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**Mindfulness-based stress reduction intervention  
in a sample of pregnant women in a rural area**

**S.G.Williams**

**2012**

**Mindfulness-based stress reduction intervention  
in a sample of pregnant women in a rural area**

A research project submitted in fulfilment of the requirements for the degree of

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**Stephen Gordon Williams**



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## Abstract

In this study, nine pregnant women in a rural area were assessed for a range of affective and mood disorders, as well as for coping self-efficacy and use of mindfulness in daily life. A mindfulness-based stress reduction intervention was implemented using “Healing Rhythms”, a commercially available computer-based mindfulness software programme, which uses biofeedback to assist in teaching self-regulation and mindfulness-based approaches for reducing stress. The programme was supplied already loaded onto laptops which were lent to participants for the study. Most participants showed improvements on measures of Trait anxiety and coping self-efficacy, with two participants whose scores at baseline met clinical criteria for depression dropping significantly to a non-clinical score at the end of the programme. Participants were interviewed and most reported satisfaction with using the programme, and a belief that it could be useful for other pregnant women especially where women felt challenged by stressors during pregnancy. The aim of the study was to identify whether a computer-based mindfulness programme for stress reduction would have utility and efficacy in a rural population. The results suggest that there were measureable gains for most participants, and that such a programme could be a supportive and helpful option for rural women who wish to learn how to better manage perinatal stress.

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## **Chapter 1: Introduction**

### **1.1 Stress in pregnancy and the development of stress reduction interventions**

There has for many years been considerable evidence to suggest that women who are unduly stressed whilst pregnant may experience increased risk of premature birth (Lobel, Cannella, Graham, DeVincent, Schneider, & Meyer, 2008), birthing complications (Chung, Lau, Yip, Chiu, & Lee, 2001), or postnatal depression (Whiffen, 1998), with adverse effects that can continue to have an impact postnatally on parent-child bonding and attachment (Anhalt, Telzrow & Brown, 2007). Researchers have also identified potential long-term impacts on the wellbeing of the child even into adolescence (Halligan, Murray, Martins & Cooper, 2007). Over the last decade in particular, these findings have triggered an increasing focus on endeavours to identify stress reduction approaches that can be safely adapted to help manage stress for women during pregnancy (Beddoe, Chin-Po, Kennedy, Weiss, & Lee, 2009; Beddoe & Lee, 2008; Urizar, Milazzo, Huynh-Nhu, Delucchi, Sotelo, & Munoz, 2004; Vietin & Astin, 2008).

### **1.2 Epidemiology of mood and anxiety disorders in pregnancy**

Epidemiological studies and surveys relating to postnatal depression vary in their findings, often due to methodological issues, selection criteria, the screening tools used, or the chosen definition of depression. Lee and Chung (2007), for example, observed that most research relied on populations of white (Caucasian) middle-

class women, and that numerous other variables relating to ethnicity, culture, and socio-economic status are often not considered. An increasing number of meta-analyses of research relating to postnatal depression have emerged over the last ten years, many of which have sought to exclude studies where selection criteria or method have made the results difficult to generalise to the population as a whole. One such meta-analysis, conducted by Robertson, Grace, Wallington and Stewart (2004), was ultimately based on studies with over 24,000 women, and identified perinatal depression, stress and anxiety as being key factors in the development of postnatal depression, also identifying poor social support and previous episodes of depression as significant. Various degrees of prenatal distress can be seen as a risk factor for postnatal depressive disorders, of which there are degrees of severity.

Friedman and Resnick (2009) reviewed and discussed differential diagnosis across mood disorders commonly found postnatally. They identified the comparative normality of the '*baby blues*', which occur for up to 80% of women after giving birth, and are thought to relate to major hormonal changes, coming to terms with a new life-role, and exhaustion. *Post-partum psychosis* occurred but rarely, with one or two cases per 1000 births. Symptoms may include psychosis, mania, confusion and depression, with a range of disorientated and disorganised feelings and behaviours. Although women generally recover, there is a risk of further episodes of *bipolar disorder* thereafter. For those already diagnosed with bipolar disorder, over 66% were found likely to experience a mood disorder postnatally, with the majority of these being a *depressive episode*. *Anxiety disorders* or *Obsessive Compulsive disorders* may also be retriggered or exacerbated by the process of pregnancy and/or childbirth, and Friedman and Resnick also recommended

attention be paid to the possibility of anaemia or thyroid problems for women exhibiting disturbances in mood postnatally. Of all of these, the most common outcome with potentially serious consequences for mother and child is almost certainly postnatal depression.

A major depressive episode has been defined in the DSM-IV-TR as a period of low mood, or loss of interest or pleasure in life activities, sustained over at least a fortnight, with possible changes in weight, sleep pattern, or movement. Fatigue, feelings of guilt or worthlessness, problems with concentration, or recurrent suicidal ideation or thoughts of death may also be present. For a diagnosis of Major Depression five or more of the foregoing must be present, although some researchers have also included minor depression, for which the mood state must have been present for a fortnight, however less than five of the criteria are required (American Psychiatric Association, 2000). It is worth noting that in the course of pregnancy several of the criteria, including fatigue, weight gain, and changes in sleep pattern, are commonly experienced even in the absence of mood difficulties (Friedman & Resnick, 2009), and this does have relevance for measures used in research studies.

Up to 12% of men and 25% of women will experience a major depressive episode in their lifetime (American Psychiatric Association, 2000). Not only do women experience a rate of depression roughly double that of men, but research suggests that they are at the most risk of mood disorders and depressive symptomology during the period of their life when they are likely to be having children and that women caring for young children (under 16 years) are more likely to experience more severe forms of depression (Bebbington et al., 2003). In their review of these issues, Gavin et al. (2005) identified studies that when taken as a whole

suggested that 19.2% of women have experienced a depressive episode in the three-month period after giving birth. Whilst they acknowledge that they used a wide confidence interval, this is a significant figure, and represents a degree of distress experienced by almost one fifth of women with children, that we would do well to ameliorate if at all possible.

Prospective research studies have sought to identify the epidemiology of postnatal depression, as well as risk factors. Giardinelli et al.(2012) recruited pregnant women from a free obstetric course intended to help women prepare for childbirth. Women were between the 28<sup>th</sup> and 32<sup>nd</sup> week of gestation, and 590 women participated. They found that scores on the Edinburgh Postnatal Depression Scale (EPDS) suggested depression more often than the results of a structured clinical interview (SCID-1) and hypothesise that it may be easier for women to express their true feelings with a screening tool, rather than in a face-to-face interview. They noted that many of their participants were first time or young mothers, and that anxiety relating to a first birthing and parenting experience could affect the results somewhat. They found also that the presence of pre-existing psychiatric disorder prior to pregnancy was a major risk factor for anxiety and mood disorder in the last trimester, and hypothesise that withdrawal from medication due to fears of teratogenic risk could be a factor. They also found that the strongest risk factor for developing a postnatal depressive episode was the onset of a mood or anxiety disorder during the antenatal period, and that for women with previous history of mood or anxiety disorders, there was a considerably heightened risk of postnatal depression.

Banti et al. (2011), sought to estimate prevalence, incidence, recurrence, and onset of new episodes of perinatal depression. They noted that studies vary in using

either Major Depressive Episode criteria, or may include minor depressive episodes, with some relying simply on elevated depressive symptoms. For their research they relied on Major and Minor Depression as in DSM-IV-TR criteria, with participants drawn from the entire population of pregnant women presenting to local health services in Tuscany, Italy between February 2004 and March 2007. Using the EPDS and a structured clinical interview for assessment they found that 2.2% of participants developed a new depressive episode during pregnancy, whilst 6.8% developed postnatal depression. It was also found that 3.7% of women with previous depression had a recurrence during pregnancy, and 7.7% of women with previous depressive history developed depression postnatally. The prevalence of depression across participants was found in this study to decline through the three trimesters; however, the researchers attribute this to treatment that was provided for any women identified as having mild or major depressive symptoms. Overall, they found that a previous anxiety disorder, low socioeconomic status, and multiparity (multiple pregnancy) were most often associated with developing a depressive episode during pregnancy.

In their 2004 meta-analysis, Bennett, Einarson, Taddio, Koren & Einarson (2004) sought to identify meta statistics for the prevalence of depression occurrence during pregnancy by trimester. Studies included primarily relied on the EPDS, BDI, structured clinical interview for DSM-IV, and the Schedule for Affective Disorders and Schizophrenia – Pregnancy and Postpartum Guidelines. In the collated studies involving altogether 12,284 participants, they found depression occurring for 7.4% in the first trimester, rising to 12.8% in the second trimester and 12% in the third trimester. This study does not make mention of any included studies that provided treatment to participants, and so may be providing a slightly

more accurate figure for overall incidence of depression in an untreated general population. They observed, however, that some of the studies relied on women presenting to clinics and being found to have depressive conditions, so those studies may have had sample bias.

Freed, Chan, Boger and Thompson (2012) observed that in the USA there is often little to encourage the routine screening of mothers postnatally by health professional such as paediatricians when new mothers attend clinics, since if the individual does not have their own insurance to cover treatment for postnatal depression, the provider is unlikely to be reimbursed for any treatment provided. The consequent ethical dilemma appears to be avoided in many cases by simply not screening for postnatal depression. This would appear to have significance for the validity of statistics drawn on in some studies from the USA relating to perinatal and postnatal depression, since if clinicians avoid screening in order to prevent non-reimbursable expense, then the true figures may be higher than commonly cited in American literature. Depending on the sources of data therefore, some studies may report figures slightly higher than will be true for the population as a whole, others somewhat lower.

Csatornai, Kozinszky, Devosa, Toth, Krajcsi, Sefcsik and Pal (2007) conducted research into vulnerability to depression. Their retrospective study was based on outcomes from a 24-item questionnaire given to 1656 mothers post-birthing. In common with some other studies, they found that the more children a woman had, the less likely she was to develop depressed mood. Living in smaller townships or villages, however, and living in outlying areas were both associated with higher risk of postnatal depression.

### 1.3 Stress and Anxiety

In reviewing literature in the area of perinatal mental health it is apparent that many researchers appear to suggest possible links between prenatal stress and anxiety, and subsequent postnatal depression. (Lobel et al., 2008; Gotlib, Whiffen, Wallace and Mount, 1991; Robertson et al., 2004). Whilst severe stress may be associated with anxiety, which unresolved may precipitate a depressive episode, there are some differences that may usefully be set out as to how stress and anxiety are being defined for the purposes of this study.

#### *Stress.*

Research has found that women who were pregnant released higher levels of cortisol, a stress hormone, when they were exposed to a high level of daily “hassles” in early pregnancy, or when during their second trimester they were highly fearful of the impending birth. Arguably they were experiencing inescapable life situations that in some measure they were experiencing as fear-inducing, and where flight might have been desirable were it possible.

Lovibond and Lovibond (1995) described stress as a “persistent state of over-arousal which reflects continuing difficulty in meeting taxing life demands” (1995, p.33), and suggest that the stress scale in their Depression Anxiety and Stress Scale measures the level of this, where an individual is experiencing distress or frustration which is over their tolerance threshold. (Lovibond & Lovibond, 1994).

Lobel et al. (2008) identified that stress in pregnancy may be somewhat different to ordinary life stress, noting that some researchers use a definition of prenatal maternal stress (PNMS) defined as “the aggregate of negative emotional state and

stressful events or conditions during pregnancy” (p.604), and in some cases have included the pregnant women’s perceptions or appraisals of their circumstances. They note that in pregnancy, women are exposed to a number of pregnancy-specific stressors, which may include worries about parenting, strains in their relationship, physical symptoms and changes to their body, as well as anxiety about the birthing process and the well-being of the developing baby.

Littleton, Bye, Buck & Amacker (2010) conducted a meta-analysis of research focussing on stress in pregnancy, excluding all studies which also related to anxiety or depression. They found that stress alone had a negligible impact on the levels of risk for negative perinatal outcomes. In particular, minor stresses were found to have little impact, but they noted that major life events (unspecified) which were identified by mothers as stressful were more likely to be linked to low birth weight and lower neonatal weight.

#### *Anxiety.*

Spielberger et al. (1983) described Trait anxiety as the degree to which individuals perceive stressful situations as dangerous or threatening, which affects the intensity of their anxiety response. Trait anxiety was seen as a reflection of the individual’s previous experience of anxiety-inducing situations, and the likelihood that they would perceive a situation as dangerous or threatening and so become anxious. State anxiety can be described as the degree of incident-specific anxiety: the internal reactions experienced by the individual in response to a given stressor, event, or threat.

Clarke and Beck (2010) define anxiety as:



“a complex cognitive, affective, physiological and behavioural response system (ie., threat mode) that is activated when anticipated events or circumstances are deemed to be highly aversive because they are perceived to be unpredictable, uncontrollable events that could potentially threaten the vital interests of an individual.” (p.5).

We know that pregnancy can be experienced as a stressful time for many women, with increased levels of anxiety pertaining to relationships with partners, how having a new baby will impact on their life, and anxieties relating to the health of the baby, both before and post-birth (Lobel et al., 2008). The question therefore, is how these anxieties and stressors may impact on mothers, and whether those impacts are related to postnatal depression.

#### **1.4 Stress in pregnancy and the development of postnatal depression**

Whiffen (1988) conducted a prospective study with 115 pregnant women, with measures completed at 35 weeks of gestation and again postnatally. She found that postnatal depression was consistently linked with relationship issues, cognitive vulnerabilities, and experienced stress both during and after pregnancy, with relationship satisfaction and symptoms of depression prenatally being predictive of a subsequent diagnosable postnatal depression. Levels of stressful life events prenatally were predictive of symptoms of postnatal depression, as were difficulties with the new baby; however, these relationships were not sufficiently strong to be regarded as diagnostically predictive.

Gotlib, Whiffen et al (1991), also found that higher stress in pregnancy can be linked to postnatal depression. They recruited 730 pregnant women in a

prospective study that took measures at 23 weeks of pregnancy, then again at one month postnatally. They found that poor marital relationships, higher stress, and avoidant coping strategies correlated with subsequent postnatal depression, as well as poorer perceptions by the woman of the quality of her own parents' care for her as a child. This study also found that postnatal depression appeared to correlate with symptoms of depressed mood during pregnancy, and tended to confirm Whiffen's (1988) observations relating to stress, cognitive vulnerability and relationship issues, although Gotlib et al. found that marital discord tended to develop prior to symptoms of postnatal depression and was predictive of it.

Terry, Mayocchi & Hynes (1996) proposed a model for the likelihood of women developing postnatal depression, that was based around the availability of coping resources, experienced stress, and use of coping strategies. Their prospective study in Brisbane, Australia, used measures taken in the last trimester, and then one month and five months postnatally. Their findings suggested that those with an internal locus of control, who perceive that through their own actions they can affect the environment and their ability to manage stress, are less likely to experience postnatal depression; that high levels of experienced stress are associated with increased risk of postnatal depression, and that more effective use of problem-focussed coping strategies may help to prevent postnatal depression. They also found that having a temperamentally difficult baby was associated with an increase in symptoms of postnatal depression at the one-month postnatal measure.

Golbasi et al (2010) conducted a study of depressive symptoms prenatally in Turkey, recruiting 258 pregnant women who were screened with the EPDS. They found that women 30years or over tended to have higher scores, as did women

who were having unplanned pregnancies. Where women perceived that they had little or poor social support, there was a significant correlation with prenatal depression. Whilst their study as published did not provide follow up data, other authors note that anxiety and mood disorders prenatally tend to be predictive of postnatal depression (Giardinelli et al., 2010).

Giardinelli and others (2012) conducted a study with 590 pregnant women in Italy. Women were screened at 7 months gestation as well as postnatally, using EPDS, the STAI-Y and the SCID-I, as well as an interview covering psychological, sociodemographic and obstetric issues. The study found a wide range of anxiety and mood disorders were present when the women were first screened, as well as during the first three months postnatally. The study identified 21% of participants as having symptoms of depression in the last trimester; however, the author notes that a high percentage of participants were first-time mothers, and observed that often anxiety regarding the impending birth can be higher in women who have never previously given birth. The principal risk factors for postnatal depression were found to be anxiety and mood disorders.

### **1.5 The effects of stress and depression on child development**

Littleton et al. (2010) observed that there are several ways in which maternal stress can lead to negative outcomes, including the triggering of corticotrophin releasing factor, which can trigger early birthing; and catecholamine release which may be related to poor foetal growth.

In a prospective study of 230 pregnant women, Buitelaar, Huizink, Mulder, Robles de Medina and Visser (2003) collected seven saliva samples on one day in

each trimester to measure cortisol levels, and used questionnaires to measure daily 'hassles', fears and concerns, and perceived stress. They found that high levels of stressors in the first trimester, or strong fears in the second trimester about giving birth, correlated with lower scores for mental and psychomotor development, for infants when assessed at 8 months of age. This study supports the hypothesis that when stressed, mothers' stress hormones enter the circulation of the foetus, and downregulate glucocorticoid receptors, also possibly exerting a toxic effect on the developing cells of the hippocampus. This then results in permanent neural changes in the developing child.

Anhalt et al (2007), also discussed the effects of perinatal stress in mothers, focussing on the subsequent relationship between the mother and child, and the emotional and behavioural patterns exhibited by children several years after birth. Their prospective study used interviews and psychometric measures with 948 mothers one month after giving birth, then followed up with Child Behaviour Check Lists (CBCL) when the children were 6 years of age. They found significant associations between mothers' levels of stress postnatally, and children's adjustment six years later as assessed with the CBCL. Of particular interest was their finding that higher levels of parental stress and maternal depression shortly after birth were associated with elevated internalising problem scores for the children on the CBCL, at 6 years of age. Where mothers had higher levels of depression but less social support, children were more likely to also have higher externalising problem scores on the CBCL when 6 years old.

Lobel et al., (2008) conducted prospective research with 339 women to explore the impacts of pregnancy-specific stress and prenatal health behaviours. They define pregnancy-specific stress as deriving from various issues, including

physical changes and symptoms, worry about parenting, relationship problems, anxiety about birthing, and worry about the health of the baby. Where they identified pregnancy-specific stress, they found a correlation with preterm births, and lower birth weights. Littleton et al. (2010) also identified lower neonatal weight and the risk of low birth weight as the only two outcomes of statistical significance across all studies in their meta-analysis.

Field, Diego and Hernandez-Reif (2006) conducted a review of research which explored the effects of prenatal depression on the developing foetus, and subsequently the child post-birth. Research was found which indicated that the foetuses of depressed women have a more rapid heart rate, move more, are physiologically more reactive, and their vagal tone tended to reflect that of the mother. In another study, Diego, Field, Hernandez-Reif, Schanberg, Kuhn and Gonzalez-Quintero (2009) found that the newborn babies of depressed women had elevated cortisol and norepinephrine, whilst having lower dopamine levels. These biochemical profiles tended to correlate with the biochemical profiles of their mothers, who typically also had higher prenatal cortisol levels. Findings also indicated that prenatal depression in mothers from the start of the second trimester onwards was associated with greater incidence of premature birth, and slower foetal growth, resulting in babies with a low birthweight.

Stress and anxiety during pregnancy are clearly risk factors for the development of prenatal and postnatal depression, but the foregoing studies also suggest a correlation with decreased maternal and infant wellbeing both during pregnancy and postnatally. Various approaches have been utilised to measure stress and anxiety, including a variety of interview and psychometric tests, with some researchers utilising direct measurement of stress hormones with saliva or blood

samples. Having identified concerns relating to maternal stress and anxiety, it seems appropriate to identify ways in which interventions can assist with reducing or managing adverse outcomes.

## **1.6 Mindfulness in a therapeutic context**

Urizar and others (2004) conducted a pilot study with 41 women, measuring cortisol levels during pregnancy and then using a simple instruction to have a ‘stress reduction’ day. They found that this significantly lowered stress, symptoms of depression and cortisol levels for a one-day period. Other researchers have extended this study, with interventions over several weeks, such as Vietin and Astin’s (2008) study using a mindfulness-based intervention, which was also found to significantly reduce anxiety and negative affect.

Over the last 30 years there has been increasing interest in mindfulness as a component of treatment for a number of clinical disorders including depression, social phobia, chronic pain, and trichotillomania (Singh, 2010; Kang & Whittingham, 2010); and in some cases as a primary form of treatment in its own right, such as in mindfulness-based stress reduction (MBSR) (Kabat-Zinn, 2003). Literature relating to the use of mindfulness in treatment refers to a number of possible approaches to including mindfulness in psychosocial treatments, including the mindfulness skills taught as part of the Dialectical Behaviour Training programmes associated with Marsha Linehan (Dimidjian & Linehan, 2003); the Mindfulness Based Stress Reduction (MBSR) programme of intensive mindfulness training as devised and used by Jon Kabat-Zinn at the University of Massachusetts Medical Centre (Kabat-Zinn, 2003); Mindfulness-Based Cognitive

Therapy (Teasdale, Segal, Williams, Ridgeway, Soulsby & Lau, 2000), and a number of other approaches discussed by Baer in her review (Baer, 2003).

Mindfulness has historically been part of many spiritual and religious contemplative traditions, from the wandering ascetics of the Hindu traditions to the silent monastic orders in Christianity. Silent prayer and mindful concentration continue to be practiced within Christian settings, yet mindfulness as a spiritual practice tends overwhelmingly to be associated with Buddhism, perhaps because it is the major practice in that tradition, and has been for around 2,500 years (Elliott, 1993; Kang & Whittingham, 2010; Walls, 1984). Given such a period of specialised focus on mindfulness, it is unsurprising that when mental health practitioners sought to use mindfulness approaches to assist their clients, it was to Buddhist teachings that they primarily turned.

Grabovac, Lau and Willett (2011) proposed making a clear distinction between pure Buddhist practices, and the psychological models of mindfulness used in therapeutic settings, seeking to explain how these models effect change and what takes place. They acknowledge the Buddhist terms of attachment and aversion, and suggest that as thoughts arise in the mind, individuals' emotional state responds to their reactions of avoidance or desire, with a third possible response of neutrality. Thoughts are seen as transient, and will pass in time (impermanence). Lack of awareness of attachment or aversion will lead inevitably to suffering, and thoughts are not tangible, they have no personal nature as an entity: they are "not-self". Mindfulness is therefore defined by Grabovac et al., as the "moment-by-moment observing of the three characteristics (impermanence,

suffering, and not-self) of the meditation object” (p.4). In this context, the meditation ‘object’ is less likely to be a tangible item such as an icon, but more commonly would be a thought or belief which is the focus of attention.

Kang and Whittingham (2010) define mindfulness as “a moment-to-moment application of bare attention that neither linguistically nor conceptually elaborates on the bare facts of observed experience” (p.5). Across practitioners there are numerous variations in the definition of mindfulness, which is inevitable given that even within spiritual traditions there are variations of emphasis, style and beliefs regarding the practice of mindfulness. Almost all the psychological models of mindfulness are based on this system of mind-training and philosophy that has formed part of the eastern mystical tradition for many centuries (Grabovac, Lau & Willet, 2011; Kang & Whittingham, 2010; Singh, 2003). Kang and Whittingham observe that the Buddhist tradition of mindfulness has considerably more depth than the conceptualisation and use of mindfulness within clinical psychology. Whilst this is undoubtedly true, there are common elements in the practice of mindfulness that lend themselves to being used in the course of focussing on the breath, walking or sitting, and in focussed attention, and it is these elements that are most often drawn on in a psychology context (Kang & Whittingham, 2010).

Dimidjian and Linehan (2003), note the disparate approaches to mindfulness training, but suggest that despite this variety, there is a great deal of commonality in the clinical models that rely on mindfulness approaches. They specify three primary ‘qualities’ needed across all approaches when practicing mindfulness in a clinical context, namely:



(1) Observing, noticing, bringing awareness; (2) describing, labelling, noting; and (3) participating. (p.166)

They also identify three qualities related to the way in which these activities are carried out, notably

(1) Non-judgementally, with acceptance, allowing; (2) in the present moment, with beginner's mind; and (3) effectively. (p.166)

In their discussion of what is 'effective', Dimidjian and Linehan consider the religious and spiritual origins of mindfulness training, and they also identify that for clients, what is effective may depend on their level of wellness at the time. They raise as a concern, however, the possibility that some aspects may be lost when those espousing its use as a therapeutic tool have no personal practice of mindfulness. They also express some concern at the possibility of "drift" (p. 170) as over time more therapists begin to use mindfulness approaches, without any formal criteria for competence at this stage. The developers of Mindfulness-Based Stress Reduction (MBSR), one of the increasingly popular treatment approaches, clearly identify with this concern, and there is an insistence in this modality that clinicians should be well-trained and experienced in mindfulness (Kabat-Zinn, 2003).

## **1.7 Mindfulness-Based Stress Reduction**

Jon Kabat-Zinn is one of the principal figures involved in the development of Mindfulness-Based Stress Reduction (MBSR) as a treatment approach in its own

right. A significant advocate for the utility of mindfulness-based interventions, he expresses the view that clinicians who plan to use mindfulness approaches in their work should have a sound personal knowledge and experience of mindfulness practice (Kabat-Zinn, 2003). He believes that the level of depth needed for instructing in MBSR requires potential instructors to have deepened their own knowledge, ideally through attending Buddhist meditation retreats, as well as having had personal teaching from experienced MBSR teachers. He observes that the aim of MBSR is not to teach Buddhism, but to draw on effective mindfulness approaches from that spiritual tradition, and that knowledge of the tradition informs skilful use of its practices.

In MBSR, participants first attend a free pre-programme orientation session to enable them to get a sense of what the programme is about, have a first experience of mindfulness, and meet their tutors. The programme itself then consists of 8 weekly sessions, each of 2 ½ hours, with a one-day weekend retreat after week 6, to make 31 hours of tutoring in total. The programme includes guided mindfulness practices, stretching and mindful yoga, with daily assignments, guided mindfulness exercises and practices (tapes or CDs are provided). There are also group mindful communication exercises (Kabat-Zinn, 2003; Santorelli, 2012).

MBSR has been used as a treatment protocol in a number of trials, which have reported varying rates of success attributed to the mindfulness intervention. An early study involved the use of MBSR in conjunction with light therapy for moderate to severe psoriasis (Kabat-Zinn, Wheeler, Light, Skillings, Scharf,

Cropley, Hosmer & Bernhard , 1998). Psoriasis was selected as it has been long-established that stress can potentiate or underlie this skin condition. Thirty-seven participants undergoing light therapy were divided into treatment and non-treatment groups for the MBSR component, which was delivered via tape recordings during the phototherapy sessions. The researchers found that participants using the MBSR tapes experienced clearing of their skin condition 30 or 40 days earlier than the control (no-treatment) group, who only received the photo-therapy. Despite all drop-out data being included in the 'not cleared' group, the differences were still clinically and statistically significant. The authors note that unlike some therapeutic mindfulness interventions, the element of social support is not present in this study as the intervention is delivered via tape recordings, a variant on the usual MBSR interventions. This research lends itself to the idea that mindfulness interventions may not need the physical presence of a therapist, a concept that is worthy of further testing.

In a study of MBSR as an adjunct to other treatments, 10 men who had been treated for prostate cancer, but who were showing a continued rise in prostate-specific antigen (PSA), were placed on a special diet, with support for diet and increasing their exercise, with MBSR as an integral part of this intervention (Saxe, Hebert, Carmody, Kabat-Zinn, Rosenzweig, Jarzowski, Reed & Blute, 2001). PSA measurements prior to the intervention were taken from medical records. Findings were that across all participants, the rate of PSA doubling reduced considerably (to about a third of its previous rate), and 3 of the men had a significant decrease in PSA. This study did, however, involve participants in a supportive group setting, with individual support people and a highly supportive treatment team.

There was also no control group, and it is difficult to separate the MBSR element from the diet and social support elements in this study. Nonetheless, overall findings were positive, and it is at least suggestive that MBSR may have something to offer as a treatment adjunct for serious medical conditions.

A trial by Davidson, Kabat-Zinn, Schumacher, Rosenkranz, Muller, Santorelli, Urbanowski, Harrington, Bonus, and Sheridan, (2003), sought to identify not only the extent to which MBSR could improve immune response function, but also to establish to some extent the brain area responsible for achieving this. A randomised controlled trial was conducted with 41 participants. One group was provided with an 8-week MBSR mindfulness programme and then given a flu vaccine. The control group was wait-listed, and later given the flu vaccine then the course. It was found that those in the pre-vaccine MBSR group demonstrated increased activation of the left-sided anterior temporal areas of the brain, when measured through EEG analysis, and that this correlated to a larger rise in antibody production as measured through drawing blood, than the wait-list group. The findings were consistent with the previous research, and taken as a whole these studies are suggestive of mindfulness-based approaches to stress reduction as having positive effects on biochemical responses to stress, and similarly positive effects on the body's immune response functioning.

Goldin and Gross (2010) investigated the utility of MBSR in reducing anxiety symptoms for 16 participants with social anxiety disorder (SAD). They identified that clients with SAD tend to over-focus on internal cues such as negative thoughts, as well as external cues such as the facial expressions of others. This

tends to perpetuate the anxiety symptoms as habituation does not occur.

Participants were subsequently tested with challenges involving the presentation of negative self-beliefs, as well as other tasks requiring attention. After MBSR, participants reported less negative emotions than at baseline when using the MBSR techniques, but when using a distraction technique involving counting no effect was reported. Functional MRI scans were also carried out during testing, and at the end of the trials a significant decrease in amygdala activity was seen, even before the participant was cued to use the MBSR strategies. It was suggested by the researchers that explicit shifts in attention regulation were possibly becoming automatic, implicit processes, with potential implications for long-term change.

Koszycki, Benger, Shlik & Bradwejn (2007) conducted a study to compare the efficacy of MBSR with Cognitive Behavioural Group therapy (CBGT). A group of 53 clients with severe and longstanding SAD were randomly allocated between the two groups, and assessed at baseline and completion. MBSR was found to produce “robust improvements in social anxiety symptoms”(p.2524) and whilst not reducing symptoms of SAD as much as CBGT, it rated equally in terms of improvements to personal functioning, mood, and sense of well-being.

Evans, Ferrando, Carr and Haglin (2011) ran an 8 week MBSR programme with college students at a medical college. Interestingly their group of participants scored with similar levels of distress to samples of psychiatric outpatients at baseline. At completion, they reported significant reductions on many of the measures’ subscales relating to symptoms of distress, so that the profile of the

participants shifted to more closely match a normal population sample. At the completion, scores on the MAAS also increased significantly, suggesting that mindful awareness in daily life had increased.

Delivery of an MBSR programme to patients of an inner-city medical practice (Roth and Tae-Wol, 2002), focussed on 47 established patients who had been attending the practice for at least one year. In a pre-post study, medical charts were reviewed for one year either side of an 8-week MBSR programme provided in Spanish and English. Patients completing the course provided in Spanish were found to have less overall visits to the practice subsequently, and less chronic care visits after the course than before. Of those who completed the course in English, 11 long-term patients did show a reduction in chronic care visits, but a rise in total visits, and when taken together with 8 more recent patients, a rise was seen across all types of visits, an interesting difference in outcome that the authors hypothesis may be due to healthcare providers scheduling regular monthly or bimonthly appointments for patients with chronic health conditions. Since subjects reported improved health and quality of life post-study, it would be interesting to assess these outcomes perhaps in terms of the seeking of appointments, rather than the attending of appointments that had already been scheduled.

Grossman, Niemann, Schmidt and Walach (2004) carried out a review of 64 MBSR studies, with meta-analysis of 20 of these which met criteria for quality, and relevance to claims of benefits for future health based on an MBSR intervention. Findings suggested that MBSR showed utility as an intervention across a broad range of chronic disorders, with potential to assist with distress and

disability, as well as stress and more serious disorders. The authors note, however, that at the time of this review, many of the studies available had no figures available relating to long-term follow-up, and details of rate of drop-out or other concurrent interventions were either not provided, or insufficient in detail.

MBSR has also been used by other researchers in conjunction with longer-established therapies. Teasdale et al. (2000) developed a variant of Cognitive Behaviour Therapy (CBT) which draws on elements of MBSR to assist patients to become more mindful of their negative thoughts and feelings, and to respond in ways that enable them to disengage from depressive ruminations more easily. Outcomes in their controlled trial comparing this Mindfulness-Based Cognitive Therapy (MBCT) to CBT (a treatment-as-usual cohort), they found that MBCT was particularly effective with those who had experienced a major depressive episode on three or more occasions, reducing occurrence of relapse by between a third and one half of the participants who were in the MBCT cohort, as against the treatment as usual cohort.

Fjorback, Arendt, Ornbol, Fink & Walach (2011) conducted a systematic review of MBSR and MBCT randomised controlled trials. They found that MBCT was found to be superior to treatment as usual, and reduced the risk of relapse in patients with three or more episodes of depression. MBSR was superior to wait-list control groups in improving mental health for those who chose this intervention, and in 7 studies MBSR significantly reduced client perceptions of stress and distress compared to a control group. In 6 studies improvements were found in levels of anxiety. MBSR was also found to help reduce symptoms of

anxiety, depression and distress in clinical populations. MBSR was found to be a “well-established” therapy under the APA guidelines. This ability of mindfulness based treatments to effect changes in anxiety and perceptions of stress makes it of significant interest when seeking to identify a safe and gentle treatment approach for pregnant women, especially where perinatal mood or anxiety disorders may exist.

In a meta-analysis of MBSR interventions with healthy populations, Chiesa and Serretti (2009) sought to clarify the possible benefits for those without a current health condition. They found that MBSR had a significant positive effect compared to wait-list conditions, although these positive effects were non-specific and it was not possible to identify what the specific effects were. Significant reductions of stress were found, 50% greater than wait-list, and measures of a range of disorders including depression, anxiety, and obsessive compulsive problems, were also found to show improvement. This analysis supports the hypothesis that even in a normal, healthy population, mindfulness approaches may be equally effective in significantly reducing stress as in a clinical population.

Keng, Smolski and Robins (2011) reviewed three areas of empirical literature relating to mindfulness: correlational, intervention, and experimental laboratory research papers. They found that correlational research identified meditators as having an overall higher degree of wellbeing, and much lower levels of emotional regulation problems and psychological symptoms. Levels of positive affect were higher, the meditators had more vitality, increased life satisfaction, and low levels of negative affect compared to non-meditators. In controlled studies they found



that participants in MBSR studies recorded increases in left frontal brain area activation, seen as indicating positive affectual states, increased activation in brain areas associated with present-focussed reference to the self, and reduced activation in brain areas relating to cognitive elaboration, reappraisal, and processing of concepts. Laboratory studies on the impact of mindfulness in assisting with mood regulation found that when applied in the observing and accepting of emotional responses, subjective anxiety and avoidance appeared to be reduced, particularly in individuals who showed high sensitivity to anxiety or who were emotionally avoidant. It was considered that those with panic disorder would also benefit.

There is an increasing amount of research being done in the area of mindfulness interventions, with evidence to support efficacy in reducing stress and assisting with mood and anxiety in clinical and non-clinical populations. Some of the foregoing research posits change in brain activation, and there is evidence to suggest possible on-going benefits as these changes become internalised and sub-conscious responses. Given the weight of evidence for the efficacy of mindfulness interventions, the question that naturally arises in this context is: in what ways can these approaches be utilised for women who are pregnant?

## **1.8 Stress reduction and mindfulness during pregnancy**

Researchers have begun to investigate ways in which these promising results from the application of mindfulness approaches could be used with women during pregnancy. Given the awareness that excessive stress can be unhelpful for both mother and baby, Urizar et al.(2004) researched ways to reduce the levels of

stress-related cortisol in expectant women. They devised and conducted a pilot study in which participants' cortisol levels were measured using saliva swabs twice daily. During the period of the study, participants were instructed to take one day as a stress reduction day, and were told to *"Eliminate things that are stressful and/or participate in things that increase your level of relaxation"* (p.277). They found that women following this simple instruction were able to successfully lower cortisol levels and perceived themselves to be less stressed. Whilst not a mindfulness approach per se, this study clearly showed that deliberate self-talk and actions to reduce stress could prove effective in changing an individual's stress-related biochemistry.

Mindfulness approaches to stress reduction are likely to be even more effective than a one-day intervention, as they typically teach skills that can be used on an ongoing basis. Research carried out primarily in the United States (Vietin & Astin, 2008; Duncan & Bardacke, 2010, discussed post) is beginning to demonstrate that mindfulness approaches to stress reduction can be efficacious in reducing stress in pregnancy, and that these effects may go on to affect post-birth mother-child bonding, and even the closeness of the couple relationship itself, in the post-birth period.

Beddoe, Yang, Kennedy, Weiss, & Lee, (2009) examined Iyengar yoga techniques coupled with a MBSR approach for pregnant women, calling this "mindful yoga" (p.311). 16 participants over the age of 18 years and expecting a first baby took part. Exclusion criteria used to establish a non-clinical participant demographic included excluding those with existing poor mental health, and some other medical conditions including back pain. Weekly sessions included a body-scan technique, sitting meditation, Iyengar yoga, and walking meditation. There

was no control group, however psychometric tests including the PSS-10 and State-Trait Anxiety Index were used. There was no significant change in State anxiety for any participants, in fact a slight increase for those in the 2<sup>nd</sup> trimester. Trait anxiety was found to have reduced significantly after the programme for those in their third trimester, and perceived stress reduced in all participants. It is difficult in this trial to separate the effects of the yoga from the effects of the mindfulness training alone, which potentially confounds the results as far as mindfulness alone is concerned, and given the rigorous exclusion criteria, it may be difficult to generalise from this study to a normal population, where some previous health conditions, or back pain during pregnancy may in fact be the norm.

Vietin and Astin (2008) also sought to create an approach to stress reduction in pregnancy that drew on and blended different traditions and approaches. Drawing on MBSR, Mindfulness Based Cognitive Therapy (MBCT), and Acceptance and Commitment Therapy (ACT), they developed the “Mindful Motherhood” intervention. Mindfulness was cultivated by focussing on thoughts and feelings using contemplation and awareness of breath, as well as guided body awareness, mindful hatha yoga, and educational information regarding acceptance and self-awareness as used in psychological approaches to mindfulness. Earlier sessions provided more education, with later sessions focussing more on discussion and experiential exercises. Women were encouraged to include awareness of the foetus in their body-scan exercises, and there was greater use of mindful movement and walking practices than normally found in MBSR alone.

Participants attended 2 hour group sessions for 8 weeks, supplemented by weekly

readings, and were also provided with a CD containing 20-minute guided meditations for them to use at home daily. This trial found a significant reduction in anxiety and negative affect among pregnant participants who received the training. This study used a control group, who were 'wait-listed' for the intervention. The results suggested significant decline in anxiety and negative affect for the study group, compared to the control group, and a three month follow-up suggested that improvements were sustained over time.

Another programme specifically adapted for use in pregnancy from MBSR is the Mindfulness-based Childbirth and Parenting (MBCP) programme. Duncan and Bardacke (2010) developed this model that also provides contextual information about how to integrate mindfulness with the process of pregnancy, childbirth, and caring for an infant. In an uncontrolled pilot study, participants needed to commit to 3-hour group sessions weekly for 9 weeks, with one 7-hour day retreat, and a further class reunion session once all the women had given birth. The participants were also asked to commit to using 30-minute guided meditation CDs for six days of each week, for the duration of the course. Ideally participants were encouraged to attend with their partner. There was also a recommended textbook and workbook, along with the CDs. The study used four separate cohorts, with a total of 35 pregnant women in the 2<sup>nd</sup> or 3<sup>rd</sup> trimester of pregnancy. The trial found a significant reduction in appraisal of stress, a decrease in pregnancy-related anxiety, less reactivity to stressors during pregnancy, labour and postnatally, and a significant increase in positive affect. Participants also used mindfulness as a coping strategy in subsequent stressful family situations, and this was reported by them to be helpful to their wellbeing.

In all of the foregoing mindfulness training programmes, the group approach used by researchers undoubtedly made best use of researchers' time; however, all required a great deal of time commitment from the participants, and it is possible that many in a general population could find this a barrier to taking up such an option. In a rural setting particularly, the time and distance taken to travel to a central location could become quite a barrier to access for participants, and so some of these programmes may not be practical or accessible for many women. A well-chosen approach that is less demanding in terms of time and travel may be able to have similar effects for pregnant women and achieve greater uptake. Given also that many published studies from elsewhere in the world appear to have focussed primarily on city populations, it was felt that there was merit in investigating strategies that may be useful for a rural population, and the Waikato region's demographics lent itself well to such a study.

## **1.9 The current study**

The Waikato region is one of the four largest regions of New Zealand, in terms of both area and population. It covers about 25,000 square kilometres, with a population estimated at 382,716 in the 2006 census. The Waikato encompasses rugged coastal hill country, through to intensive dairy farming across the Hauraki Plains, and many areas of protected native bush, particularly in the Coromandel Peninsula. There are a number of major towns, with numerous smaller towns and settlements. Approximately 25% of the population live in rural areas (Waikato Regional Council, 2012). In many cases, access to health services is more difficult

in rural settings, as often travel is needed over considerable distances. Costs of travel can be a considerable burden, as can the time needed to get from a remote area to a major town, for services such as well child clinics, general practitioner services, birthing units or hospitals, as well as other services such as counselling or psychological services, and complementary health practitioners such as massage therapists.

It was felt that given these logistical difficulties it might be useful to test a model that could be more accessible to rural mothers, so we endeavoured to identify an approach that could be portable, and that could be engaged with on an individualised basis by the participants, at times and places most convenient to themselves. We identified a commercially available computer programme “Healing Rhythms” (The Wild Divine Project, 2006), which could be loaded onto a laptop and readily transported to different locations.

The Wild Divine Project has developed a number of computer-based bio-feedback and mindfulness training programmes which have been used in trial situations to assist with pain relief (Wild Divine Project, 2011), and with the learning of relaxation skills in children with ADHD (Amon & Campbell, 2008). Healing Rhythms, one of these programmes, is very user-friendly, and provides a simple structured approach to learning mindfulness and relaxation skills, with 15 self-paced steps, each containing instruction in mindfulness and relaxation, with a post-instructional bio-feedback exercise for each step. It was hypothesised that this programme would provide the benefits of stress reduction at a stressful time of life, in a way that would be convenient and accessible for rural women. It was further believed that its portability would also translate well into rural settings, where the physical presence of a personal tutor, or group training settings, may

not always be possible or desirable. It seemed therefore desirable to pilot the use of this programme with pregnant women in a rural setting, in order to assess how acceptable and usable the programme was for them in its current format, and to monitor changes in perceived stress, anxiety and mood as a way of measuring the effectiveness of this as an intervention.

### **1.10 Biofeedback**

Biofeedback is the term generally used to encompass a range of techniques by which physiological changes in the body that may occur following the application of increased or reduced stimuli, or in response to certain thoughts or feelings, can be brought into a person's awareness. The active element in biofeedback relates to the individual receiving an in-the-moment feedback record, such as a line trace on a screen, or an audible signal. The intent behind the use of such biofeedback may vary, but in many cases the individual is seeking to exercise some form of conscious control over some aspect of their physiology, in order to affect their physiological response and so shift the degree of response being measured (Kleen & Reitsma, 2011; Toomin & Toomin, 1975).

Galvanic Skin Response (GSR) basically measures the activity levels of sweat glands in the skin. When an individual is experiencing physiological stress, the reaction of the sympathetic autonomic nervous system (ANS) triggers an increase in sweat gland activity and a commensurate rise in skin conductivity. Changes in GSR have for this reason been used for over 50 years as a way to measure an individual's physiological stress level changes (Toomin & Toomin, 1975).

Toomin & Toomin (1975) note that client awareness of their own GSR reaction patterns creates an immediate, in-the-moment awareness of their own underlying physiological processes, and introducing GSR in their view “reduces the body-mind dichotomy” (p.37). To reframe this, it could be said that use of GSR may help to assist mindful awareness of one’s own physiological levels of arousal in given situations.

Heart Rate Variability (HRV) describes the normal physiological experience of having a varying interval of time between heartbeats. Whilst people are typically unaware of these changes, heartbeat rate typically increases with each in-breath (inhalation), and reduces with each out-breath (exhalation). The sympathetic nervous system is activated with each inhalation, and the parasympathetic nervous system is activated each time an individual exhales. It is believed that when clients learn to vary their HRV, typically achieved through mastering breathing techniques, an increase in HRV develops. Increased HRV appears to result from modulation of the relationship between the parasympathetic and sympathetic nervous systems, carried out through the central nervous system (CNS) and the other peripheral mechanisms as a result of the biofeedback. It appears that such changes affect the vagal pathways between the CNS and ANS, which have been hypothesised as involved in the regulation of communication, social, and emotional behaviours and responses. (Kleen & Reitsma, 2011). HRV can be measured by the use of a photoplethysmograph, a device which uses an infra-red light source attached typically to a finger, to monitor blood flow. The output from such a device can be converted into a graphical format, as is done with the “Healing Rhythms” software, so that the user can have a visual record of their HRV.



When HRV biofeedback was used in an ACT pilot study, clients reported increased relaxation, improved sleep, and being better able to use a mindful approach when responding to stressful situations at home. The biofeedback technique used involved a computer graphic which generated a floating balloon, the ascent or descent of which was controlled by the client's heart rate. It was felt by the researchers that this user friendly design may have assisted client adherence (Kleen & Reitsma, 2011).

A Chinese study in Shanghai utilised myoelectricity recording and galvanic skin response, as well as corticosteroid sampling, to assess participants' ability to relax (Yang, 1987). One group applied autogenic relaxation techniques from an audiotape, one group used biofeedback information to enhance relaxation, a third group used both techniques, and a control group used none of them but were simply asked to stay calm and relax. Whilst no meaningful difference was found between the experimental groups, all were found to have improved significantly when compared to the control group. The study is one of very few that appear to have used biofeedback as part of a relaxation or stress reduction intervention during pregnancy, and outcomes appear to have been positive.

A recent New Zealand study with a pregnant population was carried out at an urban birthing centre. Biofeedback measures were used to track both maternal and foetal responses while the mother engaged in a biofeedback session using "Healing Rhythms" as the basis for a one-off mindfulness practice. Results suggested that the biofeedback supported the mindfulness practices, and foetal heart-rates tended to slow somewhat (Clark, 2012).

“Healing Rhythms” measures both GSR and HRV for biofeedback measures, and presents this both graphically as an ‘on-demand’ function, and by way of integration into video-game style exercises, that enable the user to control the rise and fall of balloons, the stacking of rocks, and so on, through the biofeedback generated during their application of mindfulness exercises. Given that these user-friendly formats have been found to establish high levels of user adherence, it was anticipated that use of the Healing Rhythms programme would help to prevent participant drop-out, and provide a positive learning experience for the participants in this study.

## **Chapter 2: Method**

### **2.1 Design**

This study was designed in order to trial a computer-based mindfulness programme, to ascertain its utility as a possible tool that could be offered to women in the future. The study used a pre-post intervention design, without a control group, utilising a battery of assessment tools to measure baseline and post-intervention scores.

### **2.2 Participants**

Initial attempts to recruit participants were through pre-existing professional networks, with posters and information sheets disseminated through a variety of channels. Attempts were also made to engage with the local midwifery team. Over a period of three to four months, no participants were found through these channels, and so a second mode of recruitment was employed, using personal networks to identify women known to people who could vouch for the researcher. Using this approach, three women came forward to participate in the research, at various stages of pregnancy.

In a final attempt to gain participants, the lead researcher made arrangements to be interviewed on a regional television station, with the interview airing on Central TV in mid-2012. The researcher also persuaded the local newspaper to run an article on the research project. Finally, he gained an invitation to speak at a parents' group, and a local antenatal class. Following this publicity, four further participants came forward, and there was some snowballing, as some of these

participants encouraged pregnant friends to also participate, resulting in two further participants, making an overall total of nine.

Names have been removed and some identifying details of those who have participated in this research have been changed. Best efforts have been taken to treat all information with care for the privacy of participants, and given the small rural community, only very general demographic information will be provided for confidentiality reasons.

Ultimately, over the course of the study, 9 women participated in this project. Petrol vouchers were provided to 8 of the participants to assist with the cost of travel into town to collect and drop off laptop computers, with one participant declining vouchers.

Table 1

*Brief demographic data of the participants*

Participant	previous children	trimester at start
A	yes	2 <sup>nd</sup>
B	yes	3 <sup>rd</sup>
C	none	3 <sup>rd</sup>
D	yes	2 <sup>nd</sup>
E	yes	2 <sup>nd</sup>
F	yes	3 <sup>rd</sup>
G	none	3 <sup>rd</sup>
H	yes	3 <sup>rd</sup>
J	yes	2 <sup>nd</sup>

Previous studies have identified that previous experience of having children (Csatordai et al., 2007; Golbasi et al., 2010), and the trimester which the mother has reached Bergink et al., 2011), may have some impact on scores for measures relating to stress, anxiety and depression. Table 1 is provided in order to ensure that this information is available to any subsequent reviewer of this research; however age and other demographic data is not provided for reasons of confidentiality given the small rural setting from which participants were drawn.

### **2.3 Measures**

The study by Littleton et al. (2010) has implications for this study, in that additional measures clearly need to be used alongside measures of subjective stress, in order to establish whether there are significant life events occurring. It was also felt that it would be useful to measure anxiety and depression directly. For this reason the decision was made to use a battery of measures in this study, to address these various questions more fully. A brief synopsis of each measure follows.

#### ***Perceived Stress Scale – 10 Item (PSS-10)***

Perceived stress was measured using the PSS-10, an abbreviated form of the PSS-14 (Cohen, Kamarck, & Mermelstein, 1983). The measure was designed to measure the extent to which an individual perceives aspects of their life as “unpredictable, uncontrollable, and overloading” (p.387), as these elements have been strongly correlated to perceived stress. The PSS-10 asks participants to respond to ten questions, each rated on a five-point scale ranging from 0 to 4, based on their thoughts or feelings over the previous month. Scores range from 0

to 40, with higher scores relating to higher levels of perceived stress. In their analysis and comparative study, Roberti, Harrington and Storch (2006) found that the measure had good internal consistency, with Cronbach's alpha of .85 for perceived helplessness and .82 for perceived self-efficacy, with a reported Cronbach's alpha of .89 for the total score. They identified the PSS-10 as "a reliable and valid self-report measure of perceived stress" (p. 143) in a non-clinical population of predominantly female participants.

### ***Edinburgh Postnatal Depression Scale (EPDS)***

As mentioned in the foregoing literature review, Friedman and Resnick (2009), have observed that during pregnancy several of the criteria normally identified as symptomatic of depression, such as fatigue, weight gain, and changes in sleep pattern, are commonly experienced by pregnant women, whether or not they are experiencing any mood difficulties. As a consequence, the measure often used to screen for depression in perinatal mental health studies is the Edinburgh Postnatal Depression Scale (EPDS: Cox, Holden & Sagovsky, 1987). Whilst originally designed for postnatal screening, this 10-item self-report scale has been validated and normed for use during pregnancy as well as postnatally (Bergink et al., 2011; Ji et al., 2011). The ten items are scored on a 4-point scale ranging from 0 to 3, with total scores ranging from 0 to 30. Bergink et al. (2011) found that Cronbach's alpha was .82 for mothers in their 1<sup>st</sup> trimester, .83 in the 2<sup>nd</sup> trimester, and .84 in the 3<sup>rd</sup> trimester. They also identified that cutoff scores differ slightly when the measure is used in pregnancy, and a score of 11 in the first trimester, with scores of 10 in the following trimesters, were recommended as cutoff scores for clinical use in pregnancy.

### ***State-Trait Anxiety Inventory (STAI)***

State anxiety is anxiety experienced in the here and now, and Trait anxiety is the level of anxiety which is the norm for the individual. These mood states were assessed using the State-Trait Anxiety Inventory-State (STAI-S), and the State-Trait Anxiety Inventory-Trait (STAI-T) respectively. The STAI consists of two separate 20-question self-administered screens, the STAI-S and the STAI-T, each rated on a four-point scale. Cronbach's alpha exceeds .90 for both STAI-S and STAI-T (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), and the measure has been used extensively in research with pregnant participants (Vietin & Astin, 2008). In the STAI-S, participants are asked to record their feelings as in the present moment. In the STAI-T, participants are asked to record how they generally feel. The STAI is reported as having concurrent validity that correlates well with other anxiety questionnaires, and has been used as a measure in over 8000 studies (Groth-Marnat, 2003).

### ***Coping Self-Efficacy Scale (CSES)***

The individual's sense of confidence that they have useful coping strategies should they need them, has been linked to reduced psychological distress and improved well-being. The Coping Self-Efficacy Scale (CSES) (Chesney, Neilands, Chambers, Taylor & Folkman, 2006) is a 26-item measure developed to measure the individual's confidence that they have the ability to use problem-focussed coping skills, stop unpleasant thoughts and emotions, and obtain support from family and friends. Each item is scored between 0 (cannot do at all) and 10 (certain can do), with total scores potentially between 0 and 260. Test-retest reliability has been found to be strong for these three factors, and changes in

scores over time have been found to have good predictive validity for reduced distress and improved well-being. Cronbach's alpha was reported as lowest for the subtest "get support from friends and family", scoring .80, with the remaining subtests "use problem-focussed coping" and "stop unpleasant emotions and thoughts" scoring higher, both at .91 (Chesney, et al.).

### ***Prenatal Life Events Scale (PLES)***

In her research on prenatal maternal stress, Marci Lobel has developed the Prenatal Life Events Scale as a way to measure specific stressors that may influence experienced levels of stress (Lobel, Cannella, Graham, DeVinent, Schneider, & Meyer, 2008). Participants report which life events they have experienced during pregnancy, from a list of 28 provided options, on a yes/no column. They then report the extent to which each reported event has been distressing on a further column, scored from 0 to 3. The distress score is divided by the number of events to establish a mean total, which can be analysed together with the total number of stressful events reported. Although no Cronbach's alpha score is stated in articles relating to this measure (Lobel, Dunkel-Schetter, & Scrimshaw, 1992; Lobel, DeVinent, Kaminer, & Meyer, 2000; Lobel et al., 2008), the scale has been reported to correlate significantly with other measures of prenatal maternal stress, and has been used to assist in identifying specific stressors that might impact on participating women in this study.

### ***Mindful Attention Awareness Scale (MAAS)***

The Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003) is designed to measure the degree to which an individual is aware of internal and external stimuli in the here and now, and the degree to which they are able to



focus attention on a specific or limited aspect of that overall range of experienced stimuli. The MAAS consists of a fifteen-item scale, self-administered, with a 6-item response scale scored from 1 to 6. Mean score is calculated across all items, and higher mean scores equate to greater day-to-day experience of mindfulness. In their development of the MAAS, Brown and Ryan found significant relationships between the MAAS scores and meditation experience in adults, with Cronbach's alpha of .80-.87, and good test-retest reliability. MacKillop and Anderson (2007) reviewed the MAAS with a further large validation sample, and found Cronbach's alpha to be .89.

## **2.4 Intervention**

The Healing Rhythms programme is a 15-step guided training protocol which comes as a computer software package, together with a bio-feedback device, training manual and user guide. The bio-feedback device is reported by Wild Divine to have been developed by leading experts in bio-feedback:

“The feedback portion of the iom hardware has a well-proven scientific basis. It was developed in collaboration with some of the leading experts in the country, in particular, we chose those whose work emphasized optimal human performance, such as Liana Mattulich, M.D., Dr. Bob Whitehouse, and Sunny Turner.

According to Dr. Bob Whitehouse, a psychologist and biofeedback expert... feedback uses electronic equipment to monitor a person's internal physiological states and gives feedback that helps the recipient learn how to control these states, to activate balance, release or to recover from them. Others that contributed to The Wild Divine are Jean Houston, a pioneer researcher in human capacities, Nawang

Khechog, a former Buddhist monk...and Liana Mattulich, an M.D. and biofeedback expert”.

(Wild Divine, 2012)

This biofeedback device consists of a plug-in device connected to the computer, with three sensors into which the participant places their fingers. The central sensor is placed on the middle finger, and measures heart rate variability. The other two sensors are placed on the fingers either side of the middle finger, and measure skin conductance, by picking up sweat gland activity of the fingers. The sensors are placed on the fingers of the hand which is not controlling the computer.

The training manual for users sets out the 15 steps of the guided training, which are broken down into three clusters as follows:

#### Part One: Self-discovery

1. Quiet the mind
2. Observe your thoughts
3. Find your inner balance
4. Release physical tension
5. Cultivate positive emotions
6. Reveal your inner wisdom

#### Part Two: Creating Happiness

7. Subdue your inner critic
8. Open yourself to others

- 9. Practice compassion
- 10. Discover gratitude
- 11. Connect with something outside of yourself

### Part Three: Develop Life Skills

- 12. Set your intentions
- 13. Take a daily supplement
- 14. Commit to a personal practice
- 15. Find your rhythm

The programme sets out to teach, and have participants practice, different breathing, relaxation and mindfulness techniques to raise or lower energy levels. Stated aims also include being able to establish a sense of calm for oneself, and reducing the negative effects of stress. Part one is intended to encourage self-awareness and awareness of one's own body. Part two encourages the cultivation of empathy, compassion and gratitude. Part three aims to motivate participants to commit to a regular practice for the future (The Wild Divine Project, 2006).

## **2.5 Procedure**

The researcher met with each participant at the start of the programme, and went through the consent process and information sheet. An initial set of assessments were then completed, which sought to capture the degree to which the participant was experiencing stress and distress prior to completing the programme, and to what extent they already practiced mindful ways of being, in their daily life.

Each participant was then introduced to the computer-based mindfulness programme, which had been loaded onto laptops for the purpose of this study. They were provided with an anonymised user log-in, were shown how to log in and completed the first session in the presence of the researcher in order that assistance could be provided if needed. In the pilot study, no participant needed any assistance, and thereafter all were able to log in and complete the remaining 14 sessions at their convenience, as well as returning to completed sessions and practicing the skills further if desired. No set time-frame was given to participants, and the period taken varied between several weeks to several months (discussed further in the results section).

With limited biofeedback equipment available, laptops were shared between participants, and the local birthing unit was used as a central pick up and drop off point for the laptops. This worked well, with arrangements made via the researcher, and participants collecting the laptops when in town, then completing sessions at their homes. With some participants having other children at home, this worked in better with their normal domestic routines, especially given the distances some lived from central Thames. Where participants knew each other, such as with the group that had snowballed, participants sometimes exchanged the laptop with each other on an ad-hoc basis, when it was mutually convenient to them. This meant in effect that a participant would often have the computer for a few days, then pass it on.

Once participants had completed the programme, the researcher again made contact and once again administered the same assessment tools, to capture post-programme data. The assessments included measures of anxiety, stress,

depression, and significant life events, as well as the level of mindfulness participants reported prior to and post the training experience.

In addition to the various formal measures, a brief post-study questionnaire was prepared, and an exit interview conducted with each participant, seeking to elicit qualitative information about their experience of completing the programme, and the degree to which they felt it would be acceptable or useful for other women.

Responses to these questions have been collated and presented thematically.

Participants generally took between two to three months to complete the programme, and the final assessments and exit interview were in most cases about 2 weeks after completion.

#### *Data analysis*

At the conclusion of the study completed measures were scored and the results graphed for each measure across all participants. A further table was created for all scores across all participants, and this was used as a basis for further statistical analysis. Using SPSS we conducted Wilcoxon Signed Ranks tests, to identify significance of the mean differences between scores. The outcomes of these analyses are reported under “Results”.

#### *Qualitative outcomes*

Interviews conducted with each participant were typed up, and responses highlighted into key words and themes. These were then clustered into related themes and typed up as a summary document. This was again reviewed against the interviews to ensure that all themes had been reported with integrity.

## **2.6 The role of the researcher**

Jon Kabat-Zinn (2003) clearly articulates his own experience in mindfulness, and states that for any mindfulness based intervention to be effective, it is important that the researcher or trainer also have experience of, and preferably regular practice in mindfulness, the better to understand participants' experiences, and to facilitate the answering of any questions they may have, from personal experience "learned or deepened either through meditation retreats at Buddhist centers or through professional training programs in MSBR..." (p.149).

In this regard it is then perhaps relevant that I have been a practicing Buddhist in the Tibetan Mahayana tradition for over twenty years, using both mindfulness and other meditative approaches over this time. I have received orally transmitted teachings from His Holiness the 12<sup>th</sup> Gyalwang Drukchen Rinpoche, at a residential week-long mindfulness retreat; as well as from His Holiness the 14<sup>th</sup> Dalai Lama at public teaching events in the United Kingdom and New Zealand. Over the past 15 years I have regularly made use of the retreat facilities at a local Buddhist centre, where I from time to time do silent contemplative meditation retreats. I also use a mindfulness based approach for pain management following an injury, which I have found extremely effective.

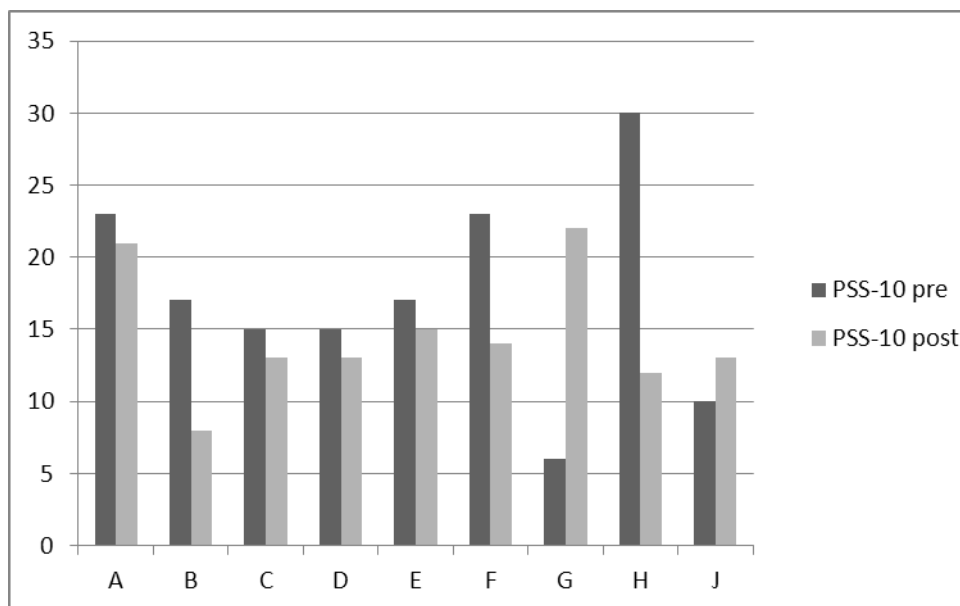
## **2.7 Ethical matters**

The study was reviewed and approved by the University of Waikato School of Psychology research ethics committee.

## Chapter 3: Results and discussion

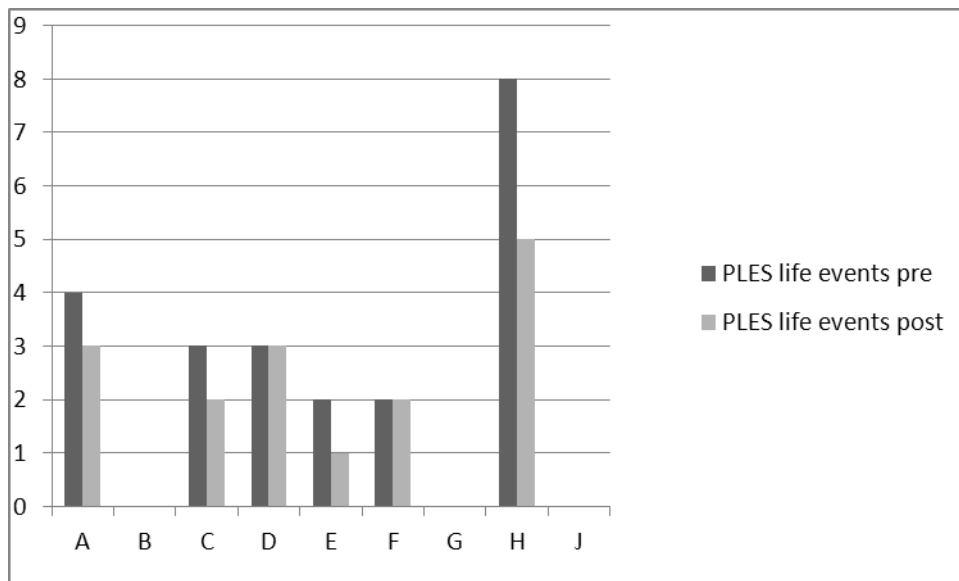
### 3.1 Self-report questionnaires

Participants were assessed using a battery of brief self-report questionnaires (see Method for detailed descriptions), both before and after the mindfulness intervention. The outcomes have been graphed to provide a visual representation of the changes reported by each participant. In each case, scores on the measure are placed on the vertical axis, with participant codes assigned to the horizontal axis.

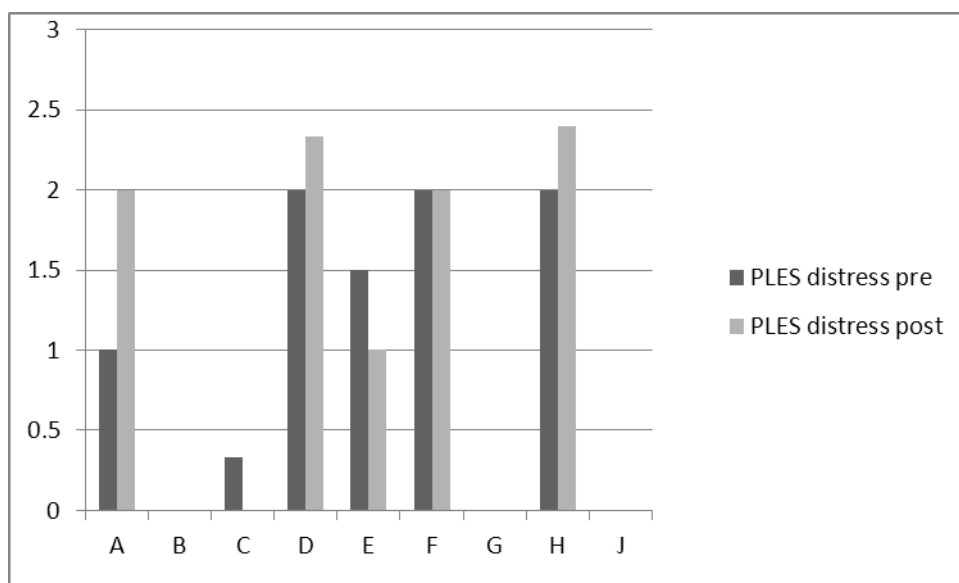


*Figure 1.* Total scores of the participants (A-J) on the Perceived Stress Scale (PSS-10), pre and post intervention.

For almost all participants, scores decreased on the PSS-10. Two participants showed an opposite trend, one of whom had cause for concern for the health of her unborn child at the time of completing the post-questionnaires, the other of whom had recently given birth and was experiencing some difficulties with feeding and settling the new baby.



*Figure 2.* Total scores of the participants (A-J) on the Prenatal Life Events Scale (PLES), pre and post intervention

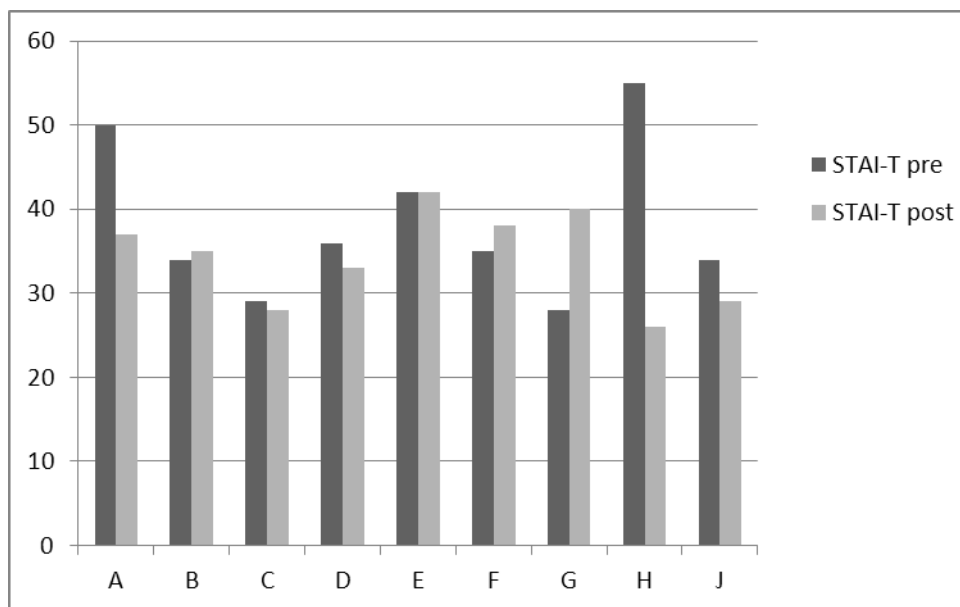


*Figure 3.* Perceived distress scores for participants (A-J) on the Prenatal Life Events Scale (PLES), pre and post intervention.

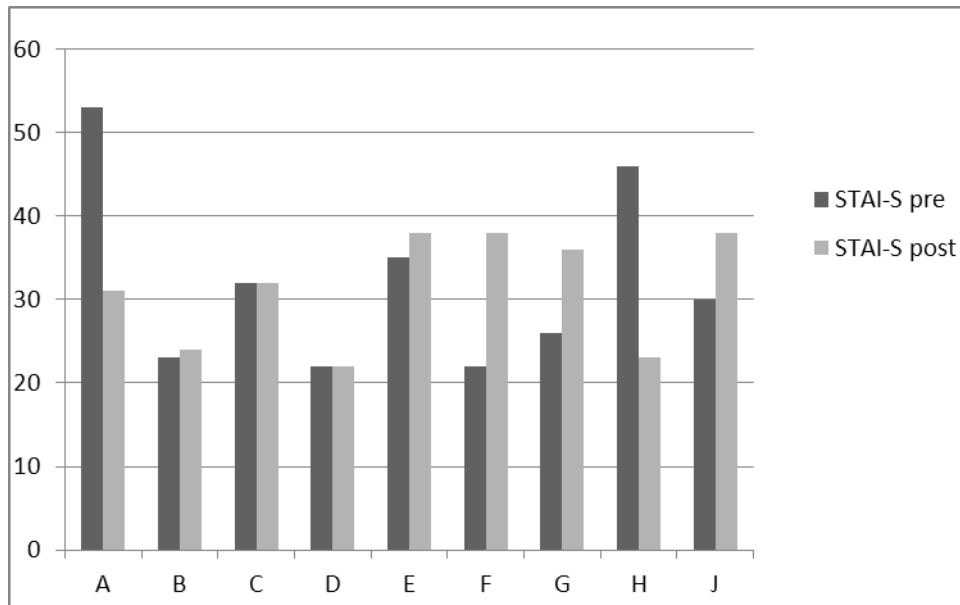
An interesting phenomenon in these results on the PLES was that a number of participants recorded more significant life events during pregnancy in the pre-



questionnaire than in the post-questionnaire. Since the PLES reports events that have happened during pregnancy, and is cumulative over time, a reduction in score was not expected for any participant. This is not to suggest that later in the pregnancy the events had not happened, but it seems that for some participants, they were no longer appraised as significant. The reduction in the number of reported life events appeared in some cases to contribute to counter-intuitive increases in perceived distress, as this score is calculated by dividing perceived distress by the number of reported significant life events. It should also be noted that participants B, G and J scored zero on pre and post measures of the PLES, and therefore show no visible bars on these graphs.

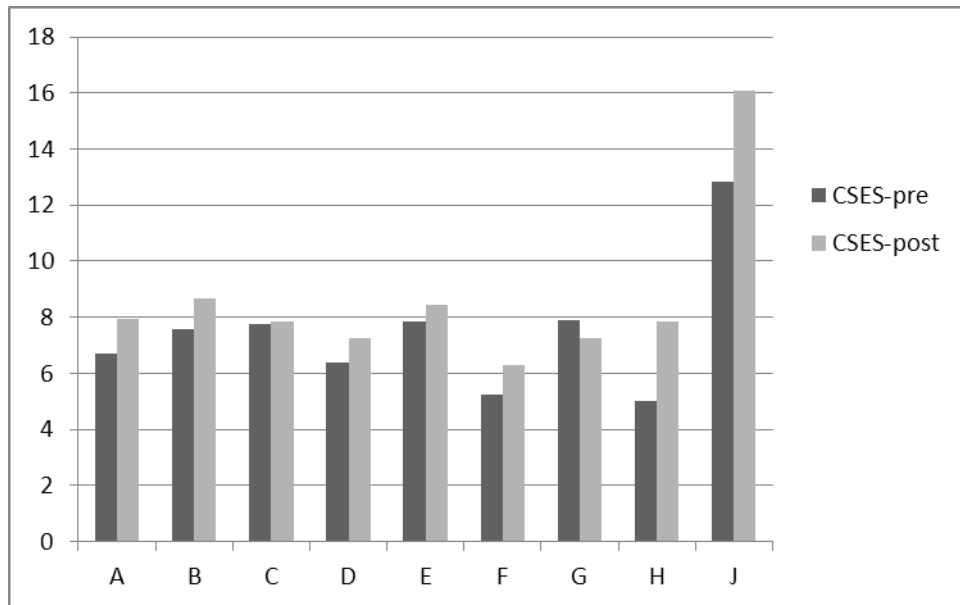


*Figure 4.* Trait anxiety scores for participants (A-J) on the State-Trait Anxiety Inventory – Trait (STAI-T) pre and post intervention.



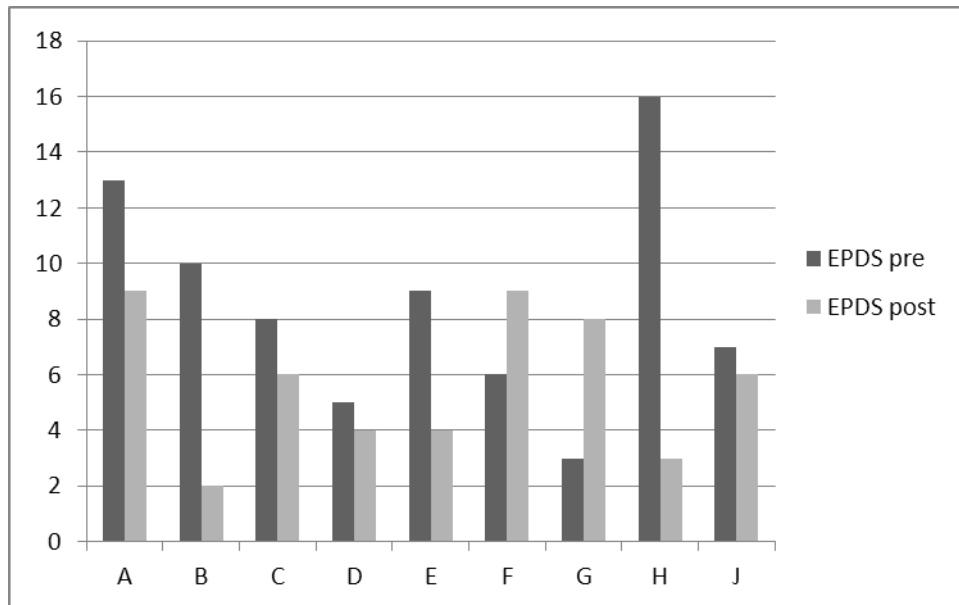
*Figure 5.* State anxiety scores for participants (A-J) on the State-Trait Anxiety Inventory – State (STAI-S) pre and post intervention.

On the STAI, a score of 40 is normally taken as the clinical cut-off for concern regarding levels of anxiety, and it is of note that two participants scored considerably above this in the pre-intervention screening. In both cases, scores dropped to considerably below the cut-off by the end of the intervention. Most of the remaining participants showed minimal change, except for participants F and G, whose state and trait anxiety did increase noticeably. This is discussed further in the discussion section post.



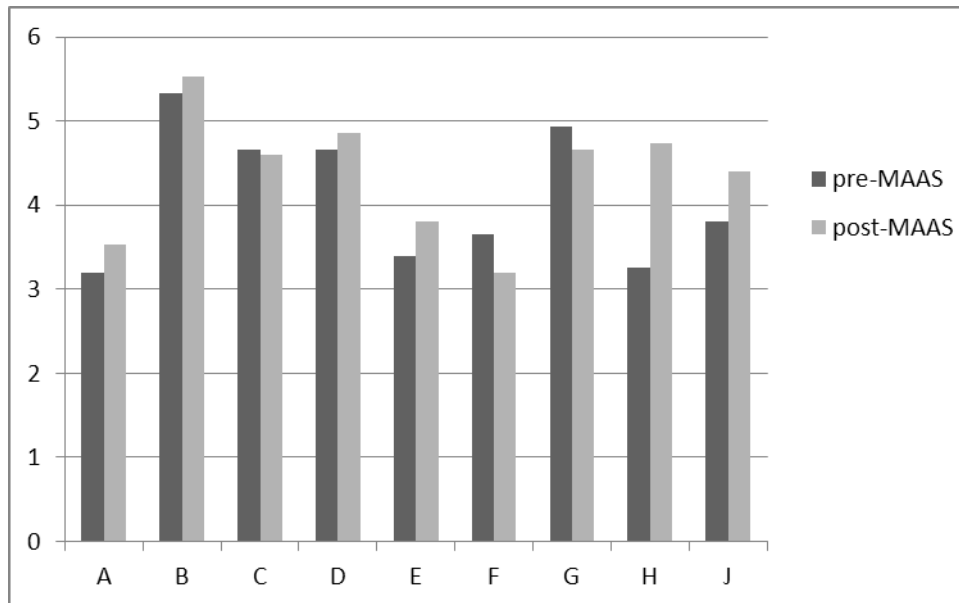
*Figure 6.* Total scores for participants (A-J) on the Coping Self-Efficacy Scale (CSES) pre and post intervention.

The CSES measures self-perceived ability to cope with stressors, and almost all participants showed a small increase in their overall sense that they could cope with stress and challenging life events. There are three subscores in this measure, and it was of interest that participants showing a general improvement in score also showed a shift in their sense that they were well-supported, marking the degree of support from others as higher after completing the mindfulness intervention.



*Figure 7.* Total scores for participants (A-J) on the Edinburgh Postnatal Depression Scale (EPDS) pre and post intervention.

It is notable that at the pre-intervention screening stage, two participants who scored highly on the STAI, also scored over 13 on the EPDS. In clinical situations, 13 is generally used as the cut-off for indicating depression, and when used in pregnancy a lower score (for these participants a score of 10) is recommended by Bergink et al. (2011). It thus seems likely that both of these participants were in fact depressed at the start of the project. It is pleasing to note that for both, the reduction in scores is such as to bring their scores more in line with the average across all participants, and moreover, below the cut-off for clinical concern.



*Figure 8.* Mean scores for participants (A-J) on the Mindful Attention Awareness Scale (MAAS) pre and post intervention.

In this graph a number of participants show a small overall increase in perceived mindful awareness, with participants H and J showing a greater shift. Two participants (F and G) described feeling pressured to complete the modules for different reasons, and it is of note that their outcomes on the mindfulness awareness measure have changed in the opposite direction to most other outcomes reported.

### 3.2 Statistical analysis

Outcome data were processed using SPSS to identify any statistically significant changes. With sample size being small, data was not a good fit to a normal curve, so it was decided to use a Wilcoxon signed ranks test, a non-parametric test.

Participant G is a significant outlier across all measures, and the only participant who indicated that she had in fact skipped through many of the teaching sections without completing them. Given that by so doing this participant effectively did not receive the complete intervention, it was decided to exclude participant G from the statistical analysis, and for this reason,  $N=8$  for the following analyses.

On the CSES a Wilcoxon Signed Ranks Test was conducted to evaluate whether there was meaningful change in individuals' sense of coping self-efficacy post-intervention. The results indicated a significant difference,  $z = -2.521$ ,  $p < .05$ . The median score for participants prior to the intervention was 6.69, the median score post-intervention was 7.84, a slight increase.

A Wilcoxon Signed Ranks Test was also conducted on the EPDS to evaluate whether the intervention had assisted in reducing depressive symptoms. The results indicated a significant difference,  $z = -1.963$ ,  $p < .05$ . The median score for participants prior to the intervention was 9, the median score post-intervention had reduced to 4.

Scores on other measures, whilst showing some changes, did not meet criteria for statistical significance.

### **3.3 Interviews with participants**

Each participant was interviewed at the end of the study using a sheet of question prompts to obtain qualitative data. Responses were recorded in writing at the time and checked with each participant for accuracy. Handwritten interview records

were then typed, and each typed transcript read by the researcher and marked with highlighter for all key words and phrases.

These were then allocated into broad themes, before a written summary was commenced, which included quotes relating to each theme. Once this was written, the interviews were re-read and checked against the summary to ensure that it was truly reflective of the interview responses and content. The themes derived from this analysis are discussed below.

### *Enjoying and relaxing*

Several participants described the programme as enjoyable [A], and “good”[B], or “really good”[D]. There were a number of participants who did the sessions in the evening before going to bed, and there were numerous comments about the exercises assisting sleep:

“makes me sleep a lot better” [D]

(If I) “woke up during the night I might do it then, to help me get back to sleep” [F]

In one case, the exercises were assisting sleep before bedtime “some of them I fell asleep” [H].

### *Completing the exercises*

One participant saw some of the exercises as “annoying” [C], another as “frustrating” [G], but for most of the participants they were generally “like good challenging”[C], and “it got easier”[H] as participants worked through the exercises.

### *Instructional screens*

One or two participants did not work through all the instructional screens, one describing some of the content as “mumbo-jumbo”[A], another simply stating that she “wouldn’t really listen” to much of the instructional content [G].

Other participants seemed to find the teaching sections more useful, with descriptions such as “really good and helpful”[H], and “interesting”[J, D, F]. One participant appreciated the varied culture and gender of the presenters[C], and two participants described mindfulness as something they would be interested to pursue further [J, F], or continue to “use in the future” [D].

### *Spiritual aspects*

Participants were asked “Can you describe any conflict with your own spiritual beliefs?” For some, tying the practices in with Christian beliefs “seemed to work better” [A], others described themselves as either not having any strong spiritual beliefs [J,G,F] or as being open-minded or finding no conflict with the underlying values [E,D].

### *Parenting support*

Several of the participants who either had children of their own or who worked with children, identified that the programme had assisted them to manage their responses better when children were troublesome:

“just taking a breath, and thinking before you react” [C].

“even with the kids when they are fighting, you can take a breath, and use it” [H].

### *Pressure and disruption*



Due to limited availability of laptops, there were times when several people were sharing one around, and there was sometimes “a bit of pressure having to get it done” [F]. Another participant felt a sense of “pressure to complete the exercises” [G]. This was clearly unfortunate for a programme intended to help reduce stress and anxiety, and both of these participants reported poorer outcomes on a number of stress-related measures. Another participant commented that she felt it was important for people not to be “interrupted whilst practicing” [J], and for those with families this was clearly something people needed to work around. For those with children, often the computer was used:

“when I knew baby was having a sleep” [F], or when children “had gone to bed” [J]. Failing that, a number of women simply completed the modules “in the evening” [D].

#### *Stress reduction in pregnancy*

When considering whether the programme assisted with stress in pregnancy, some participants felt that there was definitely a benefit, as it could “make the pregnancy a lot calmer, less stressful” [D], “made you feel really relaxed” [E], and some found it “quite relaxing, a way to unwind”, especially at the end of a busy day.

#### *Helping during labour*

Some participants also felt that the exercises would be “good for breathing in labour” [E], and one woman who did some of the exercises with her partner, found that he was able to support her during childbirth by “reminding me of the exercises” [H], and reported that this had been very helpful.

### *Criticisms*

One participant was uncomplimentary about the programme, describing the graphics as “lame” and the exercises as “wishy-washy” [G]. This was also the only participant who would not recommend the programme to a friend, and described the exercises as “not something I would choose to do with my spare time”. This participant also stated that she “wouldn’t really listen to the teaching sessions” but just “skip on to the exercises”. Interestingly, given this approach, this was the only participant whose scores became worse on almost every measure.

### *Utility for other pregnant women*

For the other participants, when asked if they would recommend the programme, responses were generally positive, including:

“yes definitely” [B],

“yes” [A,C,F,H,J],

“yes I would, it’s quite good to relieve stress” [E],

“it was really cool” [D].

## **Chapter 4: General Discussion**

### **4.1 Synopsis**

Overall findings from this study will be discussed with reference to previous research and literature where appropriate. Limitations of the study will be identified, with suggestions for further research outlined.

The principal aim of this study was to identify whether a portable computer-based mindfulness programme would prove to be both of benefit, to pregnant women in a rural setting, and also whether it would be practical, accessible and acceptable such that those using it could see it as being of value to others in similar situations. In seeking to establish whether the programme was appealing to use, a major measure was the extent to which participants dropped out, or completed all 15 sessions contained within the programme. In this study, all participants completed the programme, (although one reported skipping significant sections of the training passages), suggesting that the programme itself was experienced as being of some benefit, or at the very least, not too aversive to complete.

### **4.2 Review of findings**

Two participants with poorer outcomes expressed feeling a sense of pressure to complete the exercises. In one case the person was close to term, and in the other, the laptop was being shared with other participants, which meant it needed to be used when the participant's turn to have it for a period of time came around.

Whilst no express criteria were provided to participants as to how fast they should aim to complete the programme, it appeared that where each exercise was done on

its own, with a break between each exercise, progress, whilst slower, appeared to be generally improved in terms of outcomes over those participants who endeavoured to complete as soon as possible. It may be that completing in the slower manner meant that the process was more similar in timeframe to the MBSR model, where each weekly teaching session is followed by practice at home before the next weekly teaching session, allowing the participant to consolidate the learning and practice skills.

One potential confound in many mindfulness studies has been the question of “social support”, with some observing that it is potentially difficult to separate mindfulness from social support when it involves so much time in practice groups and so much personal tuition (Chiesa & Serretti, 2009; Evans et al., 2011). In this study, there was no need for a tutor due to the inbuilt teaching sessions in the programme, and so it became of interest to establish how possible it was for people to complete the programme with minimal to no support from a mentor. Participants reported that the programme was easy to use, and whilst some reported certain sessions as being more difficult to complete, most found the programme straightforward and easy to complete at home. Contact from the researcher was kept to a minimum, with typically one phone call to participants to check that they were getting on satisfactorily with the programme, three to four weeks after they had started. Whilst the lack of social support is not common in mindfulness interventions, the outcomes of this study tend to support the findings of Kabat-Zinn et al.(1998), in that mindfulness interventions may not need the presence of a therapist or a group of co-participants in order to be effective.

Given the small number of participants it was not anticipated that any changes on measures would reach statistical significance, and for this reason most outcomes

were simply graphed so that a visual comparison could be easily made. Somewhat unexpectedly, however, changes were found to be statistically significant on two measures, the CSES and the EPDS.

The CSES was designed to measure a person's level of confidence that they have the skills to cope with stress, and has three subscales. All participants except one showed improvements in their scores on "stop unpleasant emotions and thoughts", and again all participants except G showed an improvement in total score. Across the other two subscales, all participants except G and one other showed an improvement in problem-focussed coping, and again all participants except G and one other (not the same person) showed an improvement in perceived social support. These outcomes may suggest that mindful awareness can mediate interpretations of the actions of others, so that they are seen perhaps more favourably, or less aversively. It was also noteworthy that in several cases, fewer total life events were reported in the post-intervention measures, than in the pre-intervention measures. Since the number of life events clearly cannot have been less, it is hypothesised that following the mindfulness intervention, these participants no longer regarded the previously identified life events as so significant, and thus did not recall them in the final measurement. It is possible that the mindfulness intervention may have assisted in moderating internal emotional reactivity to life events, in such a way that rumination may have decreased, and some events ceased to be seen as significant.

Statistically significant changes were also found in the EPDS score, across all eight of the participants who completed the intervention as designed. Even given the application of the lower cut-off scores as recommended by Bergink et al.(2011), post-intervention, both participants who had been showing clinically

significant scores on this measure of depression, had reduced scores to below the cut-off. As an intervention intended to assist with maternal mood and depressive symptoms, this mindfulness approach has performed excellently in this regard.

Some scores on the STAI also showed change, which although insufficient for statistical significance, bear comment. Two participants who expressed feeling somewhat pressured whilst completing the programme, experienced a rise in both state and trait anxiety. Both of the participants who had been showing clinical levels of depression at the start of the intervention, however, showed reductions of 22-23 points on the STAI-T, with reductions of 13 and 29 points respectively on the STAI-S.

In the qualitative feedback from the study it was pleasing to note that the majority of participants enjoyed using the programme, with some expressing interest in pursuing further enquiries regarding mindfulness training. Participants also reported improved sleep, increased sense of relaxation, and a sense of being able to de-stress at the end of a busy day. Those with previous children commented that using the breathing strategies before intervening in childhood disputes enabled them to feel more calm and less reactive, an outcome that supports the findings of Duncan and Bardacke (2010), who found that after completing their programme, participants used mindfulness as a coping strategy in subsequent stressful family situations, and found this helpful.

### **4.3 Limitations**

It proved more challenging than anticipated to recruit participants for the study, and although there were no exclusion criteria, the sample is essentially a sample

of convenience. It could also be argued that since the majority of participants were self-selected, coming forward in response to publicity, all participants may have had a predisposition to respond favourably to mindfulness approaches: a point also made by Fjorback et al. (2011). It is possible that openness to mindfulness approaches may improve receptiveness to this intervention. There was some inherent self-selection based on interest in this group of participants, and it is not yet clear whether a randomly selected group would accept this approach so well.

Clearly, research into mindfulness approaches suggests an interest by the researcher in the area, and perhaps an expectation that the intervention will be useful. Although researcher interaction with participants in this study was able to be minimised through the use of technology, it is nonetheless possible that participants may have provided the feedback which they felt would accord with researcher expectations.

It should also be noted that this study did not use a control group. It is not therefore possible to rule out the possibility that anxiety may decrease over time in pregnant women, or that the passing of time may allow experienced levels of stress to decrease. In any future replication, use of a control group would serve to address these questions.

Lack of resources was a possible issue in this study. Some participants found themselves becoming more stressed, rather than less so, and whilst in one case this seems to have been associated with imminent birth, in the other case it seems to be very much linked to the lack of laptops. Only two laptops were available for the study, and at times one of these was being shared by several participants, who were passing it between them. Whilst at the time this was not envisaged as being a

problem, the feedback suggests that in any future study, attempts should perhaps be made to have this programme more individually available, with more laptops or electronic pads available.

Whilst one participant who started the programme achieved significant gains, others had varying levels of success, and one factor that seems to be implicated in this is the pace at which the programme was undertaken. Where the programme was undertaken relatively slowly, with gaps between sessions, good results eventuated. Where the programme was completed more quickly, gains were lower, and in some cases where the participant felt pressured, stress increased. In any future study it would be sensible to aim for a minimum of a 15-week completion period, with individual laptops to avoid feelings of pressure, as the longer time-frame appears optimal.

One outlier was participant G, who felt that her yoga practice was more beneficial than ‘mindfulness’, and effectively dismissed the programme as ‘wishy washy’. In every case this participant’s scores shifted contrary to the overall trend, and in some cases to a significantly negative extent. Since the researcher believes that outliers also have something to add to a study, these results were not excluded other than for statistical analysis of outcomes for those who had completed all aspects of the intervention. Instead the reasons for the differences were considered. It was hypothesised that feelings of needing to complete the study in a shorter timeframe (as this participant was closer to term than many others), may have created a sense of pressure. Failing to adhere to the programme’s guidelines meant that the teaching elements were in most cases not fully engaged in, and either cut short or avoided, so that the skills may not have been as well-learned as others. This would reduce the likelihood of internalisation, which is believed to be



what underlies the shifts in stress response (Goldin & Gross, 2010), and may also explain some of the difficulties this participant had at times with completing the practice screens, although some attributions were made to biofeedback equipment problems. It was notable that this was also the only participant who reported significant issues with using the biofeedback device.

#### **4.4 How could this study be expanded upon**

In obtaining consents, all participants have given consent to be contacted again in 12 months' time, for a follow-up study. It is anticipated that there will be long-term gains, and obtaining these measures will hopefully not only support and validate this mindfulness intervention approach, but also address concerns raised in some meta-analyses that long-term outcomes are rarely reported and therefore efficacy over time impossible to know (Fjorback et al. (2011).

In using a programme that utilises biofeedback to inform participants how effectively they are using the taught skills, it is not easy to separate the biofeedback component from the mindfulness component. Whilst outcomes appear to be consistent with literature on other mindfulness interventions in terms of outcome, it might be useful to conduct a larger study in the future, comparing use of biofeedback alone with mindfulness approaches alone, and with both together.

In any future study it may be useful to not only replicate the measures used in this study, but to also contemplate the obtaining of saliva samples for cortisol levels, as has been done in some other studies, as a direct physiological measure of stress hormone release. It may also be useful to consider in more specific detail, the

period which participants allow to elapse between sessions, and whether there is an optimal spacing to obtain the best outcomes.

#### **4.5 Conclusions**

Overall this study was able to make a significant contribution to research in the field. The study effectively separated social support from the mindfulness intervention, rare in other studies, and whilst the number of participants was small, it does suggest that the mindfulness intervention used was generally effective for most of the participants. Whilst noting the lack of a control group, the study has shown a shift in perceived stress and in trait anxiety for some participants following the intervention, suggesting that the intervention can assist in producing significant shifts in coping self-efficacy, and be helpful in reducing scores on a measure of depression that is well-validated for clinical and research use. The programme has been found to be acceptable and practical for pregnant women, and appears to have generally had a positive impact.

## References

- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision*. Washington, District Columbia: American Psychiatric Association.
- Amon, K.L., & Campbell, A. (2008). Can children with AD/HD learn relaxation and breathing techniques through biofeedback video games? *Australian Journal of Educational & Developmental Psychology*, 8, 72-84.
- Anhalt, K., Telzrow, C.F., & Brown, C.L. (2007). Maternal stress and emotional status during the perinatal period and childhood adjustment. *School Psychology Quarterly*, 22, (1), 74-90. DOI: 10.1037/1045-3830.22.1.74.
- Baer, R.A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*, 10, 125-143. DOI 10.1093/clipsy/bpg015.
- Banti, S., Mauri, M., Oppo, A., Borri, C., Rambelli, C., Ramacciotti, D., Montagnani, M.S., Camilleri, V., Cortopassi, S., Rucci, P., & Cassano, G.B. (2011). From the third month of pregnancy to 1 year postpartum. Prevalence, incidence, recurrence, and new onset of depression. Results from the perinatal depression – research and screening unit study. *Comprehensive Psychiatry*, 52, 343-351. DOI: 10.1016/j.comppsy.2010.08.003.

- Bebbington, P., Dunn, G., Jenkins, R., Lewis, G., Bmgha, T., Farrell, M. & Meltzer, H. (2003). The influence of age and sex on the prevalence of depressive conditions: report from the National Survey of Psychiatric Morbidity. *International Review of Psychiatry*, 15, 74-83. DOI: 10.1080/0954026021000045976.
- Beddoe, A.E., Chin-Po, P.Y., Kennedy, H.P., Weiss, S.J., & Lee, K.A. (2009). The effects of mindfulness-based yoga during pregnancy on maternal psychological and physical distress. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 38, 310-319. DOI: 10.1111/j.1552-6909.2009.01023.x.
- Beddoe, A.E., & Lee, K.A. (2008). Mind-body interventions during pregnancy. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 37, 165-175. DOI: 10.1111/j.1552-6909.2008.00218.x.
- Bennett, H.A., Einarson, A., Taddio, A., Koren, G., & Einarson, T.R. (2004). Prevalence of depression during pregnancy: Systematic review. *Obstetrics and Gynecology*, 103, (4), 698-709. DOI: 10.1097/01.AOG.0000116689.75396.5f .
- Bergink, V., Kooistra, L., Lambregtse-van den Berg, M.P., Wijnen, H., Bunevicius, R., van Baar, A., & Pop, V. (2011). Validation of the Edinburgh Depression Scale during pregnancy. *Journal of Psychosomatic Research*, 70, 385-389. DOI: 10.1016/j.psychores.2010.07.008.

Buitelaar, J.K., Huizink, A.C., Mulder, E.J., Robles de Medina, P.G., & Visser,

G.H.A. (2003). Prenatal stress and cognitive development and

temperament in infants. *Neurobiology of Aging*, 24, S53-S60. DOI:

10.1016/S0197-4580(03)00050-2.

Chesney, M.A., Neilands, T.B., Chambers, D.B. , Taylor, J.M., & Folkman, S.

(2006). A validity and reliability study of the coping self-efficacy scale.

*British Journal of Health Psychology*, 11, 421-437.

Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress

management in healthy people: A review and meta-analysis. *The Journal*

*of Alternative and Complementary Medicine*, 15, (5), 593-600. DOI:

10.1089/acm.2008.0495.

Clark, D.A., & Beck, A.T. (2010). *Cognitive Therapy of Anxiety Disorders:*

*Science and Practice*. New York and London: The Guilford Press.

Clark, M. (2012). *The role of brief mindfulness meditation instruction and*

*practice in changingbiophysical indicators in pregnant women and their*

*babies*. Unpublished Masters thesis, University of Waikato, Hamilton,

New Zealand.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of

perceived stress. *Journal of Health and Social Behaviour*, 24, 385-396.

- Cox, J.L., Holden, J.M., & Sagovsky, R. (1987). Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, 150, 502-508.
- Csatornai, S., Kozinszky, Z., Devosa, I., Toth, E., Krajcsi, A., Sefcsik, T., Pal, A. (2007). Obstetric and sociodemographic risk of vulnerability to postnatal depression. *Patient Education and Counseling*, 67, 84-92. DOI: 10.1016/j.pec.2007.02.004.
- Davidson, R.J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S.F., Urbanowski, F., Harrington, A., Bonus, K., & Sheridan, J.F. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine*, 65, 564-570. DOI: 10.1097/01.PSY.0000077505.67574.E3.
- Diego, M.A., Field, T., Hernandez-Reif, M., Schanberg, S., Kuhn, C., & Gonzalez-Quintero, V.H. (2009). Prenatal depression restricts fetal growth. *Early Human Development*, 85, 65-70. DOI: 10.1016/j.earlhumdev.2008.07.002.
- Dimidjian, S., & Linehan, M.M. (2003). Defining an agenda for future research on the clinical application of mindfulness practice. *Clinical Psychology: Science and Practice*, 10, 166-171. DOI 10.1093/clipsy/bpg019.

Duncan, L.G. & Bardacke, N. (2010). Mindfulness-based childbirth and parenting education: Promoting family mindfulness during the prenatal period. *Journal of Child and Family Studies*, 19, 190-202. DOI 10.1007/s10826-009-9313-7.

Elliott, Rev.C. (1993). Christianity. In *The World's Religions* [Ed. P.B.Clarke]. London: Reader's Digest.

Evans, S., Ferrando, S., Carr, C., & Haglin, D. (2011). Mindfulness-based stress reduction (MBSR) and distress in a community-based sample. *Clinical Psychology and Psychotherapy*, 18, 553-558. DOI: 10.1002/cpp.727.

Field, T., Diego, M., & Hernandez-Reif, M. (2006). Prenatal depression effects on the fetus and newborn: A review. *Infant Behaviour and Development*, 29, 445-455. DOI: 10.1016/j.infbeh.2006.03.003.

Fjorback, L.O., Arendt, M., Ornbol, E., Fink, P., & Walach, H. (2011). Mindfulness-based stress reduction and mindfulness-based cognitive therapy – a systematic review of randomise controlled trials. *Acta Psychiatrica Scandinavica*, 124, 102-119. DOI: 10.1111/j.1600-0447.2011.01704.x.

Freed, R.D., Chan, P.T., Boger, K.D., & Thompson, M.C. (2012). Enhancing maternal depression recognition in health care settings: a review of strategies to improve detection, reduce barriers, and reach mothers in need.

[electronic version]. *Families, Systems and Health*, 30. DOI:  
10.1037/a0027602.

Friedman, S.H., & Resnick, P.J. (2009). Postpartum depression: an update.  
*Women's Health*, 5 (3), 287-295.

Gavin, N.I., Gaynes, B.N., Lohr, K.N., Meltzer-Brody, S., Gartlehner, G., &  
Swinson, T. (2005). Perinatal depression – a systematic review of  
prevalence and incidence. *Obstetrics and Gynecology*, 106, (5), 1071-  
1083.

Giardinelli, L., Innocenti, A., Benni, L., Stefanini, M.C., Lino, G., Lunardi, C.,  
Svelto, V., Afshar, S., Bovani, R., Castinelli, G., & Faravelli, C. (2012).  
Depression and anxiety in perinatal period: prevalence and risk factors in  
an Italian sample. *Archives of Women's Mental Health*, 15, 21-30. DOI:  
10.1007/s00737-011-0249-8.

Golbasi, Z., Kelleci, M., Kisacik, G., & Cetin, A. (2010). Prevalence and  
correlates of depression in pregnancy among Turkish women. *Maternal  
and Child Health Journal*, 14, 484-491. DOI: 10.1007/s10995-009-0459-  
0.

Goldin, P.R., & Gross, J.J. (2010). Effects of mindfulness-based stress reduction  
(MBSR) on emotion regulation in social anxiety disorder. *Emotion*, 10,  
(1), 83-91. DOI: 10.1037/a0018441.



- Gotlib, I.H., Whiffen, V.E., Wallace, P.M., & Mount, J.H. (1991). Prospective investigation of postpartum depression: Factors involved in onset and recovery. *Journal of Abnormal Psychology, 100*, (2), 122-132.
- Grabovac, A.D. , Lau, M.A., & Willet, B.R. (2011). Mechanisms of mindfulness: A Buddhist psychological model. *Mindfulness* [published online 06 April 2011]. DOI 10.1007/s12671-011-0054-5.
- Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits. A meta-analysis. *Journal of Psychosomatic Research, 57*, 35-43. DOI: 10.1016/S0022-3999(03)00573-7.
- Groth-Marnat, G. (2003). *Handbook of Psychological Assessment (4<sup>th</sup> ed.)*. Hoboken, New Jersey: John Wiley & Sons.
- Halligan, S.L., Murray, L., Martins, C., & Cooper, P.J. (2007). Maternal depression and psychiatric outcomes in adolescent offspring: A 13-year longitudinal study. *Journal of Affective Disorders, 97*, 145-154. DOI: 10.1016/j.jad.2006.06.010.
- Ji, S., Long, Q., Newport, D.J., Na, H., Knight, B., Zach, E.B., Morris, N.J., Kutner, M., & Stowe, Z.N. (2011). Validity of depression rating scales during pregnancy and the postpartum period: Impact of trimester and

parity. *Journal of Psychiatric Research*, 45, 2130219. DOI:  
10.1016/j.psychires.2010.05.017.

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10, 144-156. DOI  
10.1093/clipsy/bpg016.

Kabat-Zinn, J., Wheeler, E., Light, T., Skillings, A., Scharf, M.J., Cropley, T.G., Hosmer, D., & Bernhard, J.D. (1998). Influence of a mindfulness meditation-based stress reduction intervention on rates of skin clearing in patients with moderate to severe psoriasis undergoing phototherapy (UVB) and Photochemotherapy (PUVA). *Psychosomatic Medicine*, 60, 625-632.

Kang, C. & Whittingham, K. (2010). Mindfulness: A dialogue between Buddhism and clinical psychology. *Mindfulness*, 1, 161-173. DOI 10.1007/s12671-010-0018-1.

Keng, S., Smolski, M.J., & Robins, C.J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review*, 31, 1041-1056. DOI: 10.1016/j.cpr.2011.04.006.

Kleen, M., & Reitsma, B. (2011). Appliance of Heart Rate Variability biofeedback in Acceptance and Commitment Therapy: A pilot study. *Journal of Neurotherapy*, 15, (2), 170-181. DOI:  
10.1080/110874208.2011.570695.

Koszycki, D., Benger, M., Shlik, J., & Bradwejn, J. (2007). Randomised trial of a meditation-based stress reduction programme and cognitive behaviour therapy in generalised social anxiety disorder. *Behavior Research and Therapy*, 45, 2518-2526. DOI: 10.1016/j.brat.2007.04.011.

Lee, D.T.S. & Chung, T.K.H. (2007). Postnatal depression: an update. *Best Practice & Research Clinical Obstetrics and Gynaecology*, 21, (2), 183-191. DOI: 10.1016/j.bpobgyn.2006.10.003.

Lefkowitz, D.S., Baxt, C., & Evans, J.R. (2010). Prevalence and correlates of posttraumatic stress and postnatal depression in parents of infants in the neonatal intensive care unit (NICU). *Journal of Clinical Psychology in Medical Settings*, 17, 230-237.

Littleton, H.L., Bye, K., Buck, K., & Amacker, A. (2010). Psychosocial stress during pregnancy and perinatal outcomes: a meta-analytic review. *Journal of Psychosomatic Obstetrics and Gynecology*, 31, (4), 219-228. DOI: 10.3109/0167482X.2010.518776.

Lobel, M., Cannella, D.L., Graham, J.E., DeVincent, C., Schneider, J., & Meyer, B.A. (2008). Pregnancy-specific stress, prenatal health behaviours, and birth outcomes. *Health Psychology*, 27, (5), 604-615. DOI: 10.1037/a0013242.

- Lobel, M., DeVincent, C.J., Kaminer, A., & Meyer, B.A. (2000). Impact of prenatal maternal stress and optimistic disposition on birth outcomes in medically high-risk women. *Health Psychology, 19*, (6), 544-553. DOI: 101037//0278-6133.19.6.544.
- Lobel, M., Dunkel-Schetter, C., & Scrimshaw, S.C.M. (1992). Prenatal maternal stress and prematurity: A prospective study of socioeconomically disadvantaged women. *Health Psychology, 11*, (1), 32-40.
- Lovibond, P.F., & Lovibond, S.H. (1994). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behavioural Research and Therapy, 33*, (3), 335-343.
- Lovibond, P.F., & Lovibond, S.H. (1995). *Manual for the Depression Anxiety Stress Scales (2<sup>nd</sup> ed.)*. University of New South Wales: Sydney, Australia.
- MacKillop, J., & Anderson, E.J. (2007). Further psychometric validation of the mindful attention awareness scale (MAAS). *Journal of Psychopathology and Behavioural Assessment, 29*, 289-293. DOI: 10.1007/s10862-007-9045-1.
- Roberti, J.W., Harrington, L.N., & Storch, E.A. (2006). Further psychometric support for the 10-item version of the Perceived Stress Scale. *Journal of College Counselling, 9*, (2), 135-147.

Robertson, E., Grace, S., Wallington, T., & Stewart, D.E. (2004). Antenatal risk factors for postpartum depression: a synthesis of recent literature. *General Hospital Psychiatry*, 26, 289-295. DOI: 10.1016/j.genhosppsych.2004.02.006.

Roth, B., & Tae-Wol, S. (2002). Mindfulness-based stress reduction and health care utilisation in the inner city: Preliminary findings. *Alternative Therapies in Health and Medicine*, 8, (1), 60-66.

Santorelli, S.F. (2012). *Stress Reduction Program*. Worcester, Massachusetts: University of Massachusetts Medical School.

Saxe, G.A., Hebert, J.R., Carmody, J.F., Kabat-Zinn, J. Rosenzweig, P.H., Jarzowski, D., Reed, G.W., & Blute, R.D. (2001). Can diet in conjunction with stress reduction affect the rate of increase in prostate specific antigen after biochemical recurrence of prostate cancer? *The Journal of Urology*, 166, 2202-2207.

Sears, S.R., Kraus, S., Carlough, K., & Treat, E. (2011). Perceived benefits and doubts of participants in a weekly meditation study. *Mindfulness* [published online 12 April 2011]. DOI:10.1007/s12671-011-0055-4.

Singh, N.N. (2010). Mindfulness: A finger pointing to the moon. *Mindfulness*, 1, 1-3. DOI:10.1007/s12671-010-0009-2.

- Spielberger, C.D., Gorsuch, R.L., Lushene, R., Vagg, P.R., & Jacobs, G.A. (1983). *Manual for the State-Trait Anxiety Inventory (Form Y)*. Palo Alto, California: Consulting Psychologists Press.
- Teasdale, J.D., Segal, Z.V., Williams, J.M.G., Ridgeway, V.A., Soulsby, J.M., & Lau, M.A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology*, 68, (4), 615-623. DOI: 10.1037//0022-006X.68.4.615.
- Terry, D.J., Mayocchi, L., & Hynes, G.J. (1996). Depressive symptomatology in new mothers: a stress and coping perspective. *Journal of Abnormal Psychology*, 105, (2), 220-231.
- The Wild Divine Project (2006). *Healing Rhythms: 15-step guided training manual*. Eldorado Springs, Colorado: Author.
- Toomin, M.K., & Toomin, H. (1975). GSR biofeedback in psychotherapy: some clinical observations. *Psychotherapy: Theory, Research & Practice*, 12, (1), 33-38.
- Urizar, G.G., Milazzo, M., Huynh-Nhu, L., Delucchi, K., Sotelo, R., & Munoz, R.F. (2004). Impact of stress reduction instructions on stress and cortisol levels during pregnancy. *Biological Psychology*, 67, 275-282. DOI:10.1016/j.biopsycho.2003.11.001.

Vieten, C., & Astin, J. (2008). Effects of a mindfulness-based intervention during pregnancy on prenatal stress and mood: Results of a pilot study. *Archives of Women's Mental Health, 11*, 67-74. DOI 10.1007/s00737-008-0214-3.

Waikato Regional Council. (2012). About the region. Retrieved June 2, 2012 from <http://waikatoregion.govt.nz>.

Walls, A. (1984). Christianity. In *A Handbook of Living Religions* [Ed. J.R.Hinnells]. London: Penguin Books.

Whiffen, V.E. (1988). Vulnerability to postpartum depression: A prospective multivariate study. *Journal of Abnormal Psychology, 97*, (4), 467-474.

Wild Divine (2012). *About Wild Divine*. Retrieved June 9, 2012 from <http://www.wilddivine.com/about-wild-divine>.

Wild Divine Project (2011). *Good Samaritan Orthopedics* (Treatment review article). Retrieved June 2, 2011 from <http://www.wilddivine.com>.

Wolsko, P.M., Eisenberg, D.M., Davis, R.B., & Phillips, R. (2004). Use of mind-body medical therapies: Results of a national survey. *Journal of General Internal Medicine, 19*, 43-50.

Yang, L. (1987). The effects of EMG biofeedback and autogenic training in

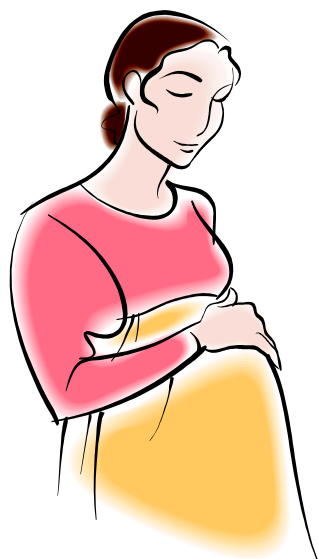
relieving the anxiety of pregnant women. (K.Kong, Trans.). *Acta Psychologica Sinica*, 19, (4), 420-426.



# Pregnant?

## Stressed?

### This is for you!!



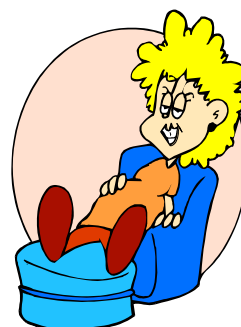
A group of researchers at the University of Waikato are working on ways to help pregnant women reduce their stress levels. This project, based in Thames, is looking at how women can be helped to find ways to relax and feel calm during pregnancy.

The research uses a computer-based programme that teaches mindfulness and self-relaxation techniques. Participants can complete sessions whenever convenient to them. Participants will receive petrol vouchers to assist with travel to Thames, each time they complete a computer session.

Ethics approval has been given: #11/23

**For more information, please contact Steve Williams**

**[stevewilliams@farmside.co.nz](mailto:stevewilliams@farmside.co.nz) or 07 868 6420**



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**Stress reduction in pregnancy****INFORMATION SHEET**

A group of researchers from the University of Waikato is undertaking a project to help us understand how stress affects women during pregnancy, and whether a mindfulness based approach to stress reduction can be helpful in reducing experienced stress. We would like to invite you to take part in this project, which will involve completing some questionnaires (or answering questions in person if you prefer). You are always free to decide not to participate, not to answer any particular questions, or to stop your involvement at any time.

If you decide to participate we will provide some initial questionnaires, which ask about stress, anxiety, and mood. These should take about 30 minutes to complete, and we ask that you complete these yourself, giving your own opinion. If you would prefer to answer these questions in an interview, we will arrange for someone to come and talk with you, and they will fill in the forms. This may, however, take a little longer.

Steve Williams, a researcher based in Thames, will then arrange with you to meet, and will introduce you to a computer-based mindfulness training programme. Once you have been logged into this computer, you can return to it when it best suits, to complete further modules of the programme, which has 15 modules altogether. The researcher will be available to answer any questions that you may have, and is experienced in mindfulness-based relaxation. Sessions may be completed with or without the researcher present, and arrangements for computer access can be made ahead of time if needed.

A few weeks or so after completing the programme, we will again provide some questionnaires, and also seek some feedback about how you have found the process. None of this information will become part of your medical record, and we will keep all your information confidential and anonymous. The only exception to this would be that if we were concerned about your safety, such as if you were having suicidal thoughts, we would talk with you about what supports are available and let your doctor or midwife know about the concern. Some general information on support services is provided in this packet.

All participants in this project will be given an ID number, so that your name will not appear on computer files or anything that you fill out apart from the consent form. No material which could identify you will be used in any reports based on this study. We recognise that the Thames-Coromandel has a widely spread rural population, and therefore participants will be offered a \$10 petrol voucher each time they come into Thames to complete a module, up to the number of modules overall. If you fill in the form marked 'petrol vouchers' arrangements will be made to send the vouchers to you by post or have the vouchers available for collection when you are in Thames.

Note: within the mindfulness-based programme is a section entitled 'taking a daily supplement'. This refers to daily mindfulness practices, rather than the taking of tablets or dietary supplements. To clarify this, however, we wish to recommend that should participants decide to take tablets or dietary supplements during the course of pregnancy, that this should be done in consultation with your maternity care provider or GP only.

This study has been reviewed and approved by the University of Waikato School of Psychology Ethics Committee. If you have any questions or concerns about your rights as a participant in this research study you can contact the convenor of the Research and Ethics Committee, Dr Lewis Bizo, phone 07 838 4466 ext. 6402 or 07 856 0095, email [lbizo@waikato.ac.nz](mailto:lbizo@waikato.ac.nz).

You can also contact an independent health and disability advocate. This is a free service provided under the Health and Disability Commissioner Act, and can be accessed by calling 0800 555 050.

We appreciate your time and participation in this project, which will help us identify ways we can work with women around stress in pregnancy.

*If you have any questions about the details of the project or issues related to getting to sessions or using equipment, please contact Steve Williams on 07 868 6420 or 027 276 3088, or email [stevewilliams@farmside.co.nz](mailto:stevewilliams@farmside.co.nz)*

*If you have any questions about the study at any time, please feel free to call the lead researcher, Carrie Cornsweet Barber, on 07 838 4466 x 6685, or email [cbarber@waikato.ac.nz](mailto:cbarber@waikato.ac.nz)*

**EXPRESSION OF INTEREST**

I have read the information pack about the proposed research into stress reduction in pregnancy, and would be interested in participating in this research. I would be happy for a researcher to contact me to discuss the research further, and to offer me a consent form to sign if I decide to be involved (this sheet is not a consent form, but only a request for further information).

Please provide your details below:

Name \_\_\_\_\_

Postal address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone number \_\_\_\_\_

Mobile \_\_\_\_\_

Email address \_\_\_\_\_

**CONSENT FORM****Research Project: Mindfulness-based stress reduction in pregnancy**

Name of researchers: Carrie Cornsweet Barber, Ph.D.

Steve Williams BA Psych (Hons).

I have received an information sheet about this research project, or the researcher has explained the study to me. I have had the chance to ask any questions and discuss my participation with other people. Any questions have been answered to my satisfaction.

I agree to participate in this research project and I understand that I may withdraw at any time up to three weeks from the final interview. If I have any concerns about this project I may contact the convenor of the research ethics committee (Dr Robert Isler, phone 838 4466 ext. 8401, email [r.isler@waikato.ac.nz](mailto:r.isler@waikato.ac.nz))

Participant name (PLEASE PRINT) \_\_\_\_\_ Date \_\_\_\_\_

Signature \_\_\_\_\_

**Contact for Follow-up study**

We may wish to conduct a follow-up study in the future, to see how those who have completed this programme are doing, compared with others who have not. If you might be interested in participating in any follow-up study, please could you provide some contact details below, so that we can contact you in the future to tell you what we are planning and see if you are interested.

This is not a consent form, this is just to give us permission to contact you in the future and ask if you wish to be involved, if such a study goes ahead.

ID number \_\_\_\_\_

Name \_\_\_\_\_

Postal address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone number \_\_\_\_\_

Mobile \_\_\_\_\_

Email address \_\_\_\_\_

**Summary of research findings**

If you would like us to send you a summary of the research findings after the study is complete, please provide your mailing address or a suitable email address below:

Name \_\_\_\_\_

Postal address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Or

Email address \_\_\_\_\_

## QUESTIONNAIRES

The following Questionnaires form part of this appendix:

PSS-10	Perceived Stress Scale – 10 item
EPDS	Edinburgh Postnatal Depression Scale
STAI-S	State-Trait Anxiety Inventory - State
STAI-T	State-Trait Anxiety Inventory - Trait
CSES	Coping Self-Efficacy Scale
PLES	Prenatal Life Events Scale
MAAS	Mindful Attention Awareness Scale



## Appendix H

**Interview Guide for completion interview**

What has it been like doing the exercises?

How did you feel about the philosophy behind the teaching sections?

Can you describe any conflict with your own spiritual beliefs?

How well do you think this would work for pregnant women in general?

Can the exercises be useful to you without the computer programme?

Are you able to use any of the techniques now without the computer?

Would you recommend this programme to a friend?