A2). The two data points were collected over a 2-week period and the reason for the missing final datum point is unknown. There was 100% stability with all data points falling within the stability envelope, but this result has limited validity as there were only two data points, so the stability envelope results would always be 100%. The

limited number of data points in this phase means results from this phase should be interpreted with caution.

There was an improvement in level between the baseline phase (A1) and intervention phase (B1). The mean between the phases increased by 13.2 minutes of total practice per week from 3.8 minutes per week to 17 minutes per week. NAP showed a large positive effect size of .94 and Tau-U was 1.06.

PC04's total practice time increased by 22.45 minutes per week, from 3.8 minutes to 26.25 minutes per week when comparing the baseline (A1) and post-intervention (A2) phases. The NAP effect size for this phase comparison was 1.00 and Tau-U =1.5.

PHQ-4. The summary of data for PC04's PHQ-4 is shown in Table 10, and graphically displayed in *Figure 12*.

Table 10

PC04 PHQ-4 scores

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	12.00	12	100%	Zero change	n/a	n/a
B1	7.83	5-11	67%	Dec/thera	n/a	n/a
A2	3.50	3-4	100%	Dec/thera	n/a	n/a
A1-B1	Deteriorating	n/a	n/a	n/a	1.00	1.00
A1-A2	Deteriorating	n/a	n/a	n/a	1.00	1.00

Note. Dec = decelerating. Thera = therapeutic. A1-B1 and A1-A2 refer to between phase changes.

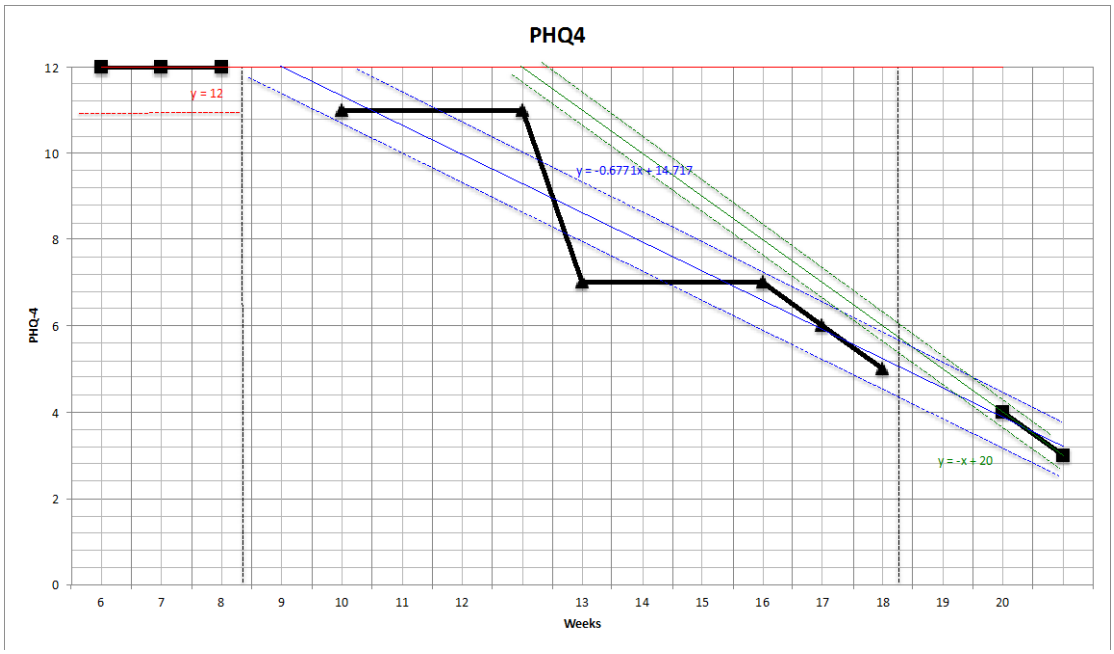


Figure 12. PC04 PHQ-4 scores.

The baseline phase had three data points over 3 weeks, all of which were 12 (twelve is the highest possible score on the PHQ-4). The post-intervention phase stability was 100%, but with only two data points it needs to be interpreted with caution. Between the baseline phase (A1) and the intervention phase (B1) there was a decrease in score on the PHQ-4 of 4.17, from 12 to 7.83. The NAP effect size for this change was 1.00 and TauU was 1.00, indicating a large effect size. Clinically, a drop from 12 to 7.83 changes the patient's category from severe to moderate on this anxiety and depression screening tool. The change between baseline (A1) and post-intervention (A2) was 8.5 points, from 12 to 3.5, which changed the screening tool outcome from severe to mild. The NAP effect size for this change was 1.00 and TauU was 1.17 representing a large effect size.

Summary. PC04 experienced an increase in total practice time between phase A1 and A2 of 22.45 minutes per week, and a reduction in PHQ-4 score with a large effect size, moving the participant from the severe to mild category.

Participant PC06.

Total practice. The summary of data for PC06's total practice is shown in Table 11, and graphically displayed in *Figure 13*.

Table 11

PC06 total practice

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	4.50	1-15	0%	Acc/thera	n/a	n/a
B1	9.75	9-12	100%	Acc/thera	n/a	n/a
A2	6.00	3-9	0%	Dec/contra	n/a	n/a
A1-B1	Improving	n/a	n/a	n/a	0.75	0.50
A1-A2	Improving	n/a	n/a	n/a	0.75	0.50

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

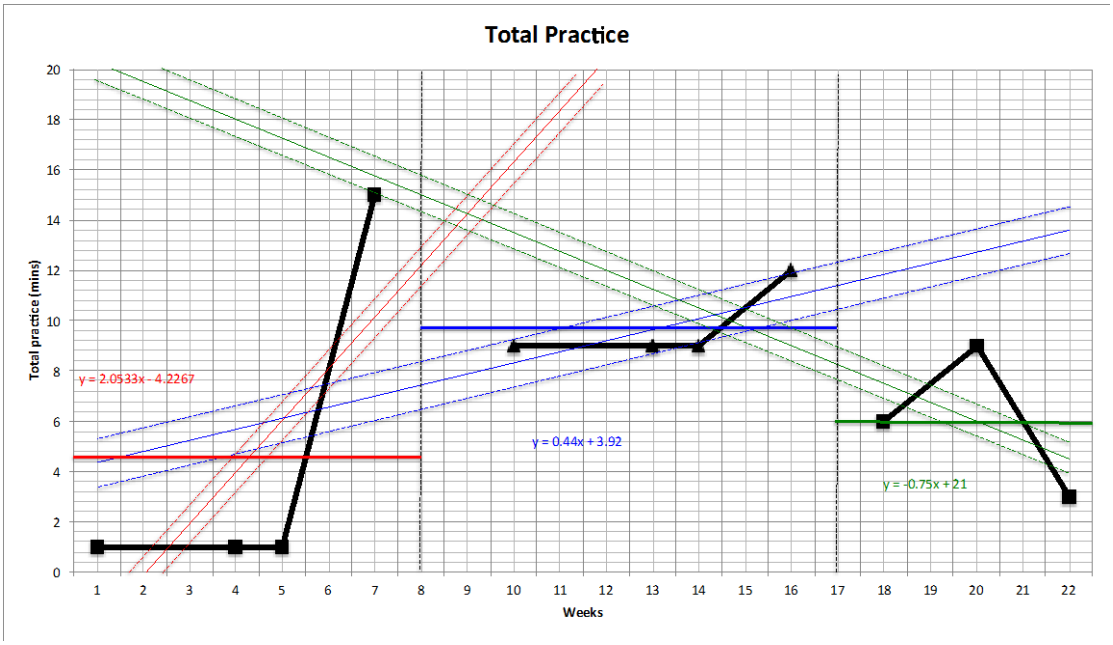


Figure 13. PC06 total practice.

The trend for the baseline was accelerating and therapeutic, which is not what is desirable in the baseline phase, because it suggests that without an intervention the participant's score would have increased over time. Due to the positive baseline trend, the Tau-U score may be the more reliable effect size estimate. The baseline and post-

intervention phases were variable (0%) and, therefore, any conclusions about trend are extremely tentative. The intervention phase was stable (100%).

There was an improvement in level between the baseline phase (A1) and intervention phase (B1). The mean between the phases increased by 5.25 minutes of total practice per week from 4.5 minutes per week to 9.75 minutes per week. NAP showed a positive effect size of .75 and Tau-U was .50.

PC06's total practice time increased 1.5 minutes per week, from 4.5 minutes to 6 minutes per week when comparing the baseline (A1) and post-intervention (A2) phases. The NAP effect size for this phase comparison was .75 and Tau-U was .50.

PHQ-4. The summary of data for PC06's PHQ-4 is shown in Table 12, and graphically displayed in *Figure 14*.

Table 12

PC06 PHQ-4 scores

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	2.75	1-6	0%	Dec/thera	n/a	n/a
B1	4.50	3-5	50%	Dec/thera	n/a	n/a
A2	5.33	3-7	0%	Acc/contra	n/a	n/a
A1-B1	Deteriorating	n/a	n/a	n/a	0.25	-0.50
A1 - A2	Deteriorating	n/a	n/a	n/a	0.13	-0.75

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

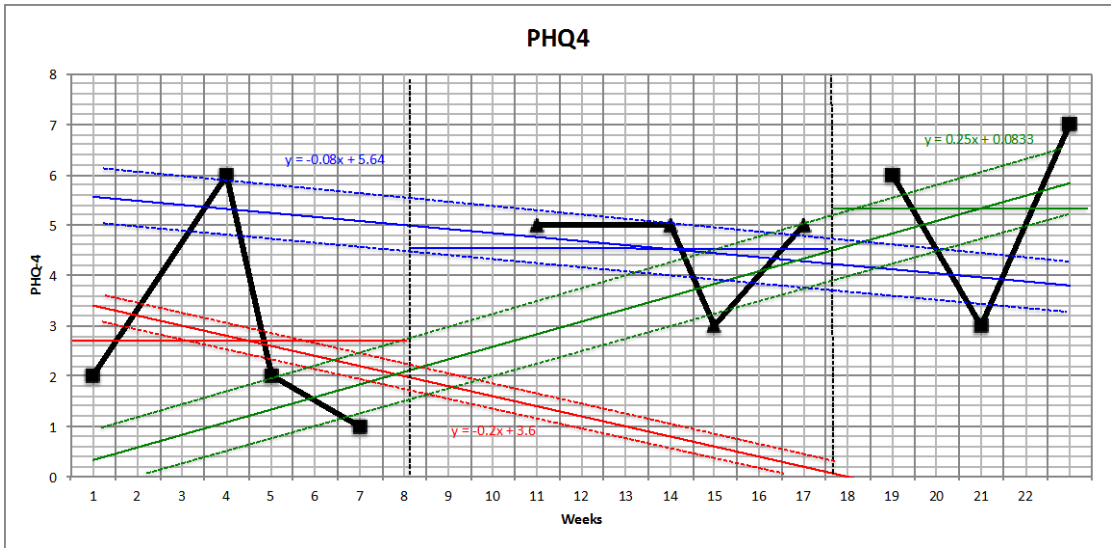


Figure 14. PC06 PHQ-4 scores.

There was a high level of instability, shown as 0% stability, and a decelerating trend, which for the PHQ-4 is therapeutic. This is not a desirable trend for the baseline as it suggests that with no intervention that the participant would improve over time. The PHQ-4 score of 2.75 is also in the normal category, out of a possible score of 12. Therefore, this participant was starting in a non-clinical category and it will be difficult to detect any positive change. Between the baseline phase (A1) and the intervention phase (B1) there was an increase in score on the PHQ-4 of 1.75, from 2.75 to 4.5. The NAP effect size for this change was 0.25 and Tau-U -.5, indicating a negative effect size. Clinically, the participant moved from the normal category to the mild category. The change between baseline phase (A1) and post-intervention phase (A2) was from a score of 2.75 to a score of 5.33, representing an increase of 2.58 points. The NAP effect size for this change was medium negative with NAP = .13 and Tau-U = -.75. The participant moved from a normal to mild category.

Summary. PC06 experienced a small increase in total practice time per week of 1.5 minutes and a small deterioration in PHQ-4 score.

Participant PC07.

Total practice. The summary of data for PC07's total practice is shown in Table 13, and graphically displayed in *Figure 15*.

Table 13

PC07 total practice

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	13.33	0-20	33%	Dec/contra	n/a	n/a
B1	8.00	1-20	100%	Acc/thera	n/a	n/a
A2	45.00	40-50	100%	Dec/contra	n/a	n/a
A1-B1	Improving	n/a	n/a	n/a	0.44	-0.11
A1-A2	Improving	n/a	n/a	n/a	1.00	1.00

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

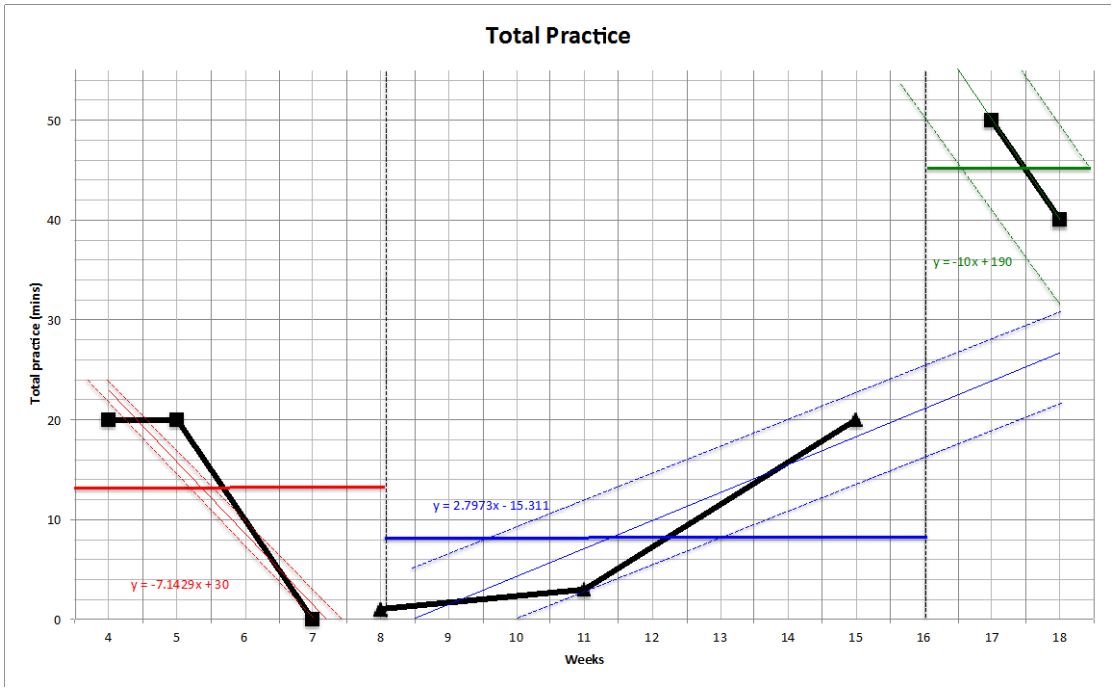


Figure 15. PC07 total practice.

The baseline trend was decelerating/contra-therapeutic and variable (33%). The stability for the intervention phase was stable (100%). There were two data points out of a possible three for the post-intervention phase (A2). The two data points were collected over a 2-week period and the reason for the missing final data point is unknown. There

was 100% stability with all data points falling within the stability envelope, but this result has limited validity as where there are only two data points stability envelope results will always be 100%. The limited number of data points in this phase means results from this phase should be interpreted with caution.

There was deterioration in mean total practice score between the baseline phase (A1) and intervention phase (B1). The mean between the phases decreased by 5.33 minutes of total practice per week from 13.3 minutes per week to 8 minutes per week. NAP showed an effect size of .44 and a TauU of -.11.

PC07's total practice time increased 31.67 minutes per week, from 13.3 minutes to 45 minutes per week when comparing the baseline (A1) and post-intervention (A2) phases. The NAP effect size for this phase comparison was 1.00 and with TauU of 1.

PHQ-4. The summary of data for PC07's PHQ-4 is shown in Table 14, and graphically displayed in *Figure 16.*

Table 14

PC07 PHQ-4 scores

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	8.00	5-10	33%	Acc/contra	n/a	n/a
B1	10.67	5-12	0%	Dec/thera	n/a	n/a
A2	5.00	4-6	100%	Dec/thera	n/a	n/a
A1-B1	Deteriorating	n/a	n/a	n/a	0.33	-0.33
A1 - A2	Improving	n/a	n/a	n/a	0.83	0.67

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

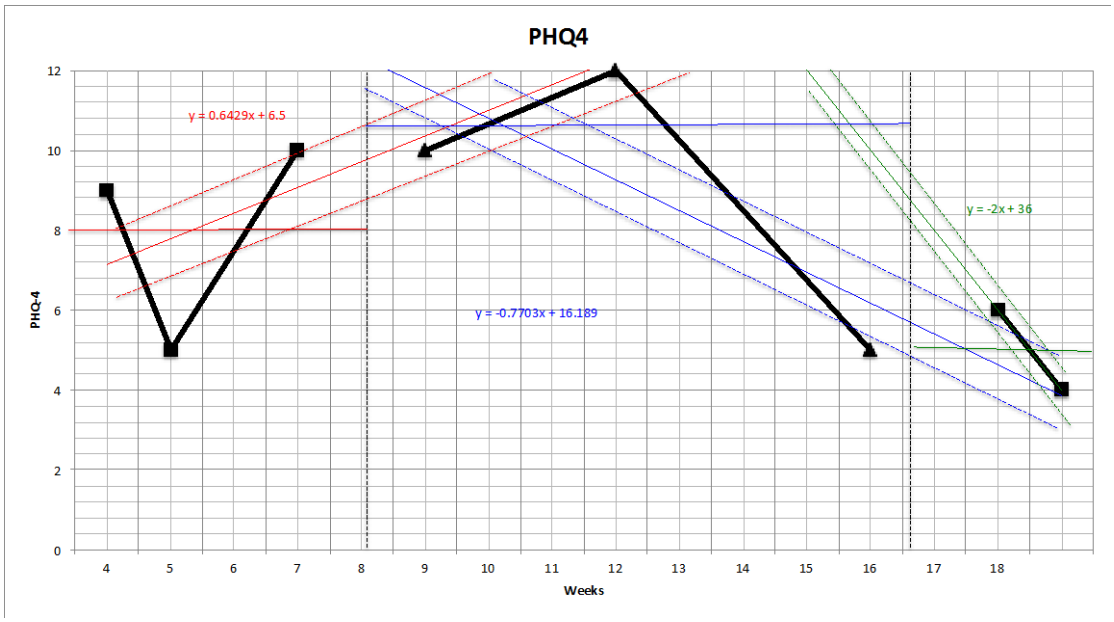


Figure 16. PC07 PHQ-4 scores.

There was accelerating and contra-therapeutic change trend, and 33% stability. The intervention phase (B1) was variable (0%) showing highly irregular scores, none of which fell inside the 80/20 stability envelope. The post-intervention phase trend was decelerating and therapeutic, and the stability was 100%, but with only two data points stability will always be 100%, and, therefore, the result needs to be interpreted with caution. Between the baseline phase (A1) and the intervention phase (B1) there was an increase in score on the PHQ-4 of 2.67, from 8 to 10.67. The NAP effect size for this change was 0 and the Tau-U was -.11. The change between baseline (A1) and post-intervention (A2) was 3 points, from 8 to 5, which changed the screening tool outcome from moderate to mild. The NAP effect size for this change was .83 and the Tau-U was .67 representing a medium effect size

Summary. PC07 experienced an increase of 31.67 minutes per week of total practice between phase A1 and A2, with an improvement in PHQ-4 score from the moderate to mild category.

Participant PC08.

Total practice. The summary of data for PC08's total practice is shown in Table 15, and graphically displayed in *Figure 17*.

Table 15

PC08 total practice

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	20.00	15-22.5	100%	Dec/contra	n/a	n/a
B1	16.00	6-22.5	50%	Acc/thera	n/a	n/a
A2	22.50	22.5	100%	Stable	n/a	n/a
A1-B1	Deteriorating	n/a	n/a	n/a	0.31	-0.39
A1-A2	Improving	n/a	n/a	n/a	0.67	0.33

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

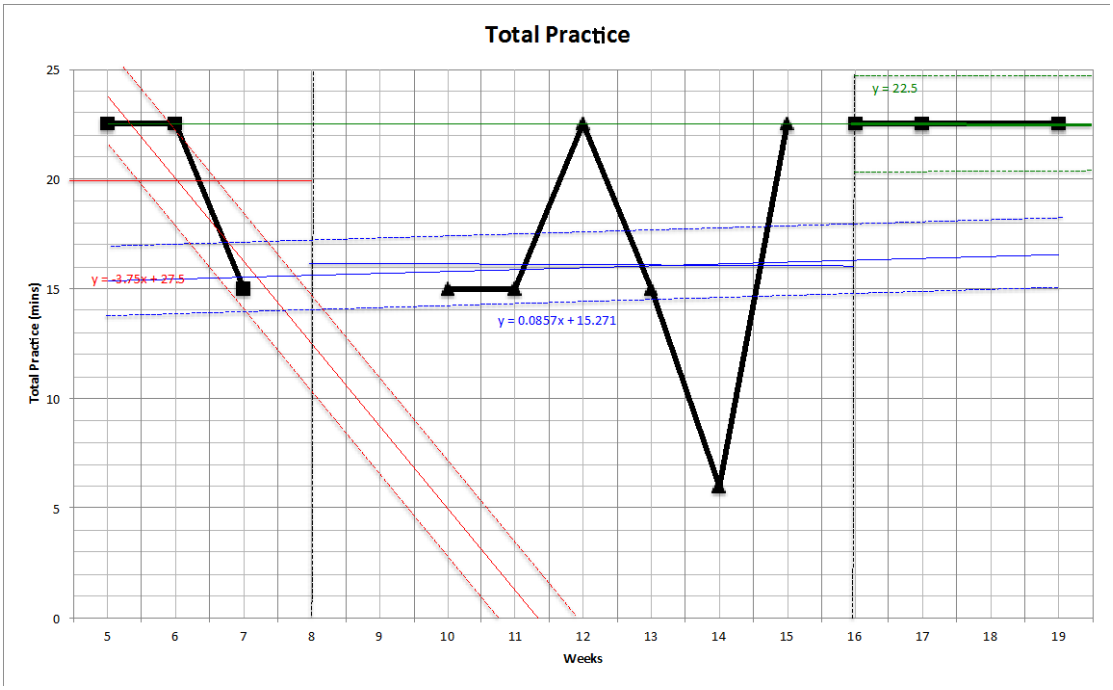


Figure 17. PC08 total practice.

The trend for the baseline phase was decelerating/contra-therapeutic and stable (100%). There were two data points within week 14 as the participant came to therapy six calendar days between appointments. Since there were no data points in week 15,

the datum point for week 14 plus 6 days was taken to be the datum point for week 15. Calculating the stability envelope, phase B1 was variable (50%).

There was deterioration in mean total practice score between the baseline phase (A1) and intervention phase (B1). The mean between the phases decreased by 4 minutes of total practice per week from 20 minutes per week to 16 minutes per week. NAP showed an effect size of .31 with a Tau-U of -.39.

PC08's total practice time increased 2.5 minutes per week, from 20 minutes to 22.5 minutes per week when comparing the baseline (A1) and post-intervention (A2) phases. The NAP effect size for this phase comparison was 0.67 and the Tau-U was .33.

PHQ-4. The summary of data for PC08's PHQ-4 is shown in Table 16 and graphically displayed in *Figure 18*.

Table 16

PC08 PHQ-4 scores

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	5.30	4-7	100%	Dec/thera	n/a	n/a
B1	9.00	6-11	0%	Acc/contra	n/a	n/a
A2	9.70	5-12	0%	Dec/thera	n/a	n/a
A1-B1	Deteriorating	n/a	n/a	n/a	0.07	-0.87
A1-A2	Deteriorating	n/a	n/a	n/a	0.16	-0.67

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

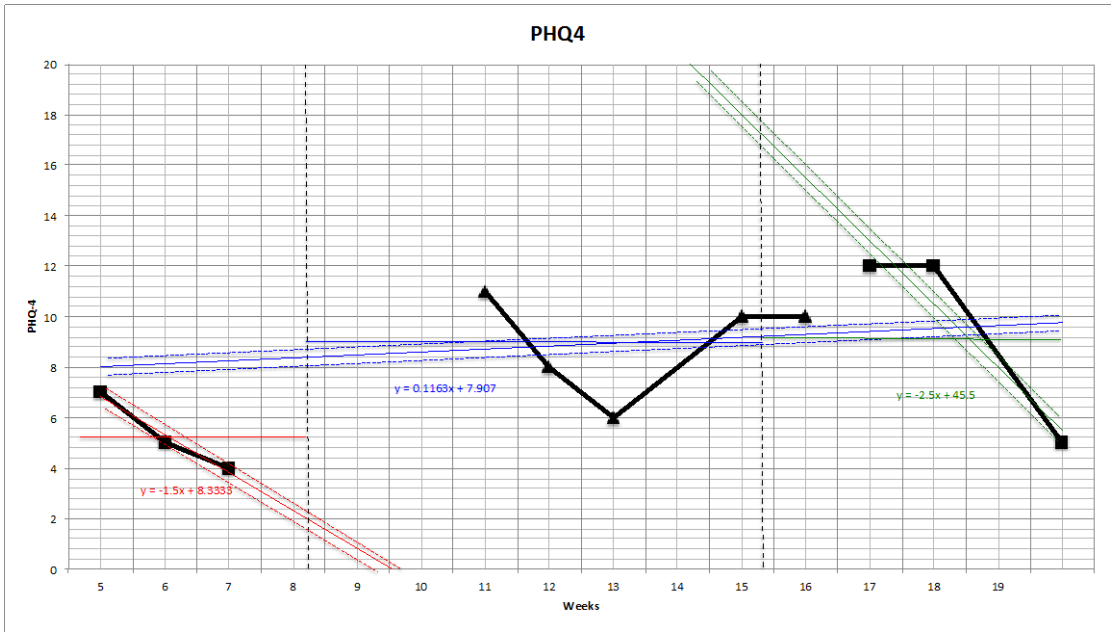


Figure 18. PC08 PHQ-4 scores.

There was a decelerating and therapeutic change trend, which is not in the direction hoped for during the baseline phase, and 100% stability, and this suggests that without the intervention there may have been a therapeutic change over time. Between the baseline phase (A1) and the intervention phase (B1) there was an increase in score on the PHQ-4 of 3.7, from 5.3 to 9. The NAP effect size for this change was .07 and the Tau-U was -.87 indicating a negative effect size. This is the opposite direction of change hypothesised and moved the participant from a mild to severe category. The change between baseline (A1) and post-intervention (A2) was 4.4 points, from 5.3 to 9.7, which changed the screening tool outcome from mild to severe. The NAP effect size for this change was .16 and the Tau-U was -.67, representing a negative effect size.

Summary. PC08 experienced an increase in total practice time of 2.5 minutes between A1 and A2 phases, with a change in PHQ-4 category from mild to severe.

Participant PC09.

Total practice. The summary of data for PC09's total practice is shown in Table 17, and graphically displayed in *Figure 19*.

Table 17

PC09 total practice

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	4.70	2-6	0%	Zero change	n/a	n/a
B1	7.60	3-12	33%	Dec/contra	n/a	n/a
A2	5.25	3-6	50%	Acc/thera	n/a	n/a
A1-B1	Improving	n/a	n/a	n/a	0.78	0.56
A1-A2	Improving	n/a	n/a	n/a	0.58	0.17

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

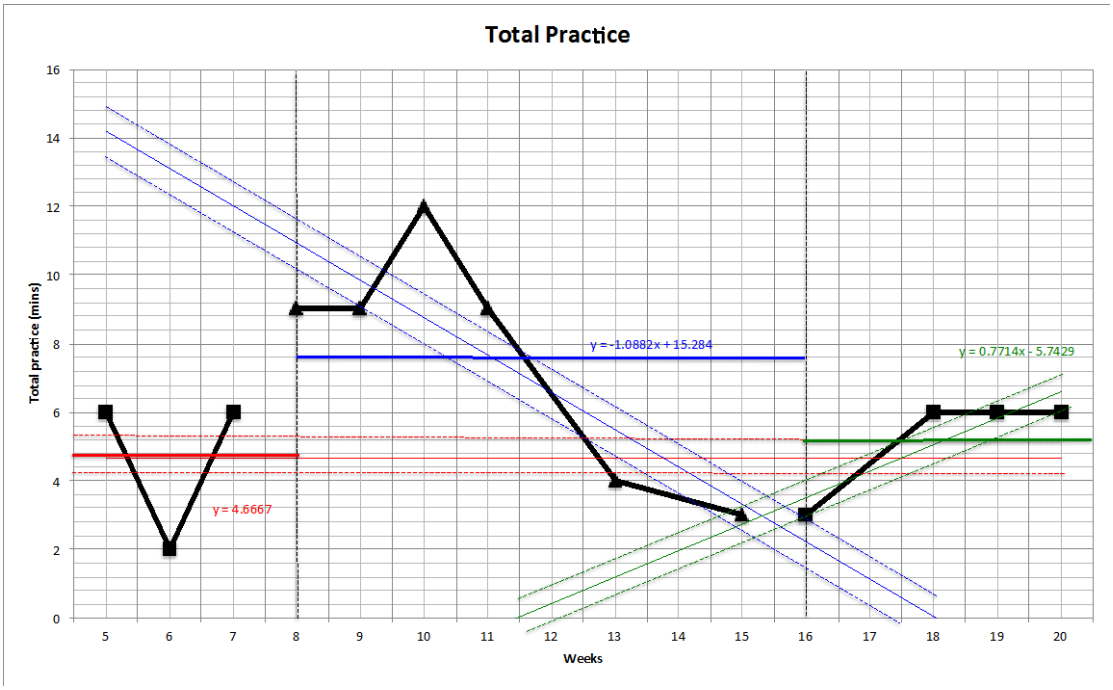


Figure 19. PC09 total practice.

The trend for the baseline phase was zero change, but variable (0%) and any conclusions about trend are tentative. The intervention phase showed a decelerating/contra-therapeutic trend, which is the opposite of the hypothesised change, although the mean for the phase did increase over baseline. The intervention phase was variable (0%), which makes drawing conclusions on trend difficult.

There was an improvement in level between the baseline phase (A1) and intervention phase (B1). The mean between the phases increased by 2.9 minutes of total practice per week from 4.7 minutes per week to 7.6 minutes per week. NAP showed an effect size of .78 and a Tau-U of .56.

PC09's total practice time increased 0.55 minutes per week, from 4.7 minutes to 5.25 minutes per week when comparing the baseline (A1) and post-intervention (A2) phases. The NAP effect size for this phase comparison was .58 and the Tau-U was .17.

PHQ-4. The summary of data for PC09's PHQ-4 is shown in Table 18, and graphically displayed in *Figure 20*.

Table 18

PC09 PHQ-4 scores

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	2.00	1-3	0%	Dec/thera	n/a	n/a
B1	0.42	0-1	16%	Dec/thera	n/a	n/a
A2	0.33	0-1	0%	Acc/contra	n/a	n/a
A1-B1	Improving	n/a	n/a	n/a	0.92	0.83
A1-A2	Improving	n/a	n/a	n/a	0.96	0.96

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

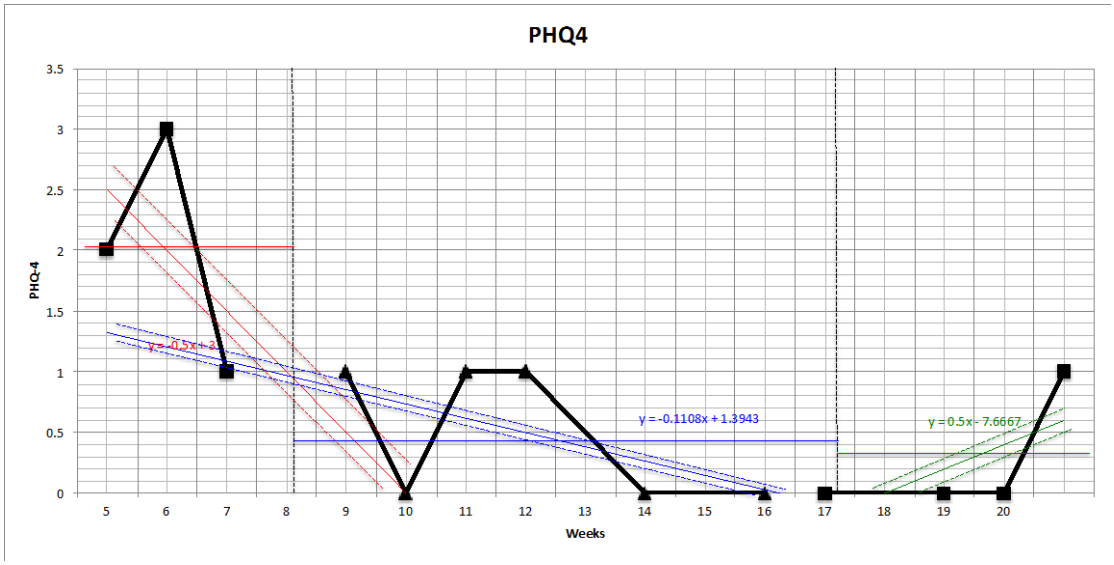


Figure 20. PC09 PHQ-4 scores.

There was a high level of instability, shown by 0% stability, and a decelerating trend in the baseline phase, which for the PHQ-4 is therapeutic. This is not a desirable trend for the baseline as it suggests that with no intervention the participant would improve over time. The PHQ-4 score of 2 is also in the normal category, out of a possible score of 12. Therefore, this participant was starting in a non-clinical category and it would be difficult to detect any positive change.

Between the baseline phase (A1) and the intervention phase (B1) there was a decrease in score on the PHQ-4 of 1.58, from 2 to 0.42. The NAP effect size for this change was .92 effect size and a Tau-U of .83. Clinically, a drop from 2 to 0.42 does not change the participant's category – the participant remained in the normal category. The change between baseline (A1) and post-intervention (A2) was 1.67 points, from 2 to 0.33. The NAP effect size for this change was .96 and the Tau-U was .96. However, a change of 1.67 points on a scale from 0 to 12, which does not change the participants' category, which started off at normal regardless, was unlikely to be clinically significant.

Summary. PC09 experienced a small increase in total practice time between the A1 and A2 phase of 0.55 minutes, with an improvement in PHQ-4 that it is unlikely to be clinically significant as the participant remained in the normal category.

Participant PC10.

Total practice. The summary of data for PC10's total practice is shown in Table 19, and graphically displayed in *Figure 21*.

Table 19

PC10 total practice

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	8.00	7.5-9	100%	Acc/thera	n/a	n/a
B1	28.88	21-52.5	50%	Dec/contra	n/a	n/a
A2	21.00	21	100%	Zero change	n/a	n/a
A1-B1	Improving	n/a	n/a	n/a	1.00	1.00
A1-A2	Improving	n/a	n/a	n/a	1.00	1.00

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

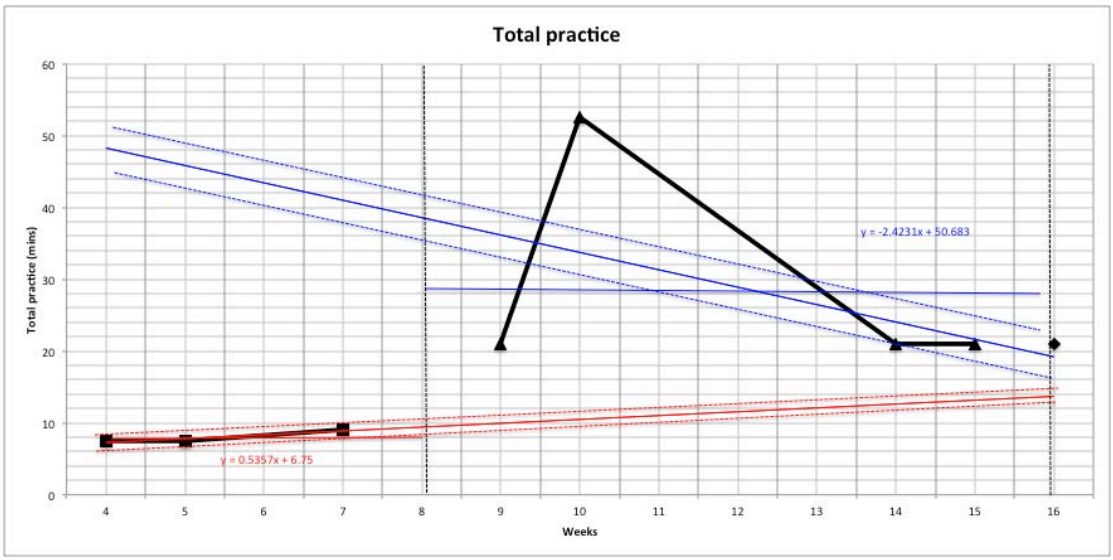


Figure 21. PC10 total practice.

PC10 had three data points in the baseline phase completed over a 4-week period. The trend for the baseline was accelerating and therapeutic, which is not desirable for a baseline phase as it suggests that the participant may have improved over time with no intervention; therefore, the Tau-U score may be a more accurate estimate of effect size. However, the subsequent improvement does exceed the projected trend line for the baseline phase. One hundred per cent of the data points for phase A1 were within the stability envelope, indicating a stable result. There was one datum point out of a possible three for the post-intervention phase (A2), and the reason for the missing final data points is unknown. The limited number of data points in this phase means results from this phase should be interpreted with caution.

There was an improvement in total practice level between the baseline phase (A1) and intervention phase (B1). The mean between the phases increased by 20.88 minutes of total practice per week from 8 minutes per week to 28.88 minutes per week. NAP showed a large positive effect size of 1.00 and the Tau-U was 1.00.

PC10's total practice time increased 13 minutes per week, from 8 minutes to 21 minutes per week when comparing the baseline (A1) and post-intervention (A2) phases. The NAP effect size for this phase comparison was 1.00 with a Tau-U of 1.00.

PHQ-4. The summary of data for PC10's PHQ-4 is shown in Table 20, and graphically displayed in *Figure 22*.

Table 20

PC10 PHQ-4 scores

Phase	Level	Range	Stablity	Trend	NAP	Tau-U
A1	2.67	2-3	100%	Dec/thera	n/a	n/a
B1	2.75	2-3	50%	Dec/thera	n/a	n/a
A2	3.00	3	n/a	n/a	n/a	n/a
A1-B1	Deteriorating	n/a	n/a	n/a	0.46	-0.80
A1-A2	Deteriorating	n/a	n/a	n/a	0.33	-0.33

Note. Dec = decelerating. Thera = therapeutic. A1-B1 and A1-A2 refer to between phase changes.

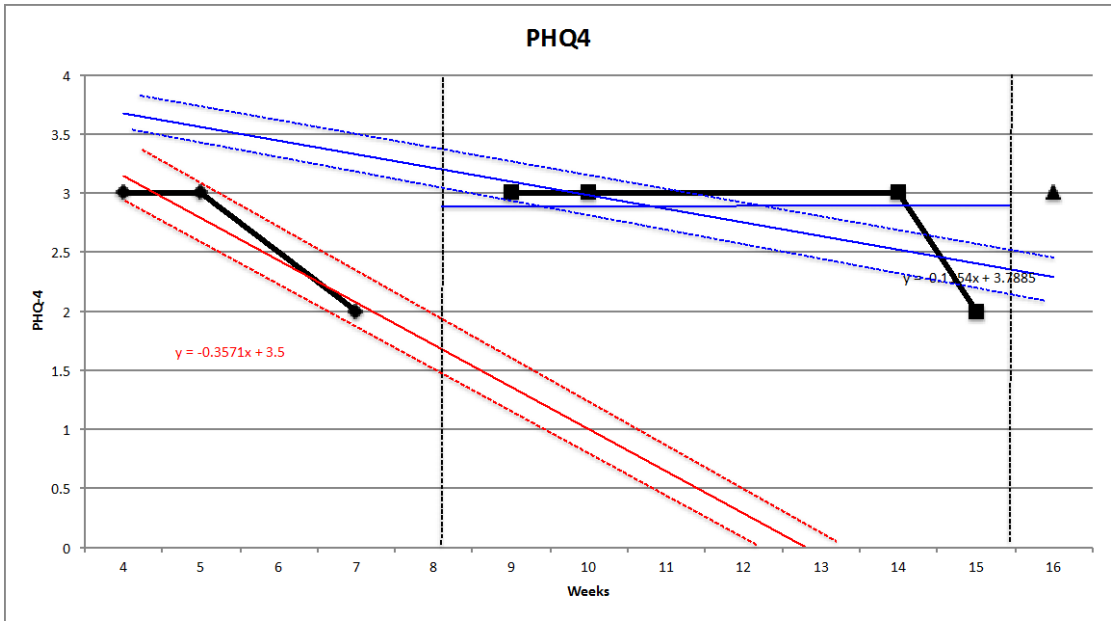


Figure 22. PC10 PHQ-4 scores.

The baseline phase had a decelerating and therapeutic trend, which is not desirable for the baseline phase as it suggests that the participant's score may have decreased over time without the intervention. The post-intervention phase showed a PHQ-4 score of 3 with only one datum point, trend and stability cannot be calculated and results should be interpreted with caution. Between the baseline phase (A1) and the intervention phase (B1) there was an increase in score on the PHQ-4 of 0.08, from 2.67 to 2.75. This magnitude of change is likely to be so insignificant as to represent no change. The NAP effect size for this change was .46 indicating a negative effect size and the Tau-U was -.80. The change between baseline (A1) and post-intervention (A2) was 0.33 points, from 2.67 to 3, which changed the screening tool outcome from normal to mild. The NAP effect size for this change was .33 and the Tau-U was -.33 representing a negative effect size. The baseline score for participant PC10 was so low it was going to be difficult to detect any positive change on such a brief measure.

Summary. PC10 experienced an increase in total practice score between phases A1 and A2 of 13 minutes, with a small negative change from the normal to mild category on the PHQ-4.

Section 3 - Additional data

MINT ratings. Each week participants were asked to rate how useful the text messages they had received in the previous week were on a scale from 0 to 10, where 0 was not helpful at all, and 10 was very helpful. Five participants responded to the text message question and the results are shown in Table 21 below.

Table 21

Participant ratings for MINT

	Participant				
Week	PC07	PC08	PC10	PC06	PC09
Week 1	n/a	5	8	7	9
Week 2	n/a	2	8	8	9
Week 3	n/a	1	8	8	9
Week 4	n/a	0	8	8	9
Week 5	n/a	n/a	8	9	n/a
Week 6	5	2	8	9	8
Week 7	n/a	n/a	8	8	8
Week 8	7	2	8	n/a	8

Participant survey. Participants were asked six questions at the end of the intervention phase about their experiences using MINT. Three participants completed the survey and the results are shown in **Table 22** below.

Table 22

Participant survey responses

Questions	Scale	PC08	PC09	PC01
Rate how useful you found MINT?	0 (not at all useful) – 10 (extremely useful)	7	8	2
How often did you read the text messages?	0 (never) – 10 (always)	10	10	1
How often did you do the daily activity suggested in the text message?	0 (never) – 10 (always)	5	8	1
What did you like about MINT?	Comment	Reminders to be mindful were helpful	Consistent and practical advice on how to do mindfulness exercises	They were handy but just bad timing personally
Was there anything you didn't like about MINT?	Comment	No	The repetition of the same messages	It was a bit too much at times, the number of new messages was a bit daunting.
How would you improve MINT?	Comment	Create an app for download for ongoing help	Less repetition of the same messages	Maybe less frequent

Clinician Survey. The three clinicians involved answered four questions at the end of the trial about their experiences of their clients receiving MINT (see Appendix K). Due to the small sample size no formal qualitative analysis was undertaken. There was a theme of "variation" in their responses about their clients' experiences of MINT with comments such as "It seemed to vary a lot from client to client. Some of them utilised the texts as a reminder, while a few actively ignored them! Most clients were more able to practice when things were going well and this practice dropped off when they became distressed", "I think it was varied", "for one of the clients, he seemed to "get" mindfulness straight away, and for that reason, MINT was a useful add-on for the things that we were exploring in therapy. For the other client, he was having a

particularly hard time, and not able to engage much in mindfulness outside of sessions", and "The level of interest and curiosity seemed to determine the way the clients responded to the mindfulness components. The more interested client responded quite positively".

Overall, clinicians reported the intervention seemed to be well accepted "There were surprisingly few questions about the text package. It seemed to work well and it didn't seem to be an intrusion on people's time" and "Engagement was good for most clients and I wondered if the text package and in-session rating scales helped provide some structure and focus that they found useful.

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Chapter 8 - Discussion

The discussion chapter is divided into four sections. The first section discusses the results compared to the hypotheses that MINT will increase home-based practice, increase mindfulness skills as measured on the CAMS-R and decrease anxiety and depression symptoms as measured on the PHQ-4. The second section explores why these results may have been found, including the variability between participants noted in the study, how much home-based practice is desirable for MBCT, the appropriateness of the measures used in the study, the acceptability of the intervention and the benefits of technology in psychological practice. The third section explores the strengths and limitations of this study. The fourth section draws conclusions from this research and makes suggestions for future studies.

Section 1 – Discussion of results compared to hypotheses

The hypothesis that the intervention will increase the amount of daily home-based mindfulness practice was supported for some participants. Overall, there was a statistically significant increase of group mean total practice time per week of 7.1 minutes from the baseline to post-intervention phase, with a medium effect size. There was a large variation between participants, which is discussed further below. There was little change in levels of mindfulness skills over the duration of the trial. The hypothesis that increasing total practice will increase mindfulness skills has not been supported. There was not a consistent decrease in anxiety and depression symptoms as total practice increased and so the hypothesis that increased total practice decreases anxiety and depression symptoms as measured has not been supported. The following section discusses the reasons why these results may have occurred.

Section 2 – Areas of interest from the study

Intervention can produce behavioural change. The results from this study suggest that text message intervention created a behavioural change in some participants increasing the amount of time they were spending doing home-based mindfulness practice. These results, which show that text messages can help create behavioural changes, are consistent with those in previous studies. For example, text message reminders have been shown to reduce missed psychiatric appointments by half (Sims et al., 2012), improve adherence to asthma prevention medication (Petrie et al., 2012), increase insulin compliance in diabetics (Franklin et al., 2006), and smoking cessation programmes (Bramley, 2005; Free et al., 2009; Rogers, 2005). The process by which the text messages increased total practice is not understood. Text messages may act as a memory aid (Pijnenborg et al., 2010), they may increase belief in the intervention (Petrie et al., 2012) and they may help overcome difficulties in self-initiation or therapeutic alliance (Aguilera & Munoz, 2011). These four possible mechanisms will be discussed in turn below.

Supporting cognitive difficulties. Improvements in total practice seen during the course of this study may have been the result of text messages acting as memory aids. One participant (PC01) commented, “Reminders to remember to be mindful were useful”. The results of this study show that some participants are able to maintain gains or continue improvement after the intervention is withdrawn. Memory aids, such as text messages, have been under-researched in helping those with schizophrenia-related disorders overcome cognitive impairments associated with their condition (Pijnenborg et al., 2010). It has been hypothesised that gains made during a memory aid intervention, such as text messages, would not be sustained after the intervention was

withdrawn as a memory aid would still be required to overcome memory impairments associated with schizophrenia related disorders (Pijnenborg et al., 2010). However, this study suggests that text messages do not only act as memory aids, although the mechanism through which continued gains are seen after the intervention is withdrawn is not known. It may be that once home-base practice is learnt and the skill reinforced by repetition that the role of memory aid becomes less important, due to habit formation. It is possible that this explains post-intervention gains.

Improving motivation and self-initiation. The increase in total practice may have been as a result of the text messages increasing motivation and helping to overcome difficulties with self-initiation. MINT was developed with the aim of delivering two messages a day, one that focused on rational for MBCT and the other a suggested practice. It may be that the first text message of the day helped to increase participants' motivation to then undertake the practice that the second text message suggested. As clinician A noted "I noticed that client's motivation grew over time. At the beginning, they weren't particularly motivated at all" (see Appendix K). Text messages have been found to increase motivation to stop smoking in other studies (Bramley et al., 2005; Free et al., 2009; Rodgers et al., 2005). Through providing the prompt to practise MINT may have helped overcome difficulties in self-motivation, which another study examining text message adjuncts for home-based practice has also found (Aguilera & Muñoz, 2011).

Increasing insight. Because the text message prompts were not self-initiated, MINT may have provided increased opportunities for participants to become aware of their current state. The afore mentioned study also reported that participants note this increased self-awareness as the result of unsolicited prompts that remind them about their therapeutic goals (Aguilera & Muñoz, 2011).

Strengthening therapeutic alliance. MINT was designed to follow the content of what the participant was learning in their face-to-face therapy sessions. Because of this congruence between the work in-session and MINT, it is possible that receiving MINT helped increase the therapeutic alliance. Information and suggested practice that the clinician gave was reinforced by MINT. This in turn may have increased the participants' belief in their treatment and clinician. Clinician B commented "Engagement was good for most clients and I wondered if the text package and in-session rating scales helped provide some structure and focus that they found useful".

How much practice is needed to produce therapeutic change? This study failed to find evidence that an increase in home-based mindfulness practice led to changes in mindfulness skills or anxiety and depression symptoms. The measures are discussed further below under "appropriateness of the measures". The change in home-based mindfulness practice in minutes was from 9.32 (*SD* = 7.71) at baseline to 16.42 (*SD* = 13.45) post-intervention. The suggested duration of practice in the intervention was kept deliberately short, as per recommendations for clients with psychotic symptoms, and it appears that participants adhered to brief practice periods. It is not known whether an average increase of 7.1 minutes of home-based mindfulness practice per week per participant to 16.42 minutes is sufficient to experience therapeutic change.

In MBCT, the importance of home-based practice is emphasised (Vettese, Toneatto, Stea, Nguyen, & Wang, 2009) and during the standard 8-week MBCT course 30 to 60 minutes of home-based mindfulness practice per day is recommended (Segal, Teasdale, Williams, & Gemar, 2002). As discussed in Chapter 2 (page 29), modification in the recommended length of mindfulness practice has been suggested for those with psychosis. Recommendations for guided mindfulness practice range between 10 (Chadwick, 2014) and 15 minutes (Shonin, Gordon, & Griffiths, 2014), but these refer

to guided mediation (by person or audio recording) and not home-based mindfulness practice without audio aid. Previous studies on MBCT and people with psychosis have recommended home-based practice with two studies stipulating practice of between 3 and 10 minutes duration (Chadwick, Hughes, Russell, Russell, & Dagnan, 2009; Chadwick, Taylor, & Abba, 2005; Langer, Cangas, Salcedo, & Fuentes, 2012). However, there were no reports in these studies about whether or how much home-based practice was completed.

This study examined 'informal' home-based practice, rather than using guided meditation CDs as other studies have done. Studies that reported 'informal' home-based practice also found no relationship between the quantity of this practice and outcomes (Crane et al., 2014; Hawley et al., 2014; Perich, Manicavasgar, Mitchell, & Ball, 2013). A lack of evidence in this area of research means that it is difficult to draw conclusions about whether the amount of home-based practice was sufficient to create therapeutic change. Participants from the EI population may have many other variables that influence therapeutic change, and this variability is discussed in the section below.

Variability between and within participants. High levels of variability in data for total practice and anxiety and depression scores were seen both between and within participants in this study, which may be explained through consideration of the clinical population sample for this research. There were differences between participants in terms of age, gender, ethnicity, diagnoses and medication regimes, and this variation is commonly seen in the EI clinical setting (Turner, Boden, Smith-Hamel, & Mulder, 2009). While a highly variable population makes controlling for confounds difficult, the results do reflect the 'real-world' application of the intervention. Within-participant data was also variable for instance; for total practice baseline phase, only three participants met the 80% stability threshold (See Appendix H or Chapter 6, page 85). Clinicians also

noted in their survey responses that there was variation in the response to MINT. However, it should be noted that variation in home-based practice has also been reported in a non-clinical sample (Rimes & Wingrove, 2011), suggesting that variation may be seen regardless of clinical presentation. Specific variations in responses to the intervention are discussed further below.

Largest gains. Brinley plots revealed large change in the positive direction for total practice for two participants (PC04, PC07) from baseline to the post-intervention phase. It is interesting to note that these two participants also experienced positive change on the PHQ-4, one from the severe to mild category (PC04) and one from the moderate to mild category (PC07). Both participants were a similar age (22 and 23 years old), although age does not seem to be an explanatory factor as the three other participants who experienced positive but smaller improvements in total practice were aged between 19 and 29 years. Gender does not appear to explain why these two participants experienced the most improvement, as one was male (PC04) and the other female (PC07). The amount of time they had already been practicing mindfulness before taking part in the study does not seem to explain why these participants experienced the most improvement as one had been practicing less than 1 week, while the other reported more than 1 month but less than 1 year of previous practice. Unfortunately, neither participant completed the end of study survey. One participant (PC04) did not respond to any weekly requests to rate the text message intervention, and the other (PC07) responded twice out of a possible eight opportunities and rated MINT as 5 and 7 out of 10. The lack of additional information from these participants means there can be no further understanding of what may have lead to their gains.

Some participants were able to maintain or increase gains in the post-intervention phase and it is possible that through completing home-based practice

during the intervention the perceived benefit of home-based practice were increased. Through completing home-based practice, mindfulness skills were learnt in an experiential way that is theorised to be an important component of MBCT (Kabat-Zinn, 1990; Vettese et al., 2009). Participants may have felt benefit from completing home-based practice, which is supported by the ratings and survey responses (see Appendix G), and that may have lead to increased motivation to continue home-based practice. Responses from clinicians suggest that the intervention may also have helped reinforce therapeutic goals (see Appendix K), which may have also increased motivation to continue home-based practice after the intervention ended. Clinicians noted that those who were more motivated got more out of the trial and this is congruent with the idea that increased motivation could lead to a positively reinforcing cycle where gains are more swiftly made. Successful completion of home-based practice may for some have led to increased confidence, which has been noted to be an important factor in maintaining practice (Glaser, Kazantzis, Deane, & Oades, 2000; Rector, 2007). Successful completion of home-based practice may have also positively affected the cost-benefit analysis of whether to undertake the task (Glaser et al., 2000).

Post-intervention deterioration in total practice. Three participants (PC06, PC09, PC10) showed an increase in total practice in the intervention phase, followed by a decrease in the post-intervention phase, suggesting that some participants need on-going support to maintain the gains made. For these participants the post-intervention phase was still higher than baseline, but not as high as during the intervention. This suggests that these participants may have needed MINT to maintain gains, or a longer period of MINT to establish a home-based mindfulness practice at the higher level. There are reasons why people under the care of EI services may need additional support for completing home-based practice (see Chapter 3, page 43). If the intervention was

able to support participants to overcome some of these barriers to completing home-based practice, then when the intervention was removed the same barriers may have inhibited home-based practice completion. Some of the factors proposed to be barriers to home-based practice completion include low motivation (Deane, Glaser, Oades, & Kazantzis, 2005; Hogg & Hall, 1992; Rector, 2007); difficulty initiating activities (Deane et al., 2005; Rector, 2007); and difficulties with planning and decision making (Deane et al., 2005; Fallon, 1984). The first text of the day was a message aimed at increasing motivation, while the second text message provided a reminder to practice, which may have overcome the need for self-initiation of the home-based practice task. It has also been noted that reminders to encourage the completion of home-based practice are important (Dunn, Morrison, & Bentall, 2002). For these participants, the continuation or a longer duration of the text message intervention may have been necessary to maintain gains made during the intervention phase.

Literal interpretation of the text messages. From detailed analysis of the data, PC10 seemed to follow the text message suggestions literally, practicing once a day when prompted specifically to do so. The duration of practice for PC10 reduced from an average of 6-minutes to a 3-minute average, suggesting that the participant was following the text message directions literally to have short mindfulness practice. Some clients may have found the text messages supportive and generalised from the prompts to practise to the inspirational text messages (and possible other times where there are no text message prompts), while others may have interpreted the text messages more literally with no generalisation of skills. Cognitive impairments in patients with schizophrenia may help explain these differences. It is broadly accepted that individuals with schizophrenia experience cognitive difficulties (Dickinson, 2008). Specifically, deficits have been found relating to the ability to think creatively (J. Jaracz, Patrzala, &

Rybakowski, 2012; Nemoto et al., 2009) and an increase in perseverative errors, which relate to an inability to change from an incorrect response (M. Jaracz, Drozdz, & Borkowska, 2010; Wobrock et al., 2009). There may be a difference between participants as to the degree they are affected by cognitive impairments, particularly given the variation in diagnosis, age, and gender and other variables seen in the EI setting. These cognitive differences are likely to explain some of the variance seen in the results. One might expect the participants with a literal interpretation style to return to baseline once the trial had finished, but PC10 maintained gains (but did not improve further, as some other participants had done). With only one post-intervention data point, this conclusion should be taken cautiously.

'Bad timing'. One participant showed deterioration in total practice over the course of the study, and reported in the survey that participation in the intervention was 'bad timing' for him. Clinicians reported that for one participant the intervention came at a difficult time, which they saw as meaning that the participant was unable to maximise the benefits of the intervention. While all research participants may experience external events that could influence results, it is well known that those who have experienced their first episode of psychosis face a variety of life challenges. The participant may have been experiencing psychotic symptoms, negative symptoms, comorbid mood or personality disorders, substance use or Post-traumatic Stress Disorder, as these conditions are commonly associated with outcome after the first psychotic episode (Mcgorry, Killackey, & Yung, 2008). From the literature, other issues that may have affected this participant include the disruption of social functioning, the stigma of being 'mentally ill', and the side effects of anti-psychotic medication (Mcgorry et al., 2008). Given that EI service users are a heterogeneous group, who experience a range of challenging factors in their lives, it is not surprising that in a

research sample some participants will be affected by ‘bad timing’ and fail to benefit from the intervention.

Late improvement. One participant (PC07) showed large effect size improvements in total practice scores from baseline to post-intervention. This improvement occurred near the end of the intervention phase, which suggests that some participants take longer to achieve gains than others as a result of the intervention. Total practice appears to be a variable behaviour, and this study was set in a heterogeneous population and possibly easily influenced by life events and circumstances. It may be beneficial to have a longer intervention to maximise the possibility of creating a behaviour change. A previous study has found statistically significant change in mindfulness skills in participants with psychotic symptoms over an 8 week period (Langer et al., 2012). This time period for mindfulness intervention is the same as the current study, but suggestions have also been made for a longer period of mindfulness treatment of 12 weeks for those with psychotic type illness (Shonin et al., 2014). It is possible that extending the intervention period would have resulted in more therapeutic gains.

Appropriateness of the measures used.

Cognitive and affective mindfulness scale – revised. There are several possible explanations about why little change was detected on the CAMS-R. It is most likely there may have not been an increase in CAMS-R scores because the study was underpowered or because the increase in home-based practice did not lead to an increase in mindfulness skills.

Other possible explanations include that the CAMS-R measure may have been insensitive to change over the duration of the study (see Appendix J). Previous studies with other population groups have reported positive change on the CAMS-R; in one

study the change did not reach significance (Wolever et al., 2012), while another found a statistically significant increase with large effect size (Lenze et al., 2014). The latter study involved participants who were older adults, and it is not known if the difference in participant age in the current study could be responsible for the lack of change seen on the measure. The CAMS-R baseline range from this study was within one standard deviation of the mean of health populations (Feldman et al., 2007). The afore mentioned studies reported baseline CAMS-R scores that were higher than in this current study and yet change was still detected in these studies.

A literature search did not reveal any use of the CAMS-R with participants with psychotic features, so it is unclear whether the measure is as sensitive to change with this population. Two studies with participants with psychotic features used the Southampton Mindfulness Questionnaire (Chadwick et al., 2008) to assess change in mindfulness skills. One study found positive change on the SMQ, but the results did not reach significance (Chadwick et al., 2009) while the other found statistically significant increase using this measure (Langer et al., 2012). Another study with participants who had bipolar disorder found no link between mindfulness practice and outcomes following an 8-week MBCT programme (Perich et al., 2013).

A recent review of mindfulness scales suggests that there are differences between the CAMS-R and the SMQ (Bergomi, Tschacher, & Kupper, 2013). The CAMS-R appears to differ from other scales due to its focus on assessing the willingness and capacity for mindfulness, as well as, mindfulness related to psychological distress. The authors recommend its use in clinical studies. The SMQ in comparison assesses how one relates to “distressing thoughts and images, which are important phenomena in all mental health problems and the cornerstone of cognitive theory and therapy” (Chadwick et al., 2008, p. 452). Bergomi et al. (2013) suggest that

the SMQ is useful for assessing mental health problems and mindfulness. Feldman et al. (2007) propose the CAMS-R as a suitable measure for assessing response to treatment, but more examination of test-retest reliability of the measure would be desirable and its sensitivity to change is unknown at this time. This could be a factor in the results found in this current study. The CAMS-R appeared to be a reliable and valid measure for the construct of mindfulness and was suitable for this study because of the necessity for brief measures.

The study that was 8 weeks long (Langer et al., 2012) was able to demonstrate statistically significant changes in mindfulness skills using the SMQ, while the study that was 5 weeks long (Chadwick et al., 2009) did not reach statistical significance on this measure, despite both clinical samples being comparable. This suggests that a period of 8 weeks of intervention is desirable to be able to detect a change in mindfulness skills in participants with psychotic symptoms. Since the current intervention was 8 weeks long, it appears that this duration is suitable to reveal a change in mindfulness skills.

It should be noted that previous studies have assessed changes in mindfulness skills to assess a mindfulness intervention. In the current study, the intervention was an adjunct to existing mindfulness therapy. Therefore, the measure may not have been sensitive enough to detect a change in addition to the mindfulness therapy treatment as usual. Moreover, there may not have been enough of an increase in total practice to change the level of mindfulness skills as measured on the CAMS-R (see Chapter 8, page 135). Based on the current findings it is suggested that when clients increase their mindfulness skills of present moment awareness, there can be an increase in awareness of how unaware one actually is. Paradoxically, increased awareness may lead to self-rating oneself as less aware.

Patient Health Questionnaire - 4. The hypothesis that the intervention MINT would decrease anxiety and depression symptoms as measured on the PHQ-4 was not supported when examining group data. It may be that there is no relationship between total practice and anxiety and depression symptoms as measured on the PHQ-4, or that this study failed to find an effect due to it being underpowered. There are also other reasons an effect may not have been found in this study. Firstly, the ultra brief screening measure may have not been sensitive enough to detect changes in anxiety and depression symptoms, possibly due to having only four response choices (see Appendix N). The PHQ-4 has been validated as an ultra brief measure for anxiety and depression symptoms (see Chapter 6, page 79). A literature review failed to find any evidence for the use of the PHQ-4 in those with psychotic symptoms. Three trials examining mindfulness therapy with participants who have experienced psychotic symptoms found that there was statistically significant improvement as measured by the Clinical Outcomes in Routine Evaluation (CORE) (Chadwick et al., 2009, 2005). The CORE is a 34-item measure that assesses well-being, problems/symptoms, life functioning and risk to self/others, but these studies do not report anxiety and depression subscales specifically. Another study did not find a statistically significant difference on the symptom scale used, which included depression and anxiety symptoms (Clinical Global Impression-Schizophrenia) (Langer et al., 2012). Other measures such as those used previously or commonly used clinical measures, such as the Depression Anxiety Stress Scale-21 (Henry & Crawford, 2005), were considered for this study but were rejected because of the need for short measures to reduce the demand on participants.

Secondly, the level of total practice may have not been high enough to affect scores on the PHQ-4, or the duration of the intervention may had have to have been longer to produce change in scores on the PHQ-4. As discussed previously it is not

known if the level of total practice was high enough to produce therapeutic change (see Chapter 8, page 135). It has also been reported that increased awareness through mindfulness skills does in some individuals lead to an increase in severity of the symptoms and they become more aware of them (Lomas, Cartwright, Edginton, & Ridge, 2015). Increase in awareness of anxiety and depression symptoms may then have led to an increase in intensity of these symptoms and hence meant that PHQ-4 scores did not improve.

Data was also examined at the individual level to reveal possible patterns of change within and across participants. The three participants (PC04, PC07, PC10) who showed large effect size increases in total practice scores had large to small effect size improvement in PHQ-4 scores. This pattern of change suggests that the more they practiced the less depressed or anxious they reported to be. There was a negative correlation between increased total practice and reduced levels of anxiety and depression for these participants.

Regression toward the mean may have affected the score for one participant. Regression toward the mean can occur when the initial score falls far away from the mean, which means that subsequent scores are likely to fall closer to the mean without effects from the intervention (Nesselroade, Stigler, & Baltes, 1980). One participant's (PC01) PHQ-4 scores started at the highest possible score in the baseline phase, and, therefore, it could be expected that regression toward the mean would have accounted for some of the decrease in PHQ-4 score noted for this participant.

Acceptability of the intervention. MINT may increase the face validity of home-based mindfulness practice, through the repetition and reinforcement provided by the text messages as commented on in the clinicians' survey. Clinicians did not receive questions about MINT from their clients, suggesting that the intervention was

appropriately developed and easy to understand. The results from the participant MINT ratings and survey suggest that they generally found MINT acceptable. No clear conclusions could be drawn as to weekly modules that they found particularly acceptable or unacceptable. One participant (PC01) rated the intervention poorly at 2 out of 10, but commented that "they were handy but just bad timing personally", which is supported by his PHQ-4 scores that place him in the 'severe' category (discussed further in section x). No participants withdrew from the study, and none used the 'crisis' text function.

Benefits of technology. The pilot study shows that text messages are a useful and acceptable way to support clients with their home-based practice, which is consistent with research with a cohort of patients with depression showed that text message intervention is highly acceptable to participants (Aguilera & Munoz, 2011). Text messages are not as exciting or glamorous as 'apps', but they have several advantages. Text messages are a durable type of technology whose usage is still increasing (Ofcom, 2012). Text message packages are cheap to develop and send compared to 'apps' or websites. Health disparities are related to socio-economic status, and the use of low-cost technology interventions may help avoid high-end expensive technology solutions further increasing this disparity for mental health users (Aguilera and Munoz, 2011).

Section 3 – Strengths and limitations

Strengths. This study represents an important first step in establishing whether text message reminders can be used to support therapeutic home-based practice in an EI setting. The study explored appropriate methodological approaches for working with small clinical samples in 'real life' settings. This study engaged with technology that may be able to be used as an adjunct to existing treatment approaches in a cost-effective

manner. Participants found the text message package developed for the purpose of this study acceptable. Weekly assessment measures meant that the trajectory of change could be examined, which showed variation between participants that may be interesting to explore further in future research.

In assessing this data, six different methods were used (see Chapter 6, page 83). Using more than one measure for group analysis is useful, as there are emerging methods for analysing single case research data. Results then provide confirmatory evidence of change, which increases the certainty of the conclusions drawn. Multiple methods of analysis also allow later comparison in meta-analyses depending on the criteria used.

Participants started at different times during the year as their therapist assessed that they were suitable for the study, which helps control for the effects of history. The flexibility of different starting times also makes it easier to recruit participants within a clinical setting. The baseline length was different for participants, helping to control for the novelty of responding to measures/participating in the research. The participants who experienced the most improvement in total practice had been receiving MBCT for different amounts of time before commencing baseline measures (<1 week to <1 year). The length of time a participant had been receiving MBCT was variable among participants, helping to control for the participant responding to the newness of therapy rather than the intervention.

Limitations. The pilot study had a small sample size, and while appropriate small-n research methods were used, larger scale trials would be useful to confirm and expand upon results. It should be noted that New Zealand has a small population, making large sample sizes difficult to obtain, particularly in this clinical group. Those experiencing psychotic symptoms make up a small number of the population and those

accessing EI are fewer still; therefore, the number of participants recruited in this study reflects these challenges. No data was collected on the number of EI clients approached to take part in the research, so participation rates are not possible to calculate. Because New Zealand's inclusion criteria for EI is broader that other countries, this may limit its generalisability as participants may have had a broader profile of symptoms than would potentially be found in EI services in other countries. Additionally, the study relied on self-report by participants that may be subject to bias, but there were no other practical ways to monitor home-based practice. Effects seen as a result of the intervention may have been due to the participant receiving text messages rather than due to the specific context of the message. This issue could be addressed in future research by having a control group receiving generic text messages. Further analysis of the importance and difficulties of research in clinical settings with small sample sizes is contained in Appendix L - The importance of research in 'difficult to research' populations, barriers to research, and possible solutions: Learning from the MINT pilot study.

Internal validity. Randomisation was not possible in this clinical study and selection bias should be considered. Attrition rates were 22% (two out of nine participants did not complete) which is comparable to other estimated drop out rates in EI settings (24.6%, Turner et al., 2007). Clinicians knew their client was receiving the intervention, and, therefore, may have placed more emphasis on home-based practice so special treatment effects should be considered. This was likely to be moderated by the fact that it would have affected all participants equally.

External validity. Clinicians selected suitable clients who they considered at a stable enough place to participate in a 16-week trial. It is not known whether findings would generalise to other settings with participants with psychosis; inpatient settings, for instance. It is also unknown whether the results would generalise to participants who

have not experienced psychotic symptoms. Participants may have tried harder to do home-based practice as they knew they were being observed, so reactivity to the experimental arrangement may be a consideration. The sample was diverse in terms of diagnoses and medications so results may have been influenced by multiple treatment inference, although a multiple baseline ABA design helps to control for these differences. The intervention itself may have produced novelty effects, and this could be explored in longer studies or with variable lengths of MINT. Participants may have been affected by reactivity of assessment, as they were self-reporting. The timing of measurement may have had an effect as measures were taken in therapy sessions; participants with positive therapy associations may have responded to the measures more positively, while the reverse may also have been true.

Section 4 - Conclusions and future directions

This study shows that a text message intervention can help change behaviour in some participants. Using text message prompts as an adjunct to existing therapy leads to behaviour change: participants increased the amount of home-based mindfulness practice that they were completing. This is useful to know as home-based practice is theoretically important in MBCT, yet there is little research on how to support clients at home. Technology, specifically text messages, can be used in this way as an adjunct to existing therapy to maximise possible therapeutic gains. Text messages offer an egalitarian technology approach for mental health providers and consumers due to their low development and user costs. This finding may be useful to both practitioners and researchers.

Pilot studies in clinical settings, such as the current study, can offer useful information on which to base future studies, especially in under-researched areas. While positive results are useful, information gained about what does not work is also

valuable. Testing interventions in a clinical setting, such as this study undertook, has challenges that can be addressed by amendments in study design. Clinical trials introduce large amounts of variation, but this reflects the reality of real-world settings and increases understanding of how interventions work in their applied settings.

Four main areas of further study are suggested. Firstly, investigating the amount of home-based practice in MBCT required to create therapeutic change with a larger sample size would add useful information to the theory that it is an important component of this type of therapy. This understanding could then be used to explore ways to support and increase home-based practice to maximise therapeutic gains. Secondly, the effects of variation in the participants and outcomes including age, gender, ethnicity, diagnoses, medication use, and lifestyle issues could be explored through a larger sample. The addition of neurocognitive profile testing for participants in future studies would help to understand those who benefit most from text message interventions and those who do not. Future studies could also examine culturally responsive changes to the intervention, such as offering the intervention in Te Reo Māori. Māori are over represented in mental health statistics (Tapsell, Hallett, & Mellsop, 2017) and it would be a useful area of further study to develop this intervention to be culturally responsive. Thirdly, it is possible that other mental health users from different clinical groups who are receiving MBCT would benefit from MINT. The duration of home-based practice was kept low for participants with psychotic symptoms, but for those with other mental health issues duration could be increased, which may increase the efficacy of the intervention. Finally, similar text message programmes could be developed for different types of therapy, such as CBT, where home-based practice is used.

The research findings provide valuable information about how technology can be used to support existing therapy in an EI setting. This trial demonstrates that other small-scale pilot studies should be conducted in clinical areas, where sample sizes are likely to be small, as they can contribute useful information to support best practice. The findings from this study also open up new avenues for future research in mental health clinical practice.

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Appendix A

Mindfulness-Text (MINT) package

Week	Thought	Practice
Introduction Texts	MINT: Welcome to MINT. You'll receive 2 texts a day for the next 8 weeks. MINT will help you remember the mindfulness skills you've learnt with your therapist.	MINT: At the end of each week you'll receive a question that will end with "PLEASE REPLY". By texting back to these questions you help in this research project.
	MINT: MINT will start tomorrow morning. MINT is a computer programme - in an emergency call your therapist or text "CRISIS" for numbers you can call.	MINT: We hope you find MINT useful. If you have any questions about MINT please ask your therapist.
Week 1	MINT: Practicing mindfulness helps us transform stressful situations by relating to them differently.	MINT: Breathing mindfully sit and feel your breath going in… and out… nothing to do, only to be.
	MINT: Mindfulness isn't magic, it isn't complicated, it isn't expensive – it just takes practice.	MINT: Placing your hand on your stomach, feeling it rise and fall with your breath.
	MINT: When you learnt to ride a bike it was hard but now you'd do it without thinking on 'auto pilot'. Sometimes we live life like this on 'auto pilot'.	MINT: Breathing in and out through the nose, noticing the end of your nose feeling the breath moving in and out.

	MINT: In everyday life we can sometimes be on automatic pilot for hours, not fully aware of what we are doing or what is happening.	MINT: In the morning before you get out of bed practice bringing awareness to your breath for 1 or 2 minutes.
	MINT: When we are on automatic pilot we may react without thinking.	MINT: Taking time for yourself, taking 3 deep breaths in… and out... in…. and out… in… and out…
	MINT: Practising mindful awareness gives us more choice of how to respond to events in our lives.	MINT: Slowly breathing in and out for three breaths, keeping a gentle smile on your face.
	MINT: How useful did you find the text messages this week? Text a number between 0 and 10 where 0 = not helpful at all, 10= very helpful. PLEASE REPLY	MINT: Over the coming weeks we will discover new and useful ways to remember to practise mindfulness.
Week 2	MINT: We can become more aware of events, situations, ourselves, and other people in our lives through practising mindfulness.	MINT: Looking up at the sky, noticing the clouds moving across the sky. Your thoughts are like the clouds, they constantly change.
	MINT: The aim of the meditation practice is not to prevent the mind wandering, but to notice when it does and to gently bring it back to focusing on the breath.	MINT: Breathing in slowly, deeply, gently. Breathing out slowly, deeply, gently.
	MINT: Experiencing boredom is normal, just notice it.	MINT: Taking a bite of food, holding it your mouth, like it is the first time you have ever eaten. Noticing how it feels, noticing how it tastes.
	MINT: It is normal for the mind to wander from one thing to another, like a bee moving from one flower to another.	MINT: Noticing when the thoughts wander off, gently bringing your attention back to your breath.

	MINT: If a noise annoys you while practising breathing, notice the noise and return to the breath.	MINT: Placing an object (like a piece of fruit) by your bed so you can see it when you wake up. Next time you see the flower, smile and breathe deeply 3 times.
	MINT: There is no need to avoid feelings of worry or unhappiness, explore them with curiosity.	MINT: Taking 3 minutes, focusing on the breath, sit or lie comfortably. Breathing in, breathing out.
	MINT: How useful did you find the text messages this week? Text a number between 0 and 10 where 0 = not helpful at all, 10= very helpful. PLEASE REPLY	MINT: Choose one activity that you do every day, like brushing teeth. When you do that activity, practising being mindfully aware of what you are doing.
Week 3	MINT: There is no right time or right place to practise mindfulness. A slow breath can be taken anytime to bring you back to the present moment.	MINT: Next time you have cup of tea, taking a breath before, noticing the smell, the feeling of the cup, the feeling of tea in your mouth as you swallow.
	MINT: Experiencing discomfort is normal, just notice it.	MINT: Practising eating one or two things each day with mindful awareness. Noticing how they look, smell, feel and taste.
	MINT: Observe unwanted thoughts and feelings, notice them like clouds passing in the sky.	MINT: Placing an object (like a piece of fruit) somewhere in your home, every time you notice the flower taking three deep breaths.

	MINT: It's not hard to be mindful, but it can be hard to remember to be mindful. It takes lots of practice.	MINT: Taking 3 minutes, focusing on the breath, sit or lie comfortably. Breathing in… breathing out…
	MINT: We may hold on to pleasant thoughts and push away unpleasant thoughts. We do not need to struggle, just accept them, because thoughts are just thoughts.	MINT: Choosing a different activity from last week. When you do that activity, practising being mindfully aware of what you are doing.
	MINT: Experiencing frustration is normal, just notice it. There is no need to do anything about your frustration, just notice it and come back to your breath.	MINT: Taking deep slow breaths, noticing the mind may wander away. This is ok, it is simply what minds do. Notice and gently come back to the breath.
	MINT: How useful did you find the text messages this week? Text a number between 0 and 10 where 0 = not helpful at all, 10= very helpful. PLEASE REPLY	MINT: Mindfulness can be practised anywhere. If you forget to practise, gently notice, take a breath. You can start practising mindfulness again any time.
Week 4	MINT: Mindfulness is like a muscle - we strengthen it every time we practise.	MINT: Breathing in, breathing out. Becoming aware of the breath flowing in and out of you.
	MINT: Trying to control thoughts often leads to them coming back more strongly. If you have controlling thoughts, just notice them.	MINT: When the mind wanders, as best you can, just notice that your attention has wandered, and gently bring attention back to your breath.

	MINT: Being mindful means being aware of and accepting of what is happening in this moment.	MINT: Taking 3 minutes, focusing on the breath, sit or lie comfortably. Breathing in, breathing out.
	MINT: Notice when a strong emotion comes, "the emotion of anger is here", and gently return to the breath.	MINT: Practising mindful walking next time you walk anywhere, even inside your home. Placing one foot softly on the ground, and then the other.
	MINT: The same event can bring about many different thoughts and feelings. Thoughts can and do change over time. Thoughts are not facts.	MINT: Seeing how things are right now, choosing how we want to respond.
	MINT: Thoughts sometimes affect how we feel and how we react to everyday events. We can be aware of thoughts without always believing them.	MINT: Practising everyday helps you become better friends with thoughts, feelings and body sensations, without having to do anything at all.
	MINT: How useful did you find the text messages this week? Text a number between 0 and 10 where 0 = not helpful at all, 10= very helpful. PLEASE REPLY	MINT: Lying down, breathing, noticing first the feet, then the legs, move slowly up the body until the head. Noticing what thoughts and feelings come and go.
Week 5	MINT: Everyday there are small pleasant events that happen. With mindfulness we can notice these small pleasant everyday events.	MINT: Bringing your awareness to one pleasant event every day, noticing the thoughts, feelings and body sensation that come along with that pleasant event.

MINT: We often judge experiences as good or bad or pleasant or unpleasant without even being aware we are judging. Try describing experiences instead.	MINT: Listen to the sounds around you, noticing the thoughts and feelings that arise. Try to describe them without judging.
MINT: When we judge an experience as unpleasant we often want to push it away. Approaching our experiences with mindfulness we may see them in a different way.	MINT: We may find ourselves judging our thoughts, or our feelings or our sensations. Practise noticing the judgements and gently returning to the breath.
MINT: Sometimes we judge things as pleasant or good, we may want to hold on to them. We may feel sad when they pass or spend our time wanting them to come back.	MINT: At your next meal, try smelling each food item, notice the thoughts and feelings that come up. Noticing the differences between describing and judging.
MINT: Sometimes we judge things as unpleasant, we might want them to go away. We might feel bad just thinking about a bad experience in the past.	MINT: Find a few small objects and practise holding them in your hands, noticing how they feel and how they look.
MINT: Every day your breath is with you, you can always return to it as a point to focus on.	MINT: Taking 3 minutes, focusing on the breath, sit or lie comfortably. Breathing in, breathing out.
MINT: How useful did you find the text messages this week? Text a number between 0 and 10 where 0 = not helpful at all, 10= very helpful. PLEASE REPLY	MINT: We may think that we are our thoughts, but we also have emotions and body sensations. Using mindfulness we can become more aware of our whole self.

Week 6	MINT: Judging our experiences can bring more stress to our lives. We can't control many things that happen in our lives, but we can choose how to respond.	MINT: Sitting with your back straight, practise looking inside your body as you breathe. Noticing how the body feels.
	MINT: Mindful awareness can sometimes help us discover more choices, when we see them we have more freedom to choose how to respond.	MINT: Take a few minutes noticing how your body feels, not trying to change it, just watching how the body is feeling.
	MINT: Practising compassionate acceptance we become more aware and accepting of what is present.	MINT: Move your attention to your belly, noticing the sensations as your breath moves in and out.
	MINT: We can choose to bring more awareness into our lives with all our senses, we can choose to practise mindfulness every day.	MINT: Practising breathing we bring awareness to thoughts, feelings and body sensations.
	MINT: In each new moment we can choose to accept thoughts, feelings, body sensations and all our experiences.	MINT: Lying down, breathing, noticing first the feet, then the legs, move slowly up the body until the head. Noticing what thoughts and feelings come and go.
	MINT: When you bring awareness to difficult thoughts you may be able to deal with them better before they get too strong.	MINT: Taking 3 minutes, focusing on the breath, sit or lie comfortably. Breathing in, breathing out.
	MINT: How useful did you find the text messages this week? Text a number between 0 and 10 where 0 = not helpful at all, 10= very helpful. PLEASE REPLY	MINT: Practise bringing awareness to the difference of describing an experience compared to judging an experience.

Week 7	MINT: Being present with difficult thoughts and feelings and even making friends with them, can help you cope with fear, worry, anger and sadness.	MINT: Lying comfortably on your back, bringing your attention to your breath. Noticing any body sensations, practising noting and describing them.
	MINT: If we cope with our unpleasant feelings by pushing them away or trying to control them, we may actually end up maintaining them.	MINT: Practising noticing body sensations for 10 minutes each day, as best you can.
	MINT: Approach all your feelings with curiosity and kindness.	MINT: Whenever you experience anxiety or other strong feelings, simply breathe and practise noticing the thoughts, feelings and body sensations in the moment.
	MINT: As we strengthen our muscle of attention we may learn to see things with greater clarity and awareness.	MINT: Taking 3 minutes, focusing on the breath, sit or lie comfortably. Breathing in, breathing out.
	MINT: Seeing things more clearly we have more choice points, these are moments of freedom at which choices can be made.	MINT: Choosing a room you know well, practise looking with awareness for 3 minutes. Noticing many things I may have never noticed before.

	MINT: With clarity and compassion we may discover wonderful opportunities to make mindful choices in how we respond to events in our life.	MINT: Whenever you hear a phone ring, a bird sing, a car honk, a door close - use any sound as the bell of mindfulness. Really listen, and be present and awake.
	MINT: How useful did you find the text messages this week? Text a number between 0 and 10 where 0 = not helpful at all, 10= very helpful. PLEASE REPLY	MINT: A regular breathing space practice provides a way of checking in with yourself a few times a day.
Week 8	MINT: This is the final week of MINT. In this last week we will remind you of the skills you have learnt.	MINT: Throughout the day, take a few moments to bring your attention to your breathing, taking 5 mindful breaths.
	MINT: Practising the 3-minute breathing space every day may heighten awareness of all your experiences.	MINT: Taking 3 minutes, focusing on the breath, sit or lie comfortably. Breathing in… breathing out….
	MINT: Practising mindfulness of the breath can be helpful when you need to be grounded in this moment.	MINT: Thinking about your experiences over the past 7 weeks and write a letter to yourself. You can keep this letter private, or share it with your therapist.
	MINT: The breath is an anchor that can help you stay clear, present and aware throughout your day, moment by moment, day by day.	MINT: Noticing changes in your posture - be aware of how your body and mind feel when you move from lying down to sitting, to standing, to walking.

	MINT: You can review the messages from previous weeks - look at your text message history. These old messages can be read again, and you can practise anytime.	MINT: Be aware of any points of tightness in your body throughout the day. See if you can breathe into them, and as you breathe out let go of excess tension.
	MINT: Thanking yourself for participating in MINT, your time and your effort to practise mindfulness skills to help yourself.	MINT: Before you go to sleep at night, take a few minutes and bring attention to your breathing.
	MINT: How useful did you find the text messages this week? Text a number between 0 and 10 where 0 = not helpful at all, 10= very helpful. PLEASE REPLY	MINT: The MINT programme has now finished. Thank you for your time. We hope you found it useful. Best wishes with your mindfulness practice.

Appendix B

Participant information sheet

Participant Information Sheet

To be printed on Massey University Letterhead

Study title:	***An Investigation of a text message programme called MINT.***		
Locality:	**Auckland**	Ethics committee ref.:	**15/NTB/201**
Lead investigator:	**Mary Miller**	Contact phone number:	[redacted]

You are invited to take part in a study on a text message programme called MINT. Whether or not you take part is your choice. If you don't want to take part, you don't have to give a reason, and it won't affect the care you receive. If you do want to take part now, but change your mind later, you can pull out of the study at any time.

This Participant Information Sheet will help you decide if you'd like to take part. It sets out why we are doing the study, what your participation would involve, what the benefits and risks to you might be, and what would happen after the study ends. We will go through this information with you and answer any questions you may have. You do not have to decide today whether or not you will participate in this study. Before you decide you may want to talk about the study with other people, such as family, whānau, friends, or healthcare providers. Feel free to do this.

If you agree to take part in this study, you will be asked to sign the Consent Form on the last page of this document. You will be given a copy of both the Participant Information Sheet and the Consent Form to keep.

This document is six pages long, including the Consent Form. Please make sure you have read and understood all the pages.

What is the purpose of the study?

This study will examine a text message programme called MINT for people in therapy with Early Intervention Teams. MINT is based on Mindfulness Based Cognitive Therapy. The package aims to increase the amount of home-based mindfulness practice. The study will examine if MINT improves levels of home-based practice and if it increases mindfulness skills. The study will also examine if using MINT reduces distress caused by anxiety and depression symptoms. The client and therapist experiences of MINT will be examined.

This study has been approved by the Health and Disabilities Ethics Committee reference: 15/NTB/201.

What will my participation in the study involve?

To receive MINT you must be receiving therapy from the Early Intervention Team. You will receive MINT in addition to the usual treatment you receive from the Early Intervention Team. If you choose not to participate in MINT you will continue to receive your usual treatment. If you are interested in receiving MINT, please complete the consent form and talk to your therapist about starting MINT.

If you decide to participate you will receive MINT to your mobile phone for 8 weeks. Before you receive MINT you will be asked some brief questions about your age, gender, ethnicity and mental health symptoms. During the trial you will be asked to complete the weekly questionnaire for three times before you start MINT, while you are receiving MINT, and three times after MINT has finished. The weekly questionnaire includes a series of questions about your mood, your mindfulness skills and how you are finding using MINT. At the end of the trial you will receive a questionnaire about whether you found MINT useful. The researchers will only have access to health information that the participants give in response to the study's questionnaires. No information will be taken from your health records.

What are the possible benefits and risks of this study?

There are no foreseeable risks to participating in this study, but if you wish to withdraw from the study you can do so at any time. Your Early Intervention Team Clinical Psychologist can also request that you are withdrawn from the study, if they become concerned about your wellbeing. If while using MINT you experience a crisis in your symptoms you should contact your Early Intervention Team therapist. MINT is an automated service run by a computer, if you text the word "CRISIS" you will receive an automated text message with the numbers you can call in a crisis.

The possible benefits to this study include improving your mindfulness skills, which then decrease the distress caused by your symptoms of anxiety, and depression.

This study will be run in collaboration with the Early Intervention Team, who is responsible for your care during the trial. The investigator will ensure you receive MINT successfully and that if you wish to withdraw at any time that you stop receiving MINT.

Who pays for the study?

The Massey University Post Graduate Research Fund will fund this study. If you have any questions about the study you can contact the researchers (contact details are at the end of this form).

There is no cost for participating in the study. To thank you for your time you will receive a $40 supermarket voucher after the study is completed.

What if something goes wrong?

If you were injured in this study, which is unlikely, you would be eligible **to apply** for compensation from ACC just as you would be if you were injured in an accident at work or at home. This does not mean that your claim will automatically be accepted. You will have to lodge a claim with ACC, which may take some time to assess. If your claim is accepted, you will receive funding to assist in your recovery.

If you have private health or life insurance, you may wish to check with your insurer that taking part in this study won't affect your cover.

What are my rights?

You are under no obligation to accept this invitation. Deciding to participate or not participate will have no effect on the treatment you receive from the Early Intervention Team. In order to protect your privacy the self-report questionnaires are anonymous - the researcher will not have access to the mental health records of participants. Completion and return of the consent form shows consent. You have the right to decline to answer any particular question, and you can access the information collected about you as part of the study if you wish.

What happens after the study or if I change my mind?

Data resulting from this research will be securely stored at Massey University for 5 years, after which it will be destroyed. The information you provide will be used in Mary Miller's Doctoral thesis and submitted for assessment. The findings may be published in scientific journals or presented at scientific conferences in New Zealand and overseas. The Massey University Library will also hold a copy of the research.

Who do I contact for more information or if I have concerns?

If you have any questions, concerns or complaints about the study at any stage, you can contact:

Name, position *Mary Miller, Doctorate of Clinical Psychology Student,* Massey University.

Telephone number [redacted]
Email [redacted]

Name, position *Dr Heather Buttle,* Senior Lecturer, Massey University.

Telephone number +64 9 414 0800 extn 43103
Email h.buttle@massey.ac.nz

If you want to talk to someone who isn't involved with the study, you can contact an independent health and disability advocate on:

Phone: 0800 555 050
Fax: 0800 2 SUPPORT (0800 2787 7678)
Email: advocacy@hdc.org.nz

For Maori health support, or to discuss any concerns or issues regarding this study, please contact:

Mata Forbes RGON,
Maori Health Services Co-ordinator / Advisor,
Tel 307 4949 extn. 23939 or Mobile 021 348 432

You can also contact the health and disability ethics committee (HDEC) that approved this study on:

Phone: 0800 4 ETHICS
Email: hdecs@moh.govt.nz

Appendix C

Consent form

Consent Form

To be printed on Massey University Letterhead

Please tick to indicate you consent to the following

I have read, or have had read to me in my first language, and I understand the Participant Information Sheet.
I have been given sufficient time to consider whether or not to participate in this study.
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.
I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without this affecting my medical care.
I consent to the research staff collecting and processing my information, including information about my health.
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.
I understand the compensation provisions in case of injury during the study.
I know who to contact if I have any questions about the study in general.
I understand my responsibilities as a study participant.
I wish to receive a summary of the results from the study.

Declaration by participant:
I hereby consent to take part in this study.

Participant's name:

Signature: Date:

Declaration by Early Intervention Team Clinical Psychologist:

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:

Signature: Date:

Appendix D

Demographic questions

MINT - Mindfulness Texts

Demographic questions

Date:
Participant code:
Please answer the following questions in conjunction with the participant:

What is the participant's gender? M / F

What is the birth year of the participant?

What is the participant's ethnicity? (tick as many as apply)
New Zealand European
Māori
Samoan
Cook Islands Maori
Tongan
Niuean
Chinese
Indian
Other (please specify)

How long has the participant been receiving mindfulness-based therapy? (Please tick one - if you aren't sure you can ask your therapist).
Less than one week
Less than one month
Less than six months
Less than one year
More than one year

Appendix E

MINT - Mindfulness Texts

Weekly measures

Date:
Participant code:

Part 1

Please estimate in the last week (tick a box for each question)

How many days in the last week did you manage mindfulness practice?	***0***	***1***	***2***	***3***	***4***	***5***	***6***	***7***

How many times a day did you normally do mindfulness practice?	***0***	***1***	***2***	***3+***

How long did you normally spend practising mindfulness each day?	***Less than 1 minute***	***1 to 5 minutes***	***5 to 10 minutes***	***More than 10 minutes***

Part 2

	Please respond to each item by marking one box per row	Rarely /Not at All	Sometimes	Often	Almost Always
1	It is easy for me to concentrate on what I am doing	1	2	3	4
2	I can tolerate emotional pain	1	2	3	4
3	I can accept things I cannot change	1	2	3	4
4	I can usually describe how I feel at the moment in considerable detail	1	2	3	4
5	I am easily distracted	1	2	3	4
6	It's easy for me to keep track of my thoughts and feelings	1	2	3	4
7	I try to notice my thoughts without judging them	1	2	3	4
8	I am able to accept the thoughts and feelings I have	1	2	3	4
9	I am able to focus on the present moment	1	2	3	4
10	I am able to pay close attention to one thing for a long period of time	1	2	3	4

Part 3

	Over the past 2 weeks have you been bothered by these problems? (Please respond to each item by marking one box per row)	Not at all	Several days	More than half the days	Nearly every day
1	Feeling nervous, anxious or on edge	0	1	2	3
2	Not being able to stop or control worrying	0	1	2	3
3	Little interest or pleasure in doing things	0	1	2	3
4	Feeling down, depressed, or hopeless	0	1	2	3

Appendix F

Therapist questionnaire

MINT – therapist questionnaire

What did you notice about your clients' ability to practice mindfulness skills between therapy sessions?

Were there any questions that arose during therapy with regards to the text support package? If so, what were they?

Was there anything significant that you noticed about the way the clients responded to mindfulness components in therapy?

Was there anything significant that you noticed about the clients' levels of engagement in the therapeutic process?

Appendix G

Participant questionnaire

MINT - Mindfulness Texts

Participant questionnaire

Date:
Participant code:

Rate how useful you found MINT (0 to 10)?

0 *10*

Not at all useful

Extremely useful

How often did you read the text messages (0 to 10)?

0 *10*

Never

Always

How often did you do the daily activity suggested in the text message (0 to10)?

0 10

Never

Always

What did you like about MINT? (please comment)

Was there anything you didn't like about MINT? (please comment)

How would you improve MINT? (please comment)

Appendix H

Total practice group data

Total Practice Group Data				
Participant	Phase	Level	Stablity	Trend
PC01	A1	12.5 (7.5-20)	33% variable	Accelerating/therapeutic
	B1	6.4 (3-9)	0% variable	Accelerating/therapeutic
	A2	8.5 (7.5-9)	100% stable	Accelerating/therapeutic
PC04	A1	3.83 (1-7.5)	100% stable	Decelerating/contratherapeutic
	B1	17 (6-30)	33% variable	Accelerating/therapeutic
	A2	26.25 (22.5-30)	100% stable	Accelerating/therapeutic
PC06	A1	4.5 (1-15)	0% variable	Accelerating/therapeutic
	B1	9.75 (9-12)	100% stable	Accelerating/therapeutic
	A2	6 (3-9)	0% variable	Decelerating/contratherapeutic
PC07	A1	13.33 (0-20)	33% variable	Decelerating/contratherapeutic
	B1	24 (1-20)	100% stable	Accerating/therapeutic
	A2	45 (40-50)	100% stable	Decelerating/contratherapeutic
PC08	A1	20 (15 -22.5)	100% stable	Decelerating/contratherapeutic
	B1	16 (6-22.5)	50% variable	Accelerating/therapeutic
	A2	22.5 (22.5)	100% stable	Stable
PC09	A1	4.7 (2-6)	0% variable	Stable
	B1	7.6 (3-12)	33% variable	Decelerating contratherapeutic
	A2	5.25 (3-6)	50% variable	Accelerating/therapeutic
PC10	A1	8 (7.5-9)	100% stable	Accelerating/therapeutic
	B1	28.88 (21-52.5)	50% stable	Decelerating/contratherapeutic
	A2	21 (21)	n/a	n/a

Note: Level refers to the mean score for the phase with the range of scores shown in brackets. Stability is reported according to the 80/20 stability envelope discussed in Chapter 6, where scores of >80% are stable, and <80% are variable.

Appendix I

CAMS-R results

The summary of data for PC01's CAMS-R score is shown in Table 23, and graphically displayed in Figure 24.

Table 23

CAMS-R scores for PC01

Phase	Level	Range	Stablity	Trend	NAP	TauU
A1	20.67	20-21	100%	Acc/thera	n/a	n/a
B1	23.67	22-25	100%	Acc/thera	n/a	n/a
A2	22.33	20-24	100%	Acc/thera	n/a	n/a
A1-B1	Improving	n/a	n/a	n/a	1.00	0.78
A1-A2	Improving	n/a	n/a	n/a	0.44	0.22

Note. Acc = accelerating. Thera = therapeutic. A1-B1 and A1-A2 refer to between phase changes.

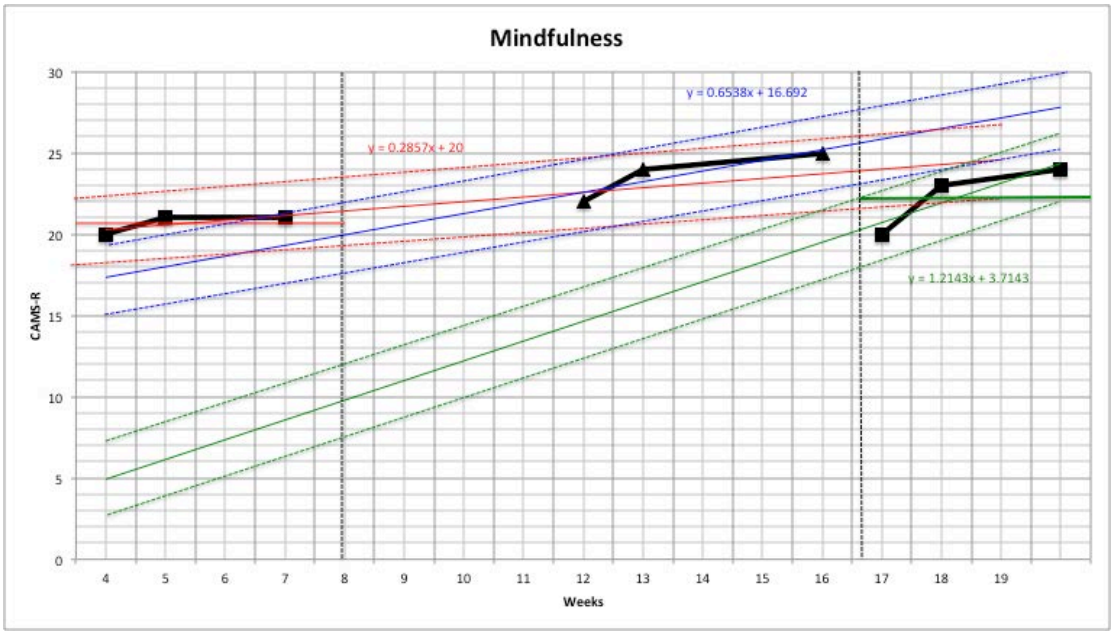


Figure 24. CAMS-R scores for PC01.

The baseline was 100% stable and the trend was accelerating and therapeutic, which is not desirable for this phase as it suggests that over time the participant would

improve without an intervention. The score on the CAMS-R went from 20.67 in the baseline phase (A1) to 23.67 in the intervention phase (B2), a positive change in the expected direction of 3 points. There was a large effect size for this change of NAP =1.00 and TauU = .78. Three points on the CAMS-R scale of 10 to 40, is unlikely to be clinically significant. There was an increase in score from 20.67 on the CAMS-R in the baseline (A1) phase to 22.33 in the post-intervention phase (A2). This was a medium effect size change of NAP =.44 and TauU = .22 The change of 1.66 overall is so small it can be said to be negligent.

Mindfulness. The summary of data for PC04's CAMS-R scores is shown in table 24, and graphically displayed in figure 25.

Table 24

CAMS-R scores for PC04

Phase	Level	Range	Stablity	Trend	NAP	TauU
A1	33.67	31-33	100%	Acc/thera	n/a	n/a
B1	31.33	30-33	100%	Acc/thera	n/a	n/a
A2	31.00	30-32	100%	Dec/contra	n/a	n/a
A1-B1	Deteriorating	n/a	n/a	n/a	-0.56	-0.69
A1-A2	Deteriorating	n/a	n/a	n/a	-0.67	-0.69

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

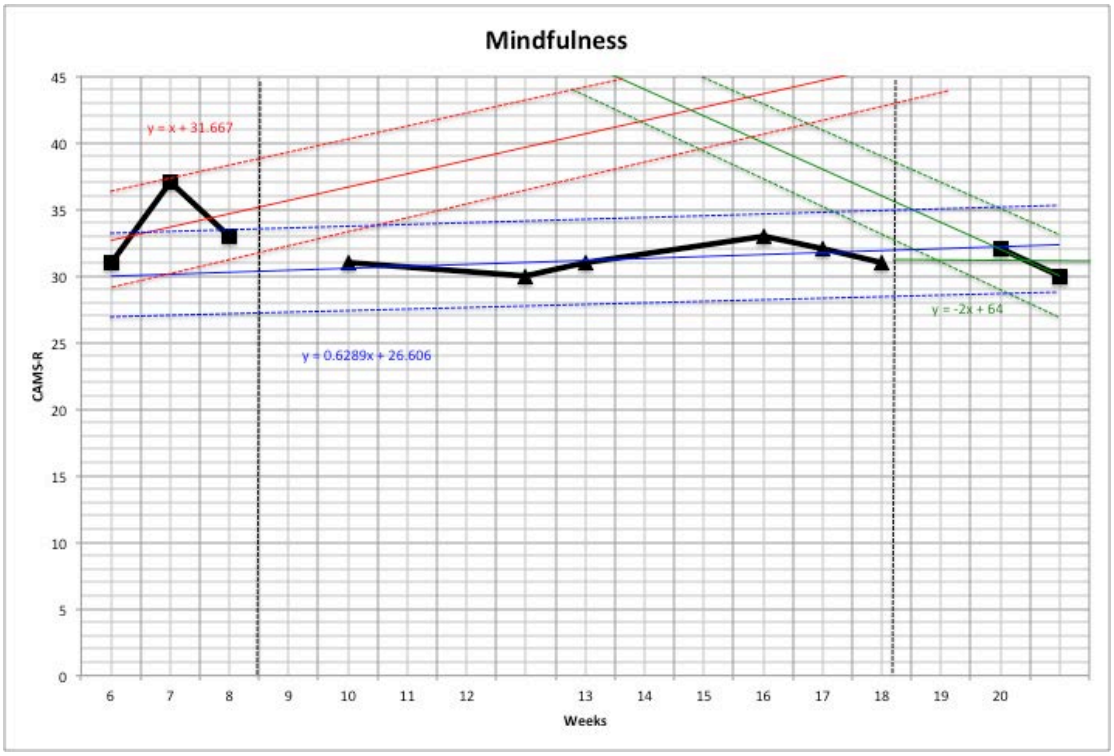


Figure 25. CAMS-R scores for PC04.

There were only two data points in the post-intervention phase, the results should be interpreted with caution, as mentioned previously stability will always be 100% with two data points. Visual analysis reveals that all data points for all phases of the trial fall within the stability envelope of the intervention phase, with the exception of one outliner within the baseline phase. This suggests that there has really been no change as a result of the intervention over the course of the trial.

The score on the CAMS-R went from 33.67 in the baseline phase (A1) to 31.33 in the intervention phase (B2). This change is in the opposite direction hypothesised and is deteriorating, showing that the level of mindfulness skills is deteriorating once the intervention is introduced. The NAP effect size of -.56 is negative showing that the data cloud is non-overlapping but in the opposite direction than was expected. TauU = .69. There was deterioration from a score of 33.67 on the CAMS-R in the baseline (A1) phase to 31 in the post-intervention phase (A2). The NAP score of -.67, TauU = -.69

shows a medium negative effect size, suggesting that the data clouds moderately overlap in a negative direction.

Mindfulness. The summary of data for PC06's CAMS-R scores is shown in Table 25, and graphically displayed in Figure 26.

Table 25

CAMS-R scores for PC06

Phase	Level	Range	Stablity	Trend	NAP	TauU
A1	22.25	17-25	25%	zero change	n/a	n/a
B1	22.75	21-25	100%	zero change	n/a	n/a
A2	22.00	21-24	100%	Acc/thera	n/a	n/a
A1-B1	No change	n/a	n/a	n/a	-0.06	-0.13
A1 - A2	No change	n/a	n/a	n/a	-0.33	-0.42

Note. Acc = accelerating. Thera = therapeutic. A1-B1 and A1-A2 refer to between phase changes.

Figure 26. CAMS-R scores for PC06.

The score on the CAMS-R went from 22.25 in the baseline phase (A1) to 22.75 in the intervention phase (B2), a positive change in the expected direction of 0.25 points. There was a small effect size for this change of NAP = -.06 and TauU = -.13.

This is such a small change that it can be said to be negligent. There was and decrease in score from 22.5 on the CAMS-R in the baseline (A1) phase to 22 in the post-intervention phase (A2). This was a medium effect size change of NAP = -.33 and TauU = -.42. The change of 0.50 overall is so small it can be said to be negligent.

Mindfulness. The summary of data for PC07's CAMS-R is shown in Table 26, and graphically displayed in Figure 27.

Table 26

CAMS-R scores for PC07

Phase	Level	Range	Stablity	Trend	NAP	TauU
A1	26.67	26-27	100%	Acc/thera	n/a	n/a
B1	25.00	23-28	100%	Dec/contra	n/a	n/a
A2	24.50	24-25	100%	Acc/thera	n/a	n/a
A1-B1	Deteriorating	n/a	n/a	n/a	-0.33	-0.56
A1 - A2	Deteriorating	n/a	n/a	n/a	-1.00	-1.33

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

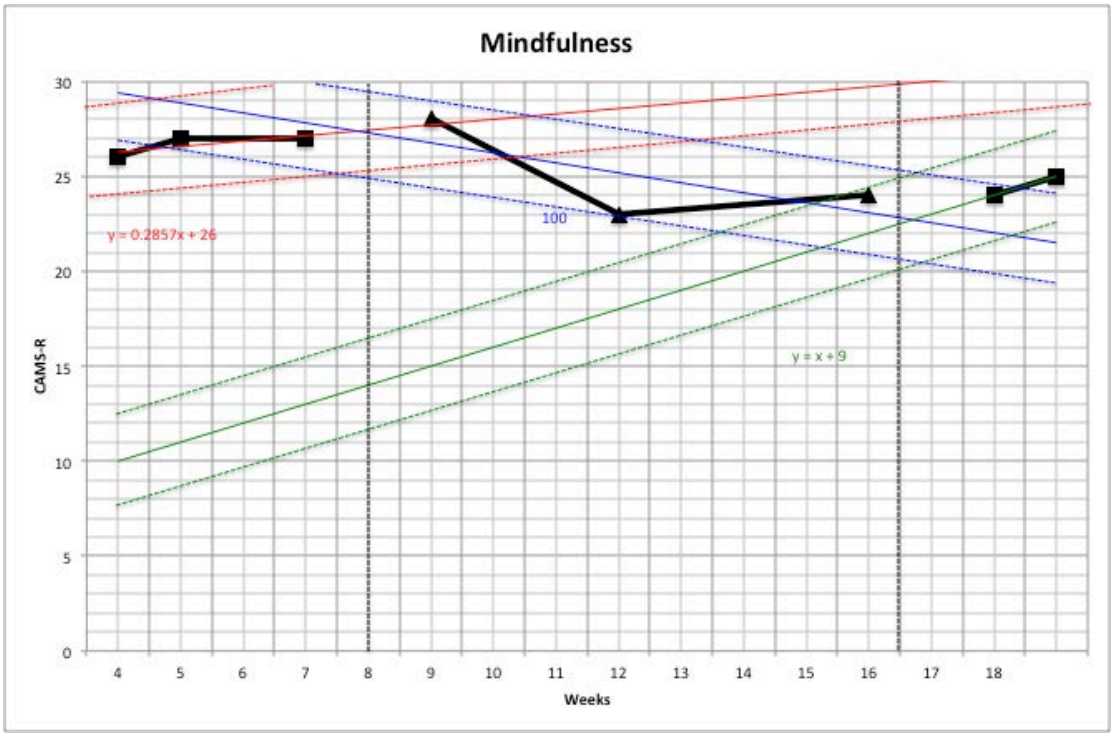


Figure 27. CAMS-R scores for PC07.

The trend for the baseline phase was accelerating and therapeutic, which is not useful for a baseline phase, as it suggests that without an intervention the participant would improve. The stability was 100% and the trend was accelerating and therapeutic. Because there were only two data points in the post-intervention phase, the results should be interpreted with caution, as mentioned previously stability will always be 100% with two data points. The score on the CAMS-R went from 26.67 in the baseline phase (A1) to 24.5 in the intervention phase (B2). This change is in the opposite direction hypothesised and is deteriorating, showing that the level of mindfulness skills is deteriorating once the intervention is introduced. The NAP effect size of -.33 and TauU = -.56 show a medium negative effect size. There was deterioration from a score of 26.67 on the CAMS-R in the baseline (A1) phase to 24.5 in the post-intervention phase (A2). The NAP score of -1 and TauU = -1.33 shows a large negative effect size. The score on the CAMS-R only drops by 2.17, which is not much on a scale of 10-40, it likely represents no change.

Mindfulness. The summary of data for PC08's CAMS-R scores is shown in Table 27, and graphically displayed in Figure 28.

Table 27

CAMS-R scores for PC08

Phase	Level	Range	Stablity	Trend	NAP	TauU
A1	21.7	19-24	100%	Dec/contra	n/a	n/a
B1	17.6	16-20	80%	Dec/contra	n/a	n/a
A2	15.7	10-21	33%	Acc/thera	n/a	n/a
A1-B1	Deteriorating	n/a	n/a	n/a	-0.87	-0.67
A1-A2	Deteriorating	n/a	n/a	n/a	-0.78	-0.44

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

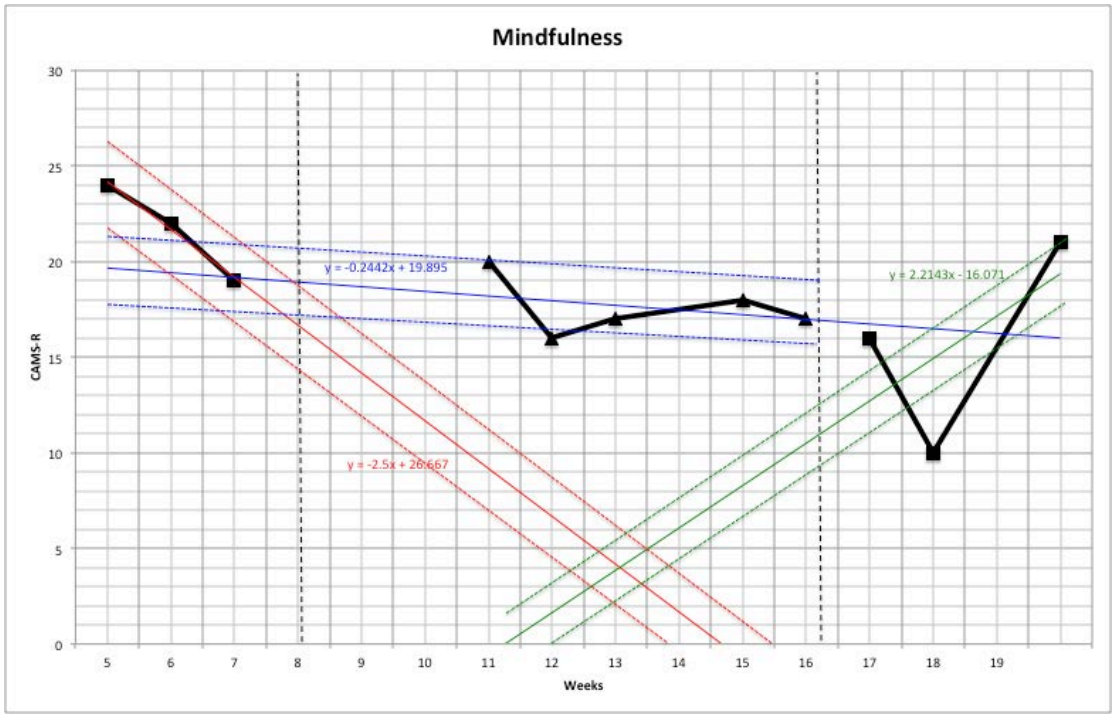


Figure 28. CAMS-R scores for PC08.

The score on the CAMS-R went from 21.7 in the baseline phase (A1) to 17.6 in the intervention phase (B2). This change is in the opposite direction hypothesised and is deteriorating, showing that the level of mindfulness skills is deteriorating once the intervention is introduced. The NAP effect size of -.87 and TauU = -.67 shows a medium negative effect size. There was deterioration from a score of 21.7 on the CAMS-R in the baseline (A1) phase to 15.7 in the post-intervention phase (A2). The NAP score of -.78 and TauU -.44 shows a medium negative effect size. However, the score on the CAMS-R only drops by 6, which is not much on a scale of 10-40, it is likely to represent a small or insignificant change.

Mindfulness. The summary of data for PC09's CAMS-R scores is shown in Table 28, and graphically displayed in Figure 29.

Table 28

CAMS-R scores for PC09

Phase	Level	Range	Stablity	Trend	NAP	TauU
A1	27.30	27-28	100%	Zero change	n/a	n/a
B1	32.00	27-33	100%	Acc/thera	n/a	n/a
A2	34.00	32-37	100%	Dec/contra	n/a	n/a
A1-B1	Improving	n/a	n/a	n/a	0.78	0.78
A1-A2	Improving	n/a	n/a	n/a	1.00	1.00

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

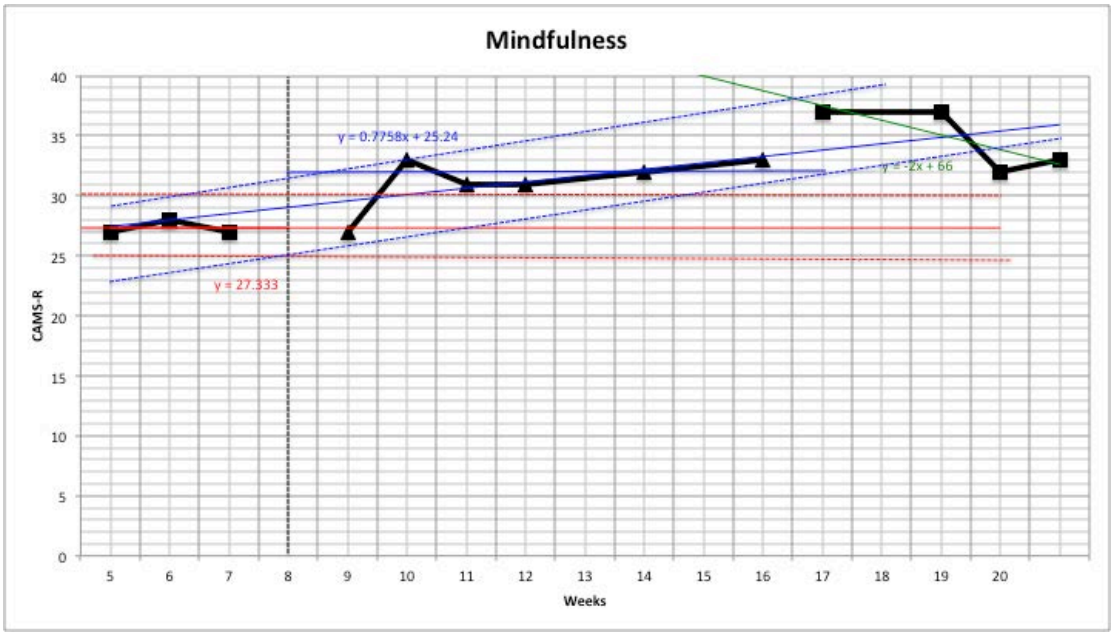


Figure 29. CAMS-R scores for PC09.

The score on the CAMS-R went from 27.30 in the baseline phase (A1) to 32.00 in the intervention phase (B2), a positive change in the expected direction of 4.7 points. There was a medium effect size for this change of NAP = .78 and TauU = 1. It is not know whether this change is clinically significant There was and increase in score from 27.3 on the CAMS-R in the baseline (A1) phase to 34 in the post-intervention phase (A2). The NAP = .78 and TauU = 1 shows a large effect size in the direction of change hypothesised.

Mindfulness. The summary of data for PC10's CAMS-R scores is shown in Table 29, and graphically displayed in Figure 30.

Table 29

CAMS-R scores for PC10

Phase	Level	Range	Stablity	Trend	NAP	TauU
A1	23.33	23-24	100%	Acc/thera	n/a	n/a
B1	24.50	24-26	100%	Dec/contra	n/a	n/a
A2	26.00	26	n/a	n/a	n/a	n/a
A1-B1	Improving	n/a	n/a	n/a	0.75	0.58
A1-A2	Improving	n/a	n/a	n/a	1.00	0.33

Note. Acc = accelerating. Dec = decelerating. Thera = therapeutic. Contra = contratherapeutic. A1-B1 and A1-A2 refer to between phase changes.

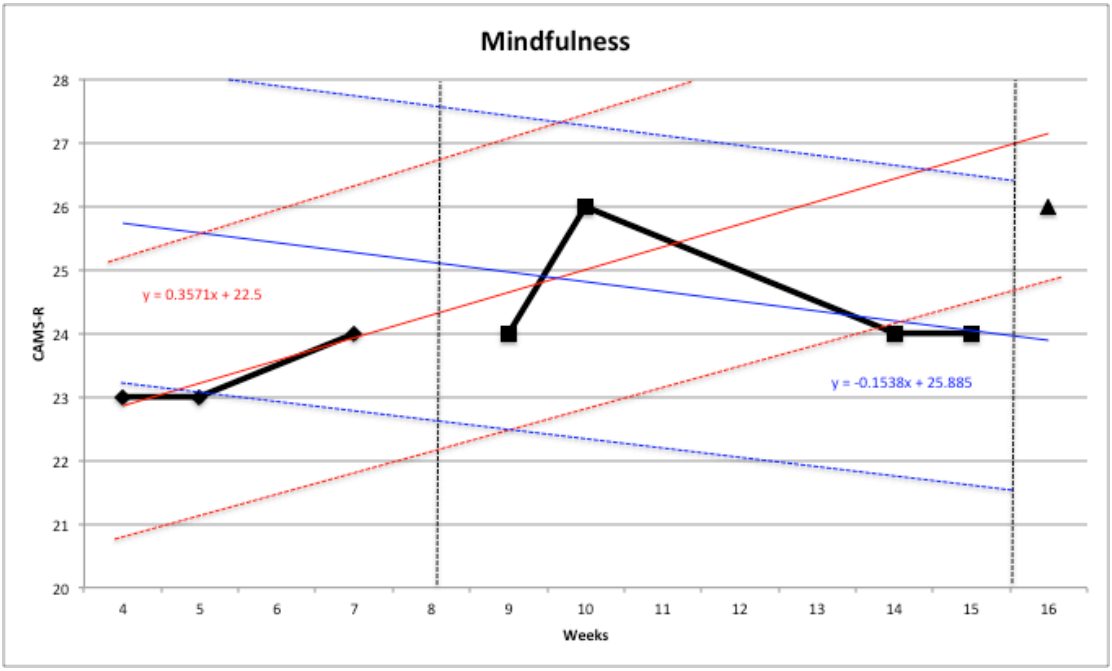


Figure 30. CAMS-R scores for PC10.

The trend for the baseline phase was accelerating and therapeutic, which is not useful for a baseline phase, as it suggests that without an intervention the participant would improve. The score on the CAMS-R went from 23.33 in the baseline phase (A1) to 24.5 in the intervention phase (B2), with a medium effect size of NAP = .75 and TauU = .58. There was an improvement from a score of 23.33 on the CAMS-R in the baseline (A1) phase to 26 in the post-intervention phase (A2). The NAP score of 1 and TauU = .33 and show a medium effect size. An increase in score on the CAMS-R of

2.67 is unlikely to be clinically significant, when the range of the scale is 10 to 40. Visual analysis reveals that all data points for all phases of the trial fall within the stability envelope of the baseline phase, with the exception of two outliners in the intervention phase, which are lower. This suggests that there has really been no change as a result of the intervention over the course of the trial.

Appendix J

Change on the CAMS-R for each participant.

The lack of change prompted further investigation of the measure. Potentially the average score on the CAMS-R was obscuring more meaningful change on some items. Each item was assessed to see how much change there was for responses across each participant. Scores for each item could be a 1, 2, 3, or 4, allowing a change range of 0-3. All items scored a change value of between 1.14 and 1.71. No participants recorded the maximum change of 3 for any items during the trial. 57% of responses represented a change of either 0 or 1, and 43% of responses represented a change of 2. The group average change was 1.41 with a range of 1-1.7.

Table 1. Change on each item of the CAMS-R for each participant.

Change on each item of the CAMS-R for each participant										
Item	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
PC08	1	2	2	2	2	2	1	2	1	2
PC09	1	2	1	2	1	1	2	1	1	2
PC06	1	2	1	2	2	1	2	1	2	2
PC01	2	2	1	2	2	1	1	1	1	2
PC04	1	1	2	0	2	1	2	1	2	1
PC07	1	1	1	2	1	1	1	2	2	2
PC10	1	1	1	1	1	1	1	1	1	1
Item change average	1.14	1.57	1.29	1.57	1.57	1.14	1.43	1.29	1.43	1.71

Table 2. Average change on the CAMS-R for each participant.

Average change on the CAMS-R for each participant	
Participants	Average change
PC08	1.7
PC09	1.4
PC06	1.6
PC01	1.5
PC04	1.3
PC07	1.4
PC10	1
Group average change	1.41 (1-1.7)

Appendix K

Clinician survey results

	Clinician A	Clinician B	Clinician C
What did you notice about your clients' ability to practice mindfulness skills between therapy sessions?	I noticed that client's motivation grew over time. At the beginning, they weren't particularly motivated at all, but once they had tried it a number of times in session, and noticed that it had been helpful, they were more willing. For one client, this happened about 3 months after the end of MINT. However, both clients that were involved in the study that I was working with commented that it was helpful to be reminded by MINT to practice.	It seemed to vary a lot from client to client. Some of them utilised the texts as a reminder, while a few actively ignored them! Most clients were more able to practice when things were going well and this practice dropped off when they became distressed.	There was variation between clients. One found it a little difficult and would be inconsistent with the practice.
Were there any questions that arose during therapy with regards to the text support package? If so, what were they?	Not particularly, because it tended to match the sort of material that we were already covering in therapy (which was helpful I think).	There were surprisingly few questions about the text package. It seemed to work well and it didn't seem to be an intrusion on people's time.	Not particularly. They did not volunteer information unless specifically asked. One client found the messages repetitive, but another found them helpful.
Was there anything significant that you noticed about the way the clients responded to mindfulness components in therapy?	Probably answered this question below. Mindfulness is something that both the clients who participated in the study, practise regularly. It's been interesting watching them both have that moment where they realise that this is a way to come "unstuck" from difficult thoughts, feelings, and sometimes tolerating hearing voices. They've both grasped	A number of the clients were able to fully grasp the concept of mindfulness use it when things were going well. However when distressed they found it much more difficult to practice in session. Some other clients seemed to do the practise by rote without seeming to fully grasp the concept so found it hard to generalise ideas to other situations or	The level of interest and curiosity seemed to determine the way the clients responded to the mindfulness components. The more interested client responded quite positively.

	the principles behind it, been really receptive to the theory and practice, and found their own way of using it.	practices.	
Was there anything significant that you noticed about the clients' levels of engagement in the therapeutic process?	I think it was varied. For one of the clients, he seemed to "get" mindfulness straight away, and for that reason, MINT was a useful add-on for the things that we were exploring in therapy. For the other client, he was having a particularly hard time, and not able to engage much in mindfulness outside of sessions. I think he felt that the texts became invasive for him. He was avoiding his phone a lot anyway, so for him it felt like it was "going off" all the time. He ignored the texts past about the second or third week, I believe. However, now that things are going well, mindfulness is an important part of his daily life, and he sees it as important in managing stress. While the timing was not ideal for him to do the study, it's possible that the texts did communicate that this was something that could help him.	Engagement was good for most clients and I wondered if the text package and in session rating scales helped provide some structure and focus that they found useful.	The one client engaged well with the process and responded very well. The other seemed a little less engaged (although needed it more) and as a result, don't think the opportunity was used to the best advantage/benefit

Appendix L

The importance of research in 'difficult to research' populations, barriers to research, and possible solutions: Learning from the MINT pilot study.

This review critically examines the process of researching in a 'difficult to research' population, from the MINT pilot study. Populations may be considered 'difficult to research' for a number of reasons including, but not limited to, the severity of the mental health issue, difficulty in accessing participants, bio-psycho-social characteristics of the participants, smaller population sample sizes, and the pressure that mental health services are under. Difficulties affecting research were identified in a pilot study investigating the efficacy of text messages to support adherence to existing treatment in an Early Intervention Service setting. The text message package was called MINT, and the research is referred to throughout as the MINT pilot study. Because of the emphasis on Evidenced-Based Practice (EBP) it is important to research in all areas of clinical practice, including groups that may be considered 'difficult to research', such as users of Early Intervention Services. The MINT pilot study highlighted some barriers to research in Early Intervention Services, which may also apply to other studies in 'difficult to research' populations. Possible solutions to these barriers are proposed, which are important for individual researchers, research institutions, service providers and publishers to consider, if the adherence to EBP is to be upheld in psychology.

The importance of research in 'difficult to research' populations

Evidenced based practice. Following developments in medical treatment in the 20th Century, the medical profession has used Evidence-Based Practice (EBP) to ensure the quality and efficacy of treatment (Spring, 2007). More recently the American

Psychological Association has incorporated EBP in its practice guidelines (American Psychological Association, 2005). EBP can be conceptualised as having three core components; best available research, clinical expertise, and patient preference, which taken together can help optimise patient outcomes (Spring, 2007). Empirically Supported Treatment (EST) based on the best available research can then be used to guide treatment protocols as part of the EBP approach (Spring, 2007). High quality research in all areas of psychology is, therefore, desirable so that EBP can be followed to optimise patient outcomes.

Randomised Controlled Trial. Randomised controlled trials (RCTs) have become the 'gold standard' in psychological research, described as "one of the simplest, most powerful and revolutionary tools of research" (Jadad & Enkin, 2007, p.1). RCTs have become increasingly popular over the past 4 decades and are relied on to provide evidence for the efficacy of an intervention. Carey and Stiles (2015) describe how RCTs have shortcomings for understanding how interventions work in applied clinical settings. For instance, unlike medicine, it is acknowledged in psychology that the clients act as 'agents of change', rather than the intervention being the only 'agent of change'. RCTs also rely on random assignment to control for confounds to the experiment, but this requires large sample sizes, which may not be possible for specific clinical populations with rare disorders thereby, limiting this type of research in these areas. RCTs may be very useful for examining simple problems under controlled circumstances, as they focus on good internal validity (Shean, 2014), but they suffer from external validity problems, as mental health consumers often face complex mental health difficulties with high levels of individual difference. In clinical practice there becomes a conflict between the need to tailor treatments to suit the client and the evidence upon which these treatments are based, which rely on stripping away process

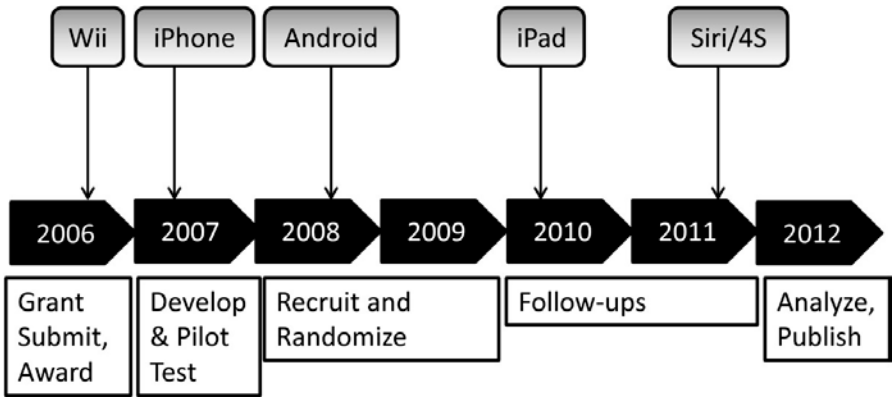
variables and moderators of therapeutic effectiveness through large group samples and randomisation (Shean, 2014). As many as 40 to 70% of mental health consumers may be excluded from research due to restrictive research criteria aimed at improving internal validity (American Psychological Association, 1995; Westen, Novotny, & Thompson-Brenner, 2004).

Analogue and real world studies. A useful definition of the aim of research is that it should be able to answer "what treatment, by whom, is most effective for this individual, with that specific problem, and under which set of circumstances" (Paul, 1967, p.111). Effectiveness studies are also called real-world studies or pragmatic trials and the aim of this type of research is to evaluate an intervention under real-world conditions, with samples that are representative of the clinical population. Traditional research methods such as randomised efficacy trials can take more than 5 years, from enrolment of participants to publication, with trials with negative results taking longer (Ioannidis, 1998). When including grant application, research design, recruitment, trial to publication time can be upwards of 10 years (Riley, Glasgow, Etheredge, & Abernethy, 2013). Figure 1 shows the typical research process in comparison to today's culture of technology (Riley et al., 2013). Time delays in the research process are compounded by the time it takes for research findings to be brought into practice.

Recruitment of participants is a common problem in research, with 90% of clinical trials failing to meet their desired enrolment levels (Weisfeld, English & Clairborne, 2012). Riley et al. (2013) call for "rapid-learning research systems" to make research design rapid, responsive and relevant. With the aim of maintaining scientific rigor while speeding the research process so that findings are relevant. Riley et al. (2013) recommend a flexible intervention testing and optimisation approach, with emphasis on failing early in order to succeed later. Riley et al. (2013) propose that

through using agile development techniques taken from Information Technology software development, research could become more responsive to error and success in the early stages, where an iterative approach could be used to quickly build on gains to provide more useful research outcomes in a timely manner. These approaches could be used in a RCT framework or in alternative research design approaches and the process could be further expedited by networking research ideas and results, and streamlining grant application processes (Riley et al., 2013).

Figure 1. Research trial to publication timeline (Riley et al., 2013).



Summary

EBP can help ensure optimal outcomes for clients, but the method by which research is undertaken can have the inadvertent effect of discouraging research in 'difficult to research' populations. Over reliance on RCTs and longitudinal research methods may exclude research on smaller groups of consumers of mental health services. There are alternative methodologies that may provide empirically sound evidence in the 'difficult to research' populations, however, there is a tension between the need for research in 'difficult to research' populations and barriers to conducting

this type of research. The next section looks at what barriers were encountered in the MINT pilot study, which might also apply to other research in 'difficult to research' populations, and adds suggestions that may help future research efforts.

MINT pilot study

The MINT pilot study aimed to use technology to support therapy already being delivered in an Early Intervention Service (EIS). EIS provide intensive care for patients aged 18 to 34 years, who have experienced at least one psychotic symptom. EIS patients typically have a range of mental health symptoms, varying diagnoses and different treatment regimes. The treatment offered by the EIS often consists of long periods of engagement and rapport building, followed by the introduction of MBCT and Acceptance and Commitment Therapy (ACT) based skills, with therapy typically lasting for 2 to 3 years (Dr J. Clark, personal communication, May 8, 2015). Mindfulness based therapeutic practices are used in EIS in the Auckland District Health Board area, New Zealand, with the aim of reducing the distress caused by psychotic symptoms. Mindfulness Based Cognitive Therapy (MBCT) was developed with the aim of preventing relapse in patients who had recovered from depression (Segal, Williams, & Teasdale, 2013). More recently, research is exploring its application for other mental health disorders, including preliminary studies for the use of MBCT in the treatment of psychosis, although caution is needed in interpreting these positive results due to the small sizes of the studies (Chadwick, Taylor, & Abba, 2005). Mindfulness skills are taught in therapy sessions, but home-based practice is essential to develop the skills learnt (Segal et al., 2013).

Mobile phone technology offers a way to extend the therapeutic connection with these clients with the aim of supporting their home-based practice. There is a small but

growing body of research on the use of text-message technology in health settings. For instance, text messages have been found to reduce the number of missed psychiatric appointments by a quarter (Sims et al., 2012), text messages have been used as an adjunct to support home-based practice in CBT (Aguilera & Munoz, 2011), and to increase compliance with asthma and diabetic medication (Franklin, Waller, Pagliari, & Greene, 2006; Petrie, Perry, Broadbent, & Weinman 2012). Rates of mobile phone ownership are high and the number of text messages sent everyday is still increasing (Nielsen, 2013; Ofcom, 2012). There is little research in the area of psychosis and mindfulness based therapy, limited research on the use of text messages in psychological therapy and no previous research on the use of text messages as a way to support clients with psychotic symptoms. The MINT pilot study aimed to add new information to these gaps in the literature. Eleven participants received MINT in addition to treatment as usual (TAU). The MINT text message programme, used as an adjunct to existing therapy, is a low cost method that can hopefully improve outcomes for these clients, with minimal additional input from the EIS therapists.

Barriers to researching 'difficult to research' populations

There is a benefit to testing interventions in clinical settings, as this allows the real life application of the intervention to be assessed with all the variables and anomalies that clients present included. However, there are difficulties facing researchers that must be understood and addressed. The MINT pilot study identified several issues that were barriers to research, which may be applicable to future studies in 'difficult to research' populations. The issues identified are discussed below and compared to findings from previous research by Furimsky, Cheung, Dewa, and Zipursky (2008), Woodall, Howard, and Morgan (2011), and Heinssen, Cuthbert,

Breiling, Colpe, and Dolan-Sewell (2003). Furimsky et al. (2008) examined recruitment difficulties for participants who have experienced a first episode of psychosis. Woodall et al. (2011) reported on participation barriers and solutions in a Genetics and Psychosis study, while Heinssen et al. (2003) discussed methodological barriers in schizophrenia research.

The MINT pilot study highlighted that when studying 'difficult to research' participants there was a need to adapt the methodology to reduce demands on both participants and clinicians. Given the likelihood of participant drop out and poor adherence to treatment, there was an imperative to decrease the demands on participants. While this is always the case, it is even more important when working with mental health users who are vulnerable. Factors thought to influence drop out in EIS settings include lack of insight; positive symptoms; younger age; male gender; history of substance abuse; low social functioning; and unemployment (Fenton, Blyler, & Heinssen, 1997; Lacro, Dunn, Dolder, Leckband, & Jeste, 2002; Nosé, Barbui, & Tansella, 2003). In the MINT pilot study because of the difficulties accessing clinicians and the strain that clinicians were already under, it was desirable to design a study in such as way as to keep the demands on the clinician as minimal as possible. Several issues impacted on the methodology including, access to participants, recruitment and retention, vulnerability of the participants, small population size, short length of the research, and the use of brief measures. These issues are discussed below with reference to previous research on research difficulties.

Access to participants. Currently in New Zealand, mental health services are under strain (Auditor General Report, 2017). Health Minster Jonathon Coleman stated there are increasing number of clients seeking mental health support, but there is decreased funding available for these services (Brown, 2017). The situation is not only

affecting those currently receiving and administering mental health care but it also effects research. Clinicians may be less likely to want to participate in research if their workload is already high. During this pilot study many clinicians were contacted to see if they were interested in taking part in the research and only one responded positively. Likewise, Fayter, McDaid, and Eastwood (2007), and Ross et al. (1999) found that clinicians were too busy to participate in research as they did not have the capacity to engage in extra work. The MINT study found one interested clinician in EIS who managed to recruit two other clinicians to take part, but despite presentations by the researcher and continued canvasing, other clinicians reported being too busy to participate, were in the process of leaving the service or were on sick leave.

The lack of access to and availability of clinicians affects the ability to research in their areas of expertise. A lack of research in specific areas of mental health decreases the clinician's ability to adhere to EBP, and ultimately compromises the client's access to optimal care. This is especially important in areas that are under researched already, as it makes establishing some evidence base even harder, and yet therapy is still needed and administered in these areas.

University students working on research theses are uniquely placed to carry out pilot studies as they have the time and access to University research funds to carry out small studies. However, due to the pressure to pass the thesis component of their course there may be an implicit pressure to choose research topics that are perceived as being 'easier'. During the process for the MINT pilot study it was suggested to the author to change the study to an analogue approach as it would be easier to access, retain and interpret results using healthy participants rather than participants with mental health issues.

University students are likely to have a lack of contacts in applied settings due to the stage of their career. This can mean making contact with potential participants difficult and relies on the individual researcher to maximise any networking opportunities. Access to participants can also be affected by who the researcher's supervisor knows and there may be a difference in numbers of contacts between a purely academic supervisor and one who also works in clinical practice. In the MINT pilot study approximately 50 clinicians were contacted about joining the research in order to access participants and this approach yielded one positive response. This low return rate may be in part due to the lack of relationship with professionals, which may be a common issue for students and non-clinical academic staff.

Recruitment and retention. Participants in mental health settings frequently have complicated histories, may have multiple diagnoses, or symptoms that overlap different diagnostic categories, and may be taking a variety of medications. All these factors complicate research as they are compounding factors that make drawing causal inference difficult. However, the compounding factors represent the complexity of mental health clients. Research imperatives tend to drive the researcher towards the removal of complicating factors, but this reductionist approach may limit the generalizability and utility of research results.

The MINT pilot study proposed that instead of trying to control and reduce complexity, these factors should be embraced as part of the environment that the intervention will eventually function in. A useful intervention should function despite the complexities of the clients that it aims to help. It was found that barriers that have been identified as issues for treatment were also potential issues for research. Treatment barriers identified were dropping out of treatment (Tuner, Smith-Hamel, & Mulder, 2007) and poor adherence to treatment (Coldham, Addington, & Addington, 2002;

Malla et al., 2006; Novak-Grubic & Tavcar, 2002; Robinson et al., 1999; Verdoux et al., 2000). In initial discussions with the participating clinicians it was estimated that each clinician had 18 potential participants, and that out of the service it was estimated 10 clinicians might participate, leading to a potential participant pool of 180. However, due to the pressures that clinicians are currently under only 3 clinicians agreed to participate in the study giving a potential pool of 44 participants. Due to poor adherence to treatment and drop out from treatment for the mental health clients, only a few were deemed suitable for inclusion in the MINT pilot study and only 11 were then successfully recruited. Two of these participants dropped out of the study, leaving a total participant sample size of nine.

People who are receiving mental health care are frequently experiencing challenging symptoms, which can make activities that normally functioning individuals take for granted difficult. For example, remembering appointments, and, coordinating practical, financial, and emotional means to attend the sessions. Potential participants may still be trying to come to terms with their illness (Furimsky et al. 2008). Fumisky et al. (2008) found that 30% of potential research participants refused any kind of psychiatric service. There are generally low attendance rates for psychiatric appointments, with 20 to 34% of mental health outpatient appointments missed (Magnes, 2008; Mitchell & Selmes, 2007). Irregular participant attendance makes collecting regular data difficult. Treatment clinicians may be focusing on developing rapport with their clients and may worry that participation in research would decrease their therapeutic alliance (Furimsky et al., 2008). The ability of researchers to successfully communicate their research to potential participants is another identified barrier to participation (Woodall et al. 2011).

As well as symptoms and situations of clients that make recruitment of participants difficult, retention of clients, and therefore, participants can also be challenging. Furimsky et al. (2008) identified retention issues including failure to respond to the intervention, experiencing side effects, having additional appointments (as a result of the research), improvement of symptoms and families not being supportive of research or treatment. In the MINT study one client gave qualitative feedback at the end of the survey that while he thought the intervention could be useful, his participation came at a 'bad time' for him in terms of what was happening in his life at that time. The issue of timing was also identified by Woodall et al. (2011) as a barrier to research participation.

Vulnerable clients. The main ethical issue in the MINT pilot study focused on the vulnerability of the participants. The participants concerned had a range of mental health issues, potentially including psychotic symptoms. The levels of stress and impairment experienced by these participants make them 'vulnerable'. The protective factor for this identified risk was the participants' involvement with EIS as part of Auckland District Health Board. The EIS provide an intensive form of therapy to their clients, including their own crisis assessment and response. Participants were supported whilst part of this research by the existing therapy and structure of the EIS. EIS clinicians continuously monitored risk to clients, so any risk that occurred as a result of participation in the study would be identified and responded to by them.

Small n/population. Due to the small population of EIS users, it was likely that the research sample size would be small. The annual incidence of schizophrenia in the general population is estimated to be 1 in 100,000, and from that potential sample only a small percentage may be suitable or willing to participate in research (Häfner & an der Heiden, 1997). A quantitative single case design approach, using ABA and non-

concurrent multi-baseline features was used in the MINT pilot study to analyse the intervention. Single case design studies can be a useful approach when examining participants in real life settings, such as the Early Intervention setting in this study, where it is not possible to recruit the large number of participants required for group analysis. A single case design approach focuses on the analysis of individuals to demonstrate change over a period of time due to an intervention (Engel & Schutt, 2013). It differs from the analysis of groups of participants where individual differences may be obscured (Engel & Schutt, 2013). Kratochwill et al. (2010) state that the single case design is frequently used in clinical psychology and education settings to establish casual inference. The underlying principle in the single case design approach is that it is possible to observe change caused by the intervention over time, when comparing a pre-intervention baseline, to during and post-intervention phases (Engel & Schutt, 2013). The type of question that the single case design can answer is "is the intervention more effective than the baseline condition?" (Kratochwill et al., 2010).

Short length. In the MINT pilot study participants were seeing their clinical psychologist on a weekly basis, one week was selected as the interval between measurements to keep the demands on participants and their therapists to a minimum. To establish baseline functioning, the self-report form was administered three times by the participants' therapist, for a minimum of three weeks. Three measurements were taken in the "A1" phase of the trial to ensure sufficient confidence in the nature of the pattern of scoring. The duration of the baseline phase varied for each participant according to how long it took them to complete the minimum of three measures. The intervention for each participant started once the researcher received the participant's baseline data. The intervention was then administered for 8 weeks, and the self-report form was given weekly during this time. This was the "B1" in the research design. Once

the participants completed the intervention their therapists collected post-intervention outcome measures. The self-report form was then administered three times over a 2-month period after the intervention and this was the "A2" in the research design. This gave a total research period of 14 measurements over a minimum period of 14 weeks. There was no requirement for the A1 and A2 phase to be weekly, which gave increased flexibility in the application of the study in a clinical setting where participants often miss appointments. While there were potentially 8 measures during the intervention, B1, phase of the study, it was not necessary for all 8 measures to be collected. Again this increased the flexibility of the study to keep participants included even if they did not attend every weekly session for the duration of the research. Extending research periods may be a way to increase participant numbers, but may result in a hypothesis that is out-dated by the time results are known (Heinssen et al., 2003). The MINT recruitment period was open for 6 months to increase the number of participants that could be recruited, but financial and practical considerations meant that this period could not be longer. Within the duration of the MINT recruitment process one of the clinicians involved left the service - longer trial periods may also mean that the researcher encounters unexpected changes to services, and treatment providers.

Brief measures. Measures of a brief nature were required as reducing the strain on participants and participating therapists was a key consideration. It was decided in consultation with the EIS clinicians that the weekly self-report form should be approximately 10 to 15 questions and fit on one side of A4 paper. The self-report measured for frequency and duration of mindfulness practice, level of mindfulness skills, and symptoms of depression and anxiety. Three questions were asked to assess the number of days of mindfulness practice each week, the average number of times of practice per day and the average duration of practice. The cognitive and affective

mindfulness scale – revised (CAMS-R) was developed as a self-report measure of mindfulness (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007). The CAMS-R is available as a 10 or 12-item measure; two items have possible construct contamination with rumination, worry, depression and anxiety symptoms and these were removed to develop the 10-item, which the authors recommend and this version was used in this study. The Patient Health Questionnaire–4 (PHQ-4) was selected as a brief, well-validated screening measure for depression and anxiety (Kroenke, Spitzer, Williams, & Löwe, 2009).

The measures were selected to be as brief and well validated as possible to reduce the demands on participants whilst also maximising the usefulness of the research results. It was found that in the MINT pilot study that there was no change in the CAMS-R results when repeated weekly over a 14-week period. There are limited measures of mindfulness skills, and there was a requirement to use a brief measure for participant acceptability, but the CAMS-R may not have been sensitive to change over the course of the trial, or there may have been no change. There was a variation in change as measured by the PHQ-4 over the course of the trial, but not a consistent negative correlation between PHQ-4 scores and total practice; therefore, the research hypothesis could not be supported. It may be that there is no relationship or it may be that this study failed to find an effect. It may be that the ultra brief screening measure was not sensitive enough to detect changes in anxiety and depression symptoms.

Discussion and recommendations

While it is important to conduct research in ‘difficult to research’ populations to help improve EBP, the MINT pilot study identified several barriers to successfully carrying out this kind of work. An understanding of the barriers can lead to increased

awareness and solutions to minimise these difficulties that may impact research results. In the areas of access to participants, their recruitment, and retention there are several viable options to increase participation in research. An important aspect of access to participants identified in the MINT pilot study was the availability of clinicians to help support research (through participant recruitment and data gathering, for instance). The benefits to service providers of research on the efficacy of treatment approaches should be emphasised to encourage the allowance of time for clinicians to participate in research opportunities. Research participation could be introduced at the first clinical appointment as part of the routine introduction with emphasis on the results of research being used to help that population, as this is known to motivate participants and is also of use to clinicians to increase their EBP adherence (Furimsky et al., 2008).

Clinical psychology students are well placed to conduct small but meaningful research in clinical populations. Universities could help support students to undertake 'difficult to research' projects, through encouraging the work as an important contribution to EBP, understanding the issues researchers may face, and providing support and dissemination of knowledge gained through previous research attempts. Access to participants could be improved by Universities developing relationships with clinical service providers in return for clinically useful research to help support the efficacy of those clinical services. The importance of strong relationships between researchers and treatment teams has been identified previously as a solution to research recruitment problems (Furimsky et al., 2008).

Clients may be motivated to become participants in research because of a desire to help, curiosity about their condition and treatment and through having positive experiences as a result of participating in research (Woodall et al., 2011). Considering

these factors in the design stage and communication of research to potential participants may help recruitment and retention.

Increasing the acceptability and support for pilot studies using alternative methodologies to RCTs in hard to research areas would allow more of these studies to be undertaken. Some limitations of small-n research may be aided by the use of multiple sites to be used for the research, and including participants with broad diagnostic criteria (Heinssen et al., 2003). Methodological challenges should be shared, as increasing the acceptability of publishing null or negative results would allow these challenges to be understood and improved upon in future research, emphasising the 'fail early to succeed later' ethos that may allow research in 'difficult to research' areas to flourish. While there is a need for research in 'difficult to research' populations in order to improve EBP for mental health consumers, to overcome the challenges will take changes by individual researcher, research institution, service providers and publishers.

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Appendix M

The CAMS-R

Cognitive and Affective Mindfulness Scale- Revised (CAMS-R)

Please respond to each item by marking one box per row		Rarely/Not at All	Sometimes	Often	Almost Always
CAMS-R1	It is easy for me to concentrate on what I am doing.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R3	I can tolerate emotional pain.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R4	I can accept things I cannot change.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R5	I can usually describe how I feel at the moment in considerable detail.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R6	I am easily distracted. (R)	☐ 4	☐ 3	☐ 2	☐ 1
CAMS-R8	It's easy for me to keep track of my thoughts and feelings.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R9	I try to notice my thoughts without judging them.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R10	I am able to accept the thoughts and feelings I have.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R11	I am able to focus on the present moment.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R12	I am able to pay close attention to one thing for a long period of time.	☐ 1	☐ 2	☐ 3	☐ 4

Scoring: Note that 6 is reversed scored. Sum of all values reflect greater mindful qualities.

Your total score: _____

Retrieved from: https://ogg.osu.edu/media/documents/MB%20Stream/CAMS-R.pdf

Appendix N

The PHQ-4

PHQ-4				
Over the last 2 weeks, how often have you been bothered by the following problems? *(Use "✔" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Little interest or pleasure in doing things	0	1	2	3
4. Feeling down, depressed, or hopeless	0	1	2	3

(For office coding: Total Score T____ = ____ + ____ + ____)

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http://www.phqscreeners.com/sites/g/files/g10016261/f/201412/English_3.pdf