

Mindfulness-Based Yoga Intervention for Women with  
Elevated Levels of Depressive Symptoms

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## **Dedication**

This dissertation is dedicated to the individuals that embody the essence of yoga and tirelessly dedicate their time and efforts to share the healing potential of this profound practice with others. I am inspired every day by the extraordinary people I have met through yoga.

## Abstract

One of the most common and debilitating health conditions in the United States and worldwide is major depression. Preliminary evidence indicates that Hatha Yoga may be an effective intervention for the management and treatment of depressive symptoms. Although compelling, these results are preliminary given the many substantial methodological limitations. Additional research is needed that addresses these limitations. The current study was a prospective, randomized, controlled intervention pilot study examining the efficacy of a 12-week mindfulness-based yoga intervention relative to a walking health education comparison condition among sedentary women ( $n=40$ ) with elevated levels of depressive symptoms. Depressive symptoms and other wellness outcomes were assessed at baseline, post-intervention, and one-month follow-up. Both groups reported decreases in depressive symptoms from baseline to post-intervention,  $f(1,33)=34.83$ ,  $p<.001$ , and from baseline to one-month follow-up,  $f(1,33)=37.01$ ,  $p<.001$ . After controlling for baseline, there were no significant between group differences on depression scores at post-intervention and one-month follow-up assessments. The mindfulness-based yoga condition reported significantly lower levels of rumination than the walking health education comparison condition, after controlling for baseline levels of rumination, at post-intervention,  $(f(1,31)=6.23$ ,  $p<0.01)$ . Similar improvements for both groups from baseline to post-intervention were observed for increased moderate intensity physical activity, perceived stress, mindfulness, quality of life, and sleep disturbance; however, there were no differences between groups. Results indicate that yoga may be effective for reducing rumination; however, its effect on

depressive symptoms is less clear. Future studies, with larger samples are needed to address the effect of yoga on depression.

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## Definition of Terms

**Hatha Yoga:** A style of yoga that incorporates physical postures (asana), breathing exercises (pranayama), and meditation to train the physical body to experience optimal physical, emotional, and spiritual health.

**Mindfulness-based Hatha Yoga:** A style of Hatha Yoga that incorporates physical postures (asana), breathing exercises (pranayama), and meditation. This style places specific emphasis on developing mindfulness skills to train the physical body in an effort to experience optimal physical, emotional, and spiritual health.

**Major depressive disorder:** Defined as having five or more of the following symptoms (must have at least one of the first two symptoms) for at least two weeks: Depressed mood, lack of pleasure or interest, sleep disturbance, weight and/or appetite changes, loss of energy, agitation, feelings of worthlessness or guilt, diminished concentration, and thoughts of death or suicide. The mood must represent a change from the individual's normal mood, cannot be caused by substances (e.g., drugs, alcohol, medications), cannot be accounted for by another mental health disorder (e.g., bipolar disorder, schizoaffective disorder), and must significantly impair their daily functioning.

**Elevated levels of depressive symptoms:** For the purposes of this study, defined as having a score of  $\geq 14$  on the Beck Depression Inventory (BDI) and a score of  $\geq 10$  on the Patient Health Questionnaire (PHQ-9).

# 1

## Introduction

## **1.1 Background**

One of the most common and debilitating health conditions in the United States and worldwide is major depression (Branchi & Schmidt, 2011; Kessler et al., 2003). Approximately 24% of individuals will experience at least one depressive episode in their lifetime (Rubio et al., 2011). Depression is associated with significant impairment, which can be worse than chronic medical disorders (Wells, Golding, & Burnam, 1989). Depressive symptoms have been correlated with the presence of chronic disease (Katon, 1987), the inability to work (Stewart, Ricci, Chee, Hahn, & Morganstein, 2003), and increased use of medical services (Johnson, Weissman, & Klerman, 1992). In fact, it is estimated that the United States spends 30 to 50 billion dollars each year on direct medical costs and time lost in productivity on individuals with depression (Robinson, Geske, Prest, & Barnacle, 2005). The Global Burden of Disease report by the World Health Organization found that depressive disorders were the fourth leading cause of disease burden in terms of lost years of life, and that major depression accounted for 12% of all total years lived with a disability worldwide in 2000 (Üstün, Ayuso-Mateos, Chatterji, Mathers, & Murray, 2004). Over the next 20 years, depression is projected to be the leading cause of disability in the United States (Mathers & Loncar, 2006).

Physical activity is associated with the reduction of depression and associated symptoms (Jorm, Christensen, Goodwin, 2003; Lawlor & Hopker, 2001; Teychenne, Ball, & Salmon, 2008). The results of physical activity as a treatment for mild to moderate depression compare favorably to psychotherapy and pharmacologic treatment,

supporting the idea that a behavioral intervention can have a similar effect on mood as pharmacologic intervention (Lawlor & Hopker, 2001).

Preliminary evidence indicates that Hatha Yoga, a specific style of Yoga that focuses on the mindful movement and physical aspect of yoga, is also an effective intervention for managing and treating depressive symptoms (Cramer, Lauche, Langhorst, & Dobos, 2013; Pilkington, Kirkwood, Rampes, & Richardson, 2005; Uebelacker, et al., 2010). However, there are several limitations related to the previous studies examining yoga including short interventions, lack of follow-up, high attrition rates, and low adherence rates. Therefore, additional studies are needed in this area.

## **1.2 Rationale**

This dissertation will address the following gaps in the literature regarding the effect of yoga on depressive and associated symptoms:

1. Few studies have examined the effect of yoga on depressive symptoms utilizing a randomized controlled study design with an active comparison control group.
2. Two studies have examined the effect of yoga on mood and anxiety, in comparison to walking, in healthy, non-depressed populations (Khattab, K., Khattab, A., Ortak, Richardt, and Bonnemeier, 2007; Streeter et al., 2010).

However, there are no published studies evaluating the effect of a home-based yoga program in comparison to a home-based walking program in depressed individuals. The majority of yoga-based interventions focused on treating depressive symptoms, have utilized an in-person class format with relatively high drop-out and low adherence rates (Uebelacker et al., 2010).

3. Several studies have examined the effect of yoga interventions on depression (Uebelacker et al., 2010), however, few studies have utilized follow-up assessments after the intervention has ended.
4. There are few published studies examining the relationship between depressive symptoms and mindfulness skills following yoga intervention among adult depressed women.
5. There are no published studies examining the impact of an intervention incorporating both hatha yoga practice and mindfulness education sessions on depressive symptoms.

The purpose of this dissertation was to examine the effect of a mindfulness-based yoga intervention on depressive symptoms among women compared to a walking health education comparison group. This study included only women, given women are twice as likely as men to meet the criteria for depression (Kessler et al., 2003). A 75-minute hatha-yoga DVD, designed specifically for managing the symptoms associated with depression and anxiety was the primary intervention tool. The DVD allowed participants to adapt their daily yoga practice according to their current mood by selecting multiple 10-minute segments from the DVD menu (Weintraub & Duncan, 2007). The style of yoga presented in the DVD has been used successfully in previous studies designed to improve depressive symptoms (Bennett, Weintraub, & Khalsa, 2008; Kinser, Bourguignon, Whaley, Hauenstein, & Taylor, 2013; Kinser, Elswick, & Kornstein, 2014). The mindfulness practices in the DVD were discussed and reinforced in regular telephone education sessions.

The yoga intervention was compared to a walking health education comparison condition. According to the American College of Sports Medicine list of metabolic equivalents, a 60-minute yoga intervention is metabolically equivalent to 60 minutes of walking at 2.5 miles per hour (mph) on a flat surface (rated at 3.0 METs). A study that measured mean oxygen consumption, heart rate, percentage predicted maximal heart rate, metabolic equivalents, and energy expenditure (kcal) found that 30 minutes of sitting and 56 minutes of beginner-level hatha yoga postures was similar to walking on a treadmill at 3.2kph (Hagins, Moore, & Rundle, 2007). Walking at this metabolic equivalent and other health behaviors were discussed and reinforced in regular telephone education sessions.

### **1.3 Specific Aims and Hypotheses**

**Specific Aim 1:** To examine the effect of a 12-week mindfulness-based yoga intervention relative to a walking health education comparison condition on depressive symptoms among women with depression.

**Related hypothesis.** Participants in the mindfulness-based yoga intervention would exhibit greater decreases in depressive symptoms than participants in the walking health education comparison condition.

**Specific Aim 2:** To examine the effect of a 12-week mindfulness-based yoga intervention on rumination (repetitive negative thinking) and perceived stress in comparison to a walking health education comparison condition among women with depression.

**Related hypothesis.** Participants in the mindfulness-based yoga intervention would report greater decreases in rumination and perceived stress than participants in the walking health education comparison condition.

**Specific Aim 3:** To examine the effect of a 12-week mindfulness-based yoga intervention on the development of mindfulness, in comparison to a walking health education comparison condition among women with depression.

**Related hypothesis.** Participants in the mindfulness-based yoga intervention would demonstrate a greater increase in mindfulness than the walking health education comparison condition.

**Specific Aim 4:** To examine the relationship between mindfulness and depressive symptoms among participants in the mindfulness-based yoga study arm.

**Related hypothesis.** Lower levels of depressive symptoms would be related to higher levels of mindfulness among women in the mindfulness-based yoga arm.

#### **1.4 Other Questions of Interest**

**Question of Interest 1:** To examine the effect of a 12-week mindfulness-based yoga intervention on perceived quality of life, sleep quality, and body mass index in comparison to a walking contact control condition among women with depression.

**Question of Interest 2:** To examine the lasting effect of a 12-week mindfulness-based yoga intervention on the variables of interest in comparison to a walking contact control condition at four weeks following completion of intervention.

# 2

## Literature Review

## **2.1 Introduction**

### **2.1.1 Prevalence of Depression**

Depression is the most prevalent of all psychiatric disorders affecting up to 25% of women and 12% of men during their lifetimes (Kessler et al., 2003; Moussavi et al., 2007). A study conducted by Bromet et al., (2011) indicated that 8.3% of the adult population in the United States had experienced a major depressive disorder during the preceding 12 months. Individuals with health conditions (i.e. obesity, cardiovascular disease, diabetes, arthritis, and cancer) also report higher rates of depression than the general population (Dickens, McGowan, Clark-Carter, & Creed, 2002; Goldney, Phillips, Fisher, & Wilson, 2004; Hofmann, Kohler, Leichsenring, & Kruse, 2013; Musselman, Evans, & Nemeroff, 1998; Onyike, Crum, Lee, Lyketsos, & Eaton, 2003), and is associated with a wide range of indicators of impairment and secondary morbidity (Kessler & Bromet, 2013).

According to results from the 2006-2008 Behavioral Risk Factor Surveillance System (BRFSS), approximately 9.0% of US adults (n=253,067) met the criteria for current depression, (Strine et al., 2008). Women are significantly more likely than men to report major depressive symptoms, at 4% and 2.7% respectively (Kessler et al, 2003).

Given the high prevalence of depression in the United States, along with the economic burdens associated with the treatment of depression and its comorbidities, there is a strong need for effective interventions that prevent and treat depression. The impact of depression on personal subjective suffering; social and occupational functioning; and physical health and mortality is substantial.

### **Chapter 2.1.2 Depression Defined**

According to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR, 2000), major depressive disorder is defined as having five or more of the following symptoms (must have at least one of the first two symptoms) for at least two weeks: Depressed mood, lack of pleasure or interest, sleep disturbance, weight and/or appetite changes, loss of energy, agitation, feelings of worthlessness or guilt, diminished concentration, and thoughts of death or suicide. The mood must represent a change from the individual's normal mood, cannot be caused by substances (i.e. drugs, alcohol, medications), cannot be accounted for by another mental health disorder (i.e. history of bipolar disorder or schizoaffective disorder), and must significantly impair their daily functioning. Major depressive is typically diagnosed using a psychiatric interview and can be categorized into one of four groups: 1) Mild depression; (2) moderate depression; (3) severe depression; and (d) severe depression with psychotic symptoms (Kessler et al., 2007). Due to the prevalence and severe consequences of major depressive disorder, a variety of interventions have been utilized to treat depression.

Although depression is characterized by depressed mood, many individuals experience a variety of psychological, cognitive, and physical symptoms beyond the depressed mood (APA, 2000). For example, up to half of women with a diagnosis of depression may experience a form of "anxious depression," characterized by excessive ruminations (Halbreich & Kahn, 2007; Marcus et al., 2008). Rumination is a complex concept, typically defined as repetitive negative thinking about one's depression and life circumstances (Smith & Alloy, 2009). Rumination is generally considered to be an

emotion-focused coping style that is often ineffective or maladaptive because it can perpetuate stress and depressive symptoms (Kuehner, Huffziger, & Liebsch, 2009; Weinstein, Brown, & Ryan, 2009). A low sense of mastery seems to contribute to brooding, a factor of rumination, when one repeatedly contemplates what is wrong in one's life and why it is not better (Treyner, Gonzalez, & Nolen-Hoeksema, 2003).

## **Chapter 2.2 Depression Treatment Options**

Depression is a complex disorder that can be difficult to treat successfully.

Depression is commonly treated with antidepressants or psychotherapy, or a combination of both (Kupfer, 1991). Although there is evidence to indicate that these approaches are effective in reducing depressive symptoms, a recent evaluation of large-scale studies on these traditional methods revealed large participant dropout rates, low remission rates, and placebo responses (Mathew & Charney, 2009; Pigott, Leventhal, Alter, & Boren, 2010; Rief et al., 2009; Turner, Matthews, Linardatos, Tell, & Rosenthal, 2008).

Psychotherapies alone have also been used with mixed results. For example, researchers conducted a meta-analysis that included 53 studies examining seven major types of psychological treatment for mild to moderate adult depression (i.e. psychodynamic treatment, problem-solving therapy, interpersonal psychotherapy, cognitive-behavior therapy, nondirective supportive therapy, behavioral activation treatment, and social skills training). Investigators concluded that none of the treatments were more or less efficacious than the others and in many cases, no more efficacious than a control or standard care (Cuijpers, Van Straten, Andersson, & Van Oppen, 2008).

Despite the traditional usage of antidepressants and psychotherapy for the treatment of depression, research indicates that compliance with antidepressant treatment is poor, and in clinical trials, the dropout rate is between 12%-40% within the initial six to eight weeks of treatment (Cipriani et al., 2009; Kirsch et al., 2008). The possible reasons for low compliance include adverse side effects and the lag time between starting antidepressants and improvements in depressive symptoms (Masand, 2003).

Psychotherapy treatments do not have the side effects as is seen with antidepressant therapy, but some individuals may experience a perceived stigma that prevents them from seeking and finding success with this type of treatment. Moreover, depression is associated with diminished health status and increased health care utilization, yet is also a significant risk factor for noncompliance to medical treatment (DiMatteo, Lepper, & Croghan, 2000). Consequently, the interest in the use and evaluation of alternative or complementary therapies has grown. For example, physical activity has been evaluated as a viable alternative treatment for major depressive disorder (Mead et al., 2009).

### **Chapter 2.3 Physical Activity Interventions and Depression**

Data from epidemiological studies indicates an association between physical inactivity and higher levels of depressive symptoms (Camacho, Roberts, Lazarus, Kaplan, & Cohen, 1991; Farmer et al., 1988) and physical activity has been shown to significantly improve mood (Mead et al., 2009). Additionally, research suggests that decreases in physical activity levels lead to increased symptoms of depression in older adults (Lampinen, Heikkinen, & Ruoppila, 2000) and that depressive symptoms decrease when physical activity is resumed (Farmer, et al., 1988). Regarding randomized trials,

Dunn, Trivedi, Kampert, Clark and Chambliss (2005) conducted a study in which individuals with mild to moderate depression were randomly assigned to either a control arm or one of four exercise treatment arms. The four exercise treatment groups were divided based on total caloric expenditure (7.0 kcal/kg/week or 17.5 kcal/kg/week) and frequency (3 days/week or 5 days/week). The four treatment groups were coded as Public Health Dose (PHD)/3 (17.5 kcal/kg/week, exercising 3 days/week), PHD/5 (17.5 kcal/kg/week, exercising 5 days/week), LD/3 (7.0 kcal/kg/week, exercising 3 days/week), and LD/5 (7.0 kcal/kg/week, exercising 5 days/week). The primary dependent variable was change of depressive symptoms based on the Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960).

At 12 weeks, the PHD/3 had the lowest mean HRSD score and the PHD group (as a whole) was significantly more effective than the LD and control group in reducing HRSD scores. Adjusted HRSD scores were reduced 47% at 12 weeks from baseline for the PHD group, in contrast to the LD group, which reported a 29% reduction in scores from baseline. As for response, (defined as 50% of baseline HRSD scores) and remission rates (defined as HRSD scores  $\leq$  7), the greatest response rate was for the PHD/5 group and the greatest remission rate was in the PHD/3 group. These results suggest that the PHD of exercise may be an effective therapy for mild to moderate major depressive disorder. However, these results should be interpreted with caution due to methodological limitations. For example, participants could not be blinded to the treatment assignment, which led to a high initial drop-out rate for the control condition in

comparison to the treatment groups. Additionally, because the participants' exercise was highly monitored, the external validity of the study was compromised.

Blumenthal and colleagues (1999) conducted a 16-week, randomized study examining the effectiveness of an aerobic exercise program compared to a standard antidepressant medication for the treatment of major depressive disorder. Participants (adult men and women, n=156) were randomly assigned to one of three groups: (a) Aerobic exercise only; (b) antidepressant medication only; or (c) combination of both exercise and medication. All three groups showed a statistically significant decrease in depressive symptoms from pre to post-test, as measured by the Hamilton Rating Scale for Depression (HAM-D) and the Beck Depression Inventory (BDI). However, there was no statistically significant difference between the three treatment groups. Additionally, exercise was done in a group setting. It is possible that the social interaction of the participants is what led to the mood response, rather than the exercise program. Despite these limitations, these results indicate that physical activity may be just as beneficial for decreasing depressive symptoms as antidepressant therapy, suggesting that individuals may be able to manage their depression without experiencing the side effects often associated with antidepressant medication.

Blumenthal and colleagues (2007) conducted a follow-up study examining the effect of a supervised group aerobic exercise program, home-based aerobic exercise program, standard antidepressant medication (sertraline), and placebo pill group on depressive symptoms among individuals diagnosed with major depressive disorder. After being randomized into one of the four study arms, participants (n=202; 153 women,

49 men) underwent a 16-week intervention program. After four months of treatment, 41% of the participants were in remission (defined as no longer meeting the criteria for major depressive disorder and a HAM-D score less than 8). Participants who had been randomized to the exercise groups had a tendency for higher remission rates than the placebo control group ( $p=.057$ ). Although all treatment groups reported lower HAM-D scores after treatment, there was not a statistically significant difference between treatment groups and the placebo group ( $p=.23$ ). Blumenthal et al. (2007) postulated that the high performance by the placebo group could be attributed to patient expectations, attention, and other nonspecific factors. Yet, these results offer promise as the exercise groups reported similar reduction rates in depressive symptoms as the antidepressant group. This could be meaningful for individuals who wish to avoid the adverse side effects of antidepressant medication.

Singh and colleagues (2005) conducted a randomized controlled trial that examined the efficacy of a high intensity progressive resistance training program or a low intensity progressive resistance training program relative to a standard care program conducted by a general practitioner. Participants ( $n=60$ ) were elderly men and women who were randomized into one of three study arms: (a) High intensity progressive resistance training (defined as 80% of 1 RM); (b) low intensity progressive resistance training (defined as 20% of 1 RM); or (c) standard care by a general practitioner group. The intervention lasted eight weeks and both resistance training groups met three times a week for 60 minutes each session. The high intensity group reported a 50% reduction on the HAM-D among 61% of the high intensity group whereas 29% in the low intensity

group and 21% in the standard care group reported a 50% reduction. This was a significant decline ( $p=.03$ ), indicating that strength-based physical activity programming may decrease perceived depressive symptoms. The results of this study are difficult to generalize as this was a specific population with motivated, otherwise healthy older adults.

In conclusion, the above studies support the hypothesis that physical activity may be an effective treatment for depression. However, it remains unclear why physical activity is effective for decreasing depressive symptoms. There is a need to better understand the underlying mechanism that accounts for the effect of exercise on depression.

### **Chapter 2.3.1 Physical Activity Interventions and Proposed Mechanisms**

The concept that exercise may be an effective treatment for mental health disorders is not a novel idea. In fact, one of the earliest reports in the psychological literature discusses the association between exercise and mental health (Vaux, 1926). This report suggested that exercise may relieve cases of depression by promoting nervous-system stimulation and improving glandular secretions. Since then, researchers have extensively examined the relationship between physical activity and mental health. Although there has been considerable progress in this line of research, the specific mechanisms and the conditions under which they operate are still being investigated. The most consistently supported postulated mechanisms fall into two categories including biochemical and psycho-social.

Biochemical mechanisms have gained considerable attention as the mechanism of which exercise influences mood. The discovery of endogenous opioid peptides in blood, both during and after exercise, was first thought to produce a euphoric feeling. This was also known as the “runner’s high,” which positively influenced mood (Steinberg & Sykes, 1985). However, research conducted in recent years has not supported this as a mechanism for the general population, given studies have found that achieving this “runner’s high” is likely to require high levels of exercise output (Boecker et al., 2008). Additionally, further studies have not indicated a relationship between endorphin levels and mood.

More recent research suggests an interaction between physical activity and central serotonin (5-hydroxytryptamine [5-HT]) as a mood enhancer (Anish, 2005). Studies including both animal and human participants have identified increased levels of 5-HT synthesis in the brain and metabolic rate with acute exercise (Blomstrand, Perrett, Parry-Billings, & Newsholme, 1989; Chaouloff, 1989; Gomez-Merino, Béquet, Berthelot, Chennaoui, & Guezennec, 2001). Increased levels of endorphins result in a state of feeling good, thus leading to improved mental health (Ernst, Olson, Pinel, Lam, & Christie, 2006). However, how influential this is on improving mood has yet to be discovered.

Researchers speculate that a sense of mastery and increased self-esteem may be a consequence of regular physical activity, which may also lead to a reduction in depressive symptoms. This could be a result of an increased sense of achievement and/or a response to the physical signs that are associated with exercise (i.e., reduction in

fatigue, muscle tone, weight loss; McAuley, Mihalko, & Bane, 1997). Physical activity can provide a medium for taking command over health behavior and body appearance that may then lead to a sense of autonomy and increased levels of self-esteem (Ekeland, Heian, Hagen, & Coren, 2005; White, Kendrick, & Yardley, 2009). The individual feels empowered and this perceived empowerment may lead to improved mental health outcomes (Ströhle, 2009). Preliminary evidence also suggests that exercise may assist in managing rumination, or repetitive negative thinking (Craft, 2005).

A proposed framework that has been gaining in popularity in recent years is the effect of exercise, specifically mindfulness-based exercise, as a way for individuals to “check in” to their exercise experience. This “check in” may help distract or let go of daily stressors or hassles and other stressful stimuli (Bahrke & Morgan, 1978). There is a well-established relationship between depression, negative self-evaluation, and negative thought processes (Garratt, Ingram, Rand, & Sawalani, 2007). Mindfulness-based exercise can aid in improving an individual’s ability to recognize these negative thought processes when they occur, which leads to improved self-esteem to manage the negative self-evaluation or thought processes appropriately. Additionally, research suggests that personal positive experiences in mindfulness-based exercise contribute to self-efficacy, whereby participants feel more motivated for and capable of participating in a mindfulness-based exercise routine, thereby reinforcing practice (Whaley, 2004). This may lead to increased positive affect and decreased symptoms of depression.

Although empirical evidence exists that supports each of these theoretical constructs explaining the relationship between physical activity and depression, questions

still remain on the exact mechanism of change. The impact of mindfulness (through mindfulness-based yoga) will be explored in the next section.

#### **Chapter 2.4 Definition of Yoga as Mindfulness-Based Physical Activity**

Historically, Western and Eastern health practices have differed in their approach to the prevention, treatment, and management of health and disease. However, globalization has led to an amalgamation of cultures and practices related to health and healing. In the West, the treatment of mental and physical illness and chronic disease are no longer limited to the traditional medical model. Within the past decade, the use of Complementary and Alternative Medicine (CAM) in the United States has continued to increase at a steady rate (Nahin et al. 2009). Many CAM techniques derive from Eastern medicine roots and focus on a combination of physical postures and mental exercises coupled with breathing techniques to achieve a harmonious integration of mind, body, and soul. Hatha yoga, along with meditation and mindful breathing exercises, are the most popular therapies in the United States (Wardle, Lui, and Adams, 2012).

Yoga is an ancient Indian science of philosophy, psychology, and discipline. The Yoga Sutras by Patanjali, written in 200 C.E. (Ravindra, 2009), has been greatly influenced by modern yoga practice. This ancient and sacred text outlines the eight-limbed path of yoga, which is an ethical outline delineating how this practice allows one to experience physical, mental, and emotional health through physical practice (asana), regulated and conscious breath work (pranayama), and meditation (dharana).

There are many interpretations of the word “yoga;” however, the literal translation of the word (from the Sanskrit root word “yuj”), is to yoke, join, connect, and bring together. The general aim of Yoga is to calm and unify the body, mind, and spirit with the intention of promoting optimal health and wellness (Iyengar, 1979). The traditional lineage of the Yoga discipline can be traced back to thousands of years ago, with its originations in India. However, the Yoga practice and teachings has spread significantly and is a popular practice across the world, including the United States. In 2008, the “Yoga in America Study” estimated that 15 million individuals in the United States practice yoga regularly (Ospina et al., 2008). Of the estimated 15 million, national surveys indicate that yoga users tend to be predominately female, Caucasian, college educated, and urban dwellers with a mean age of 39.5 years (Birdee et al., 2008).

As the popularity of yoga grew, many different styles and practices of yoga were developed. Hatha Yoga is the most practiced in the western world and focuses on training the physical body to experience optimal physical, emotional, and spiritual health (Feuerstein, 1996). Hatha yoga incorporates physical postures (asana), breathing exercises (pranayama), and meditation (dharana) to train the body, although it is very often viewed as primarily an exercise activity by individuals in the United States (Quilty, Saper, Goldstein & Khalsa, 2013).

Along with the physicality of the hatha yoga practice, mindfulness (meditation) is a primary component in the teachings and a central aspect of the yoga practice. TKV Desikachar, founder of the Krishnamacharya Healing and Yoga Foundation, writes that yoga attempts to create a state in which we are always present in every action, in every

moment (Desikachar, 1995). This description is similar to published descriptions of mindfulness in contemporary psychological literature. For example, a recent definition suggests that mindfulness includes the following two components. First, mindfulness is an established self-regulation of attention, which involves keeping attention on the immediate experience. This increased self-regulation of attention allows for increased recognition of mental circumstances in the present moment. Second, an individual adopts an orientation to the present moment, which is characterized by curiosity, openness, and acceptance.

In simpler terms, mindfulness can be defined as a set of skills, derived from contemplative traditions, which involves the cultivation of moment-to-moment, nonjudgmental awareness of one's present moment experience. According to John Kabat-Zinn (1990), the founder of the Mindfulness-Based Stress Reduction Program (MBSR), mindfulness is defined as a universal capacity to pay purposive attention to the present moment and includes self-reflection, acceptance, opening to difficulties without avoidance, and learning to be less judgmental and reactive. These seven attitudinal foundations are summarized in Table 2-1.

Table 2-1

*Seven Attitudinal Foundations of Mindfulness-Based Stress Reduction*

Foundation	Practice
Non-judging	Mindfulness is cultivated by assuming the stance of an impartial witness to your own experience. Not labeling thoughts, emotions, experiences as 'good' or 'bad'.
Patience	Mindfulness is developed by practicing patience with everyone, everything, including patience for self. Patience is a form of wisdom and demonstrates the understanding and acceptance that sometimes things unfold in its own time.
Beginner's Mind	Mindfulness is cultivated by the individual imagining how the experience would be if they were seeing or experiencing it for the first time.
Trust in Yourself	Mindfulness is cultivated by developing a basic trust in self, intuition, feelings, and instinct.
Non-striving	Mindfulness is practiced by individual focusing on cultivating of gratitude for each moment, being in that moment, and embracing the moment as it is. It is the practice of paying attention to whatever is happening without having to change it.
Acceptance	Mindfulness is practiced by acknowledging and accepting things as they are.
Letting Go	Mindfulness is practiced by individual being willing to examine the thoughts, emotions, circumstances, experiences that are attachments. Individual lets thoughts and experience be and practice observing moment to moment. Experiences and thoughts do not have to be perfect, just the best they can be in the moment.

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*Full Catastrophe Living* (p. 33-40), by Jon Kabat-Zinn, 1990, New York, New York: Bantam Dell. Copyright 1990 by Jon Kabat-Zinn.

This program has been one of the most widely studied mindfulness-based healing programs and has shown to decrease rumination in individuals with a history of depression (Jain et al., 2007; Ramel et al., 2004; Deyo, Wilson, Ong, & Koopman, 2009).

Mindfulness practice can induce states of relaxation and has been linked to the attenuation of anxiety and decreased depressive symptoms (Bohlmeijer, Prenger, Taal, & Cuijpers, 2010; Miller, Fletcher, & Kabat-Zinn, 1995; Rosenzweig, Reibel, Greeson, Brainard, & Hojat, 2003); however, this is not the ultimate goal of mindfulness. Rather, the focus of mindfulness is developing the capacity to simply observe and witness changing mental and physiological states without necessarily trying to change them, becoming attached to, or identifying with them. This, in turn, results in a state of ease and relaxation with the current circumstances as they are.

There are at least two aspects of yoga that, in other contexts, have been shown to prevent or alleviate depression. The increased development of mindfulness (Mathew, Whitford, Kenny, & Denson, 2010; Teasdale, Segal, Williams, & Ridgeway, 2000), and the physical component (yoga postures; Phillips, Kiernan, & King, 2003) have been proposed to decrease depressive symptoms. Through the active, physical practice of yoga, individuals learn mindfulness techniques. These mindfulness techniques are encouraged by “checking in” while moving through physically demanding yoga postures. These skills can be translated to other areas of life, possibly providing a coping tool effective for managing depressive symptoms. This translation may create a sense of mastery, which is another potential mechanism as to why yoga plays a role in managing depressive symptoms (Uebelacker et al., 2010).

## **Chapter 2.5 Depression, Yoga, and Mindfulness Interventions**

Yoga is increasingly being used as a treatment method for various mental disorders, either alone or as an adjunct to other therapies (Kessler et al., 2001). Preliminary findings indicate that Yoga and mindfulness (i.e., meditation) can be an effective therapeutic tool in the prevention and treatment of depression and other mood disorders (Pilkington, Kirkwood, Rampes, & Richardson, 2005; Weintraub, 2004).

For example, Woolery, Myers, Sternlieb, and Zeltzer (2004) conducted a five-week, 10-session randomized case-controlled study examining the efficacy of an Iyengar yoga intervention on the reduction of mild depressive symptoms in young adults. Participants (college-aged men and women, n=28) were randomly assigned to either a yoga intervention or a wait-list control group. Participants were experiencing mild levels of depression (based on the Beck Depression Inventory scores) and had no significant yoga experience.

Participants in the yoga intervention group reported decreases in self-reported symptoms of depression based on BDI scores and decreased trait anxiety as measured by the State-Trait Anxiety Inventory. In addition, participants in the yoga group exhibited higher morning cortisol levels by the end of the yoga intervention than the control group (higher morning cortisol levels are associated with a better mood).

Although the results of this study are promising, there are several limitations. The small sample size and lack of variance in the population (mostly female college-aged adults) makes it difficult to generalize the results. In addition, the length and frequency

of the yoga intervention was short (i.e., five weeks). The study also did not control for contact time. Finally, long-term follow-up assessments were not administered.

In a similar study, Shapiro and colleagues (2007) conducted an eight-week, 20-session single group study examining the efficacy of an Iyengar yoga intervention on the reduction of depressive symptoms among adults (n=37) who had been diagnosed with major depressive disorder and were in partial remission. Participants were assessed pre- and post-intervention and participants rated their mood states before and after each Iyengar yoga class, which makes the design of this study unique and especially meaningful. Participants reported an improved mood (dimensions of positive mood, negative mood, and energy arousal were measured) from before to after each class. Positive moods and energy/arousal increased, while negative moods decreased. In addition, there were significant reductions in depressive symptoms, anger, and anxiety. One limitation of this study was a lack of a control group. In addition, there was a relatively high dropout rate in this study (19%); however, this drop-out rate is comparable to other studies incorporating physical activity interventions.

Javnbakht, Kenari, and Ghasemi (2009) conducted a two-month randomized controlled study examining the effectiveness of a yoga intervention on the reduction of very mild depressive symptoms in women. Participants (n=65) were randomly assigned to either a yoga intervention (n=34) or a wait-list control group (n=31). Participants were experiencing mild levels of depression (based on the Beck Depression Inventory scores) and anxiety (based on the Spielberger questionnaire) and had no significant yoga experience.

Participants in the yoga intervention group did not significantly reduce their depression based on the baseline and post-treatment data. However, the experimental group reported a decrease on both state and trait anxiety relative to the control group. These results suggest that yoga may be a viable complementary therapy option for the treatment of mild anxiety disorders.

This study did have some significant methodological issues. For example, the intervention was short and included a convenient sample of women who had been referred to a yoga clinic. Although the women who were chosen for the study reported no experience with yoga, their self-selection into the yoga clinic indicates that they may have had some expectations regarding how the treatment would alleviate their symptoms. In addition, there was no active comparison of the yoga treatment group to another type of treatment for depression or anxiety. Finally, the mean depressive scores in both the experimental and control group were low before the intervention began and therefore, the results do not generalize to depressed individuals.

In an eight-week feasibility trial, Uebelacker et al. (2010) examined the effectiveness of Vinyasa yoga as an adjunctive treatment for patients diagnosed with mild to moderate levels of depression who were not responding to antidepressant medication. Participants (n=11) were also considered new to yoga practice (defined as the participant not taking more than four yoga classes in the past two years and not more than one class in the past month). Participants in the yoga intervention showed decreases in depression symptoms based on the Quick Inventory of Depressive Symptomatology (QIDS), increases in scores of mindfulness, as measured by the Five Facet Mindfulness

Questionnaire (FFMQ), and increases in behavioral activation, based on the Behavioral Activation for Depression Scale (BADs), specifically the avoidance and rumination score. Qualitative data was also collected in which participants cited emotional (i.e., feeling calm and relaxed, crying less often), physical (i.e., improved sleep and decreased pain), and social (i.e., enjoying time spent with others in the class) benefits from participating in the intervention. A significant limitation of this study is a lack of a control or comparison group. Additionally, the sample size was small and a majority of participants were well-educated, Caucasian women. Despite these methodological limitations, this pilot study offers promising results that can inform future research.

Dhananjai, Sadashiv, Tiwari, Dutt, and Kumar (2013) evaluated the efficacy of yoga on depression and anxiety among 272 obese adults between 20-45 years. Participants were 'divided' (no further details were given) into two groups consisting of either a six-month standardized protocol of Yoga classes (n=205) or a time-matched aerobic program (n=67). The Yoga group met 60 minutes per day, five days a week. The yoga techniques included postures, deep relaxation, breathing, and meditation. At six months, the Yoga group reported a reduction in depressive symptoms from pre- to post-intervention relative to a time-matched aerobics group, as measured by the Hamilton Rating Scale for Depression (HAM-D). Although the severity of depression at baseline was not reported or defined, the length of the intervention is a noteworthy strength of this study design.

Kinser, Bourguignon, Whaley, Hauenstein, and Taylor (2013) conducted an eight-week randomized, controlled study examining the efficacy of a hatha yoga intervention

compared to an attention-control activity among women diagnosed with major depressive disorder. Participants (n=27) were considered new to yoga practice, which was defined as no regular yoga or meditation practice longer than one month within the past five years. Participants randomized to the yoga intervention participated in once-weekly, 75-minute group classes and daily home practice with a DVD and handouts. Individuals randomized to the attention-control group attended a weekly 75-minute group health education class involving lectures and videos. Pre-post analysis indicated both groups reported a significant decrease in depressive symptoms as measured by the Patient Health Questionnaire (PHQ-9). The mean depression score dropped from a “moderately severe” level of depression to a “minimal” level over the course of the eight week intervention. However, the yoga group indicated a significantly greater reduction in ruminating thoughts (as measured by the Ruminative Responses Scale), which is a common (and often severe) associated symptom of depression.

The results of this study are promising; however, generalizability is limited due to the small sample size and volunteer bias. Additionally, the intervention was short and did not include any follow-up measurements. Other limitations included differential dropout between groups. Specifically, three of the 15 randomized participants dropped from the yoga group and six of the 12 randomized participants dropped from the attention-control group.

## **Chapter 2.6 Summary and Conclusions**

Major depression affects many individuals in the United States, with past-year prevalence rates of approximately 7% (Kessler, Chiu, Demler, & Walters, 2005).

Although psychotherapy and antidepressants are efficacious, data suggests approximately 60% of patients demonstrate a clinically significant response to these treatments (DeRubeis et al., 2005; Papakostas & Fava, 2007; Thase et al., 2005). Furthermore, individuals appearing to initially respond to these therapies continue to have residual symptoms (Nelson, Portera, & Leon, 2005; Ogrodniczuk, Piper, & Joyce, 2004) and are at a significant risk for relapse while maintaining antidepressant therapy (Byrne & Rothschild, 1998). Consequently, there is a need to find alternative and adjunctive methods for treating and preventing the recurrence of depression.

Complementary and alternative treatments such as yoga therapy are being increasingly used for a variety of mental health disorders, especially in anxiety and depression (Eisenberg et al., 1998; Unutzer et al., 2000). Estimates for the use of complementary alternative medicine among persons with mental health disorders range from 12.9% among patients with major depression (Wang, Patten, & Russell, 2001) to 56.7% of those with anxiety and 53.6% of those with non-major depression (R. Kessler, et al., 2001). Although the use of yoga and mindfulness-based therapies as a treatment for depression has grown in popularity, and has demonstrated to be a viable option for reducing depressive and anxiety symptoms (Hofmann, Sawyer, Witt, & Oh, 2010; Weintraub, 2004), much of the literature has been criticized methodologically.

Studies varied widely in length, intensity (dose), and type of yoga. The lack of methodological rigor with which the studies were conducted (along with several important flaws) threaten internal validity. Additionally, small sample sizes limit power to detect group differences. Lack of standardized interviews to diagnose depression and

the use of non-standardized depression outcome measures make reviews and meta-analyses problematic. Treatment length of yoga-based interventions varied; however, most are much shorter than those used in studies utilizing psychotherapy or pharmacotherapy. Finally, some studies included insufficient randomization procedures (or inadequate detail provided) or lacked a control or comparison group.

Despite these limitations, there is some preliminary evidence that yoga may be an efficacious intervention for depression. Given this preliminary evidence and the increased interest in practicing yoga, there is a strong need for methodologically sound studies that examine the efficacy of yoga for depression.

# 3

## Methods

## Study Design

This study was a prospective, randomized controlled intervention pilot study conducted in a metropolitan city in the upper Midwest of the United States. Forty women who were experiencing mild to moderate depressive symptoms were randomized to an experimental mindfulness-based yoga condition (n=20) or a walking health education comparison condition (n=20). Assessments were conducted at baseline, three months (i.e., post-intervention), and a one-month follow-up. Participants were instructed to continue their usual depression care.

This study was approved by the University of Minnesota's Institutional Review Board (IRB) and was registered with approval number 1203P11124.

## Participants and Inclusion/Exclusion Criteria

Participants were recruited from various online recruitment strategies (see Table 3-1).

Table 3-1

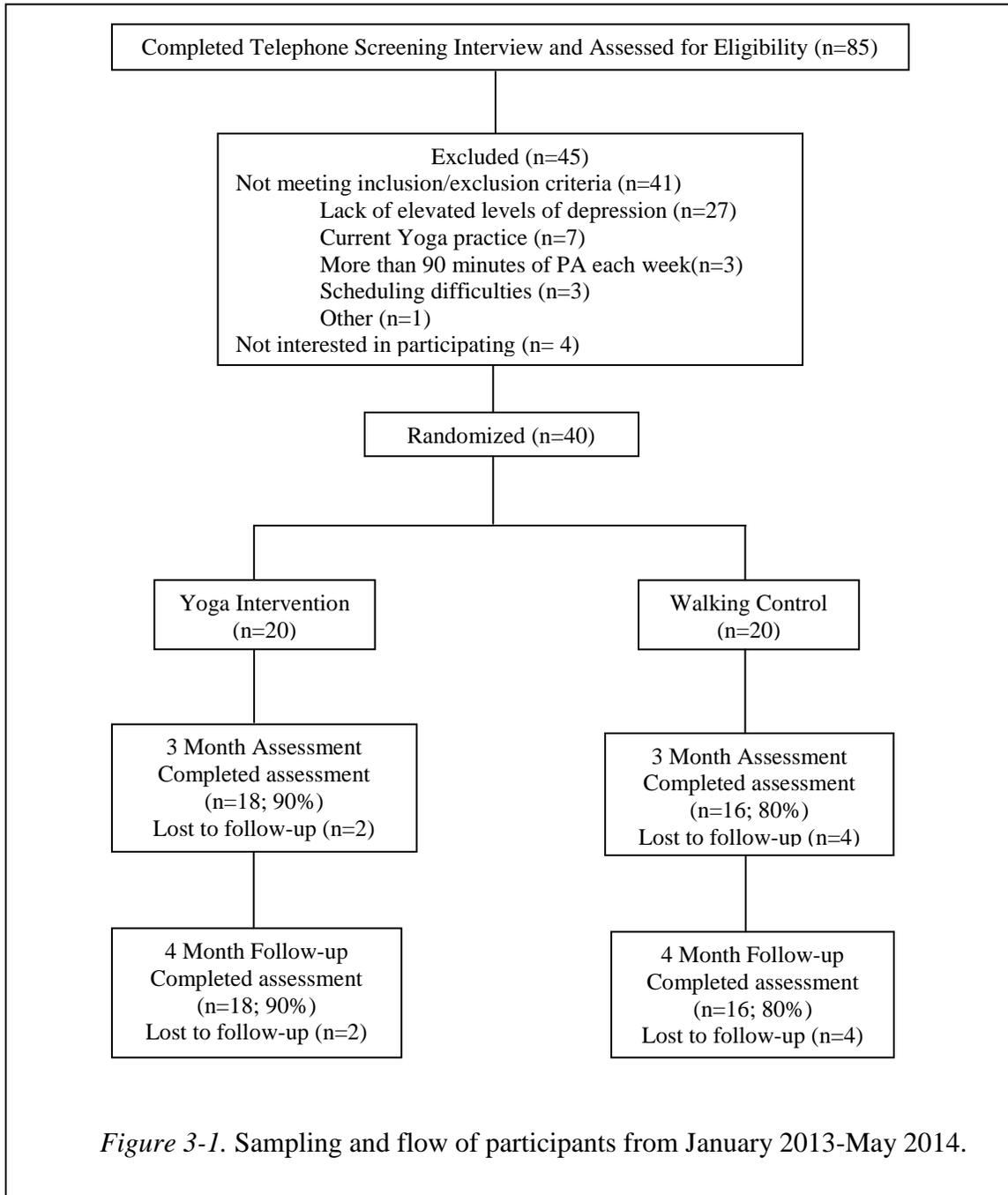
### *Methods of Recruitment*

Recruitment Method	Screened (n=85)	Randomized (n=40)	Not Randomized <sup>b</sup> (n=45)
Craig's List	48 (56.5%)	20 (50%)	28 (62.2%)
CEHD <sup>a</sup> Email Notice	9 (10.6%)	6 (15%)	3 (6.7%)
Targeted Email	22 (25.9%)	12 (30%)	10 (22.2%)
Other	6 (7.0%)	2 (5%)	4 (8.9%)

<sup>a</sup>CEHD=College of Education and Human Development at the University of Minnesota.

<sup>b</sup>Participants were not randomized because they were ineligible or not interested after obtaining more information about the study.

Eighty-five potential participants expressed interest in the study by calling or emailing the study line. Of those potential participants, forty participants were eligible and interested in participating (see Figure 3-1).



Forty women between the ages of 20 and 64 were recruited and randomly assigned into the study conditions. To be eligible for the study, participants were: (1) 18 years of age or older; (2) have a personal history of depression; (3) able to read and write in the English language; (4) able to commit to two sessions (yoga or walking) per week for 12 weeks; (5) demonstrate a willingness to be assigned to either of the study arms; and (6) be yoga naïve, defined as not taking more than four yoga classes in the past two years and not more than one class in the past month. The Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders IV was used for screening purposes to identify AXIS I Disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1997). All participants met the criteria for major depressive disorder. Additionally, at the time of eligibility screening, participants needed to have a score of  $\geq 14$  on the Beck Depression Inventory (BDI; Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., Erbaugh, J. 1961), which is indicative of at least mild to moderate levels of depressive symptoms. Participants also needed a score of  $\geq 10$  on the Patient Health Questionnaire (PHQ-9; Kroenke & Spitzer, 2002). The minimal required depression severity is consistent with scores used in other studies examining interventions for major depression (Dimidjian et al., 2006; Uebelacker, et al., 2010). Participants currently using other forms of treatment for depressive symptoms (i.e. pharmacotherapy and/or psychotherapy) were considered eligible for the study, as long as there were no changes in antidepressant medications and/or dosing over the past month or any expected changes during the intervention period.

Exclusion criteria included: (1) Individuals with a history of bipolar disorder or schizophrenia or who had been hospitalized for a psychiatric disorder within six months prior to the eligibility screening; (2) individuals not providing signed informed consent; (3) individuals reporting any other health problems that would interfere with regular yoga practice or walking sessions; and (4) individuals who engaged in more than 90 minutes of moderate intensity physical activity per week within one month prior to the eligibility screening.

## **Measures**

Study measures included adherence, physical activity, depressive symptoms, rumination, perceived stress, mindfulness, quality of life, sleep, and body mass index.

## **Adherence**

Adherence to the intervention was self-reported during the telephone sessions. Participants were asked to log their participation in their activity daily log and then reported their activity frequency and duration to the researcher, which was recorded at each telephone session.

## **Physical Activity Recall (PAR)**

The 7-Day Physical Activity Recall Interview (PAR) was used to assess physical activity frequency, duration, and intensity (Blair et al., 1985; Sallis et al., 1985).

Participants were asked to recall any physical activity they engaged in over the previous seven days and rate the activity as moderate, hard, or very hard. This interview is used

extensively in randomized controlled trials to assess exercise adherence and has demonstrated good test-retest reliability and validity (Jacobs, Ainsworth, Hartman, & Leon, 1993).

### **Primary Dependent Variable: Beck Depression Inventory (BDI)**

The Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, Erbaugh, 1961) was used to measure depressive symptoms and was the primary dependent variable for this study. The BDI is a questionnaire that addresses the severity of both cognitive and somatic aspects of depression and is a commonly used self-report scale for the measurement of depressive symptoms. The BDI serves as a standard measure of the presence and severity of depressive symptoms as consistent with the criteria of the DSM-IV (DSM-IV-TR, 2000). The BDI consists of 21 questions with each question having a set of four possible answer choices, ranging in intensity. For example: (0) I do not feel sad; (1) I feel sad; (2) I am sad all the time and I can't snap out of it; and (4) I am so sad or unhappy that I can't stand it. Participants were asked to choose the option that best described the way they had been feeling in the past week, including today. The numeric value associated with each response is reflected as a total score, with higher scores representing a greater and more severe presence of depressive symptoms. Scores greater than 10 are considered at least mild depression. A meta-analysis of the BDI's internal consistency indicated a mean coefficient alpha of 0.81 for non-psychiatric individuals (Beck, Steer & Carbin, 1988).

### **Patient Health Questionnaire (PHQ-9)**

The Patient Health Questionnaire (PHQ-9; Kroenke & Spitzer, 2002), is a multiple-choice, self-report inventory used in clinic settings and research studies to assess and monitor depressive symptoms and their severity. The PHQ-9 consists of the nine criteria on which the diagnosis of DSM-IV depressive disorders is based. Participants are asked to rate how often over the last two weeks, they have been bothered by the following problems including feeling down or depressed, loss of interest in activities, sleep disturbance, lethargy, appetite disturbance, feelings of failure, concentration disturbance, psychomotor agitation or retardation, and suicidal ideation. The questionnaire consists of nine items, each of which is scored 0-3. Participants answer (0) not at all; (1) several days; (2) more than half the days; and (3) nearly every day. Major depression is indicated if five or more of the nine depressive symptom criteria have been present at least “more than half the days” in the past two weeks, and at least one of the symptoms is depressed mood or loss of interest. Scores are combined (0-27), with total scores of greater than 10 indicating moderate depression severity. There is a final item at the end of the questionnaire which states, “How difficult have these problems made it for you to do your work, take care of things at home or get along with other people?” This item is used as a global rating of functional impairment. In a large study of 6,000 primary care and Ob-Gyn patients from general internal medicine, family practice, and obstetrics-gynecology sites, the PHQ-9 was found to have good internal reliability (Cronbach’s  $\alpha=0.89$ ), test-retest reliability (0.84), and construct validity (Kroenke, Spitzer, & Williams, 2001). The PHQ-9 shows good sensitivity (88%) and specificity (88%) for detecting depressive disorders in general and among specialized populations

(Gjerdingen, Crow, McGovern, Miner, & Center, 2009; Kroenke, Spitzer, Williams, & Löwe, 2010; Lowe, Kroenke, Herzog, & Grafe, 2004).

### **Ruminative Responses Scale (RRS)**

The Ruminative Responses Scale (RRS; Treynor, Gonzalez, & Nolen-Hoeksema, 2003) was used to measure ruminating thoughts. The RRS is a 22-item self-report questionnaire that examines reflection, brooding, and depression-related characteristics. Participants indicate the frequency in which they engage in specific thoughts or behaviors when they are feeling down, sad, or depressed by answering (1) never; (2) sometimes; (3) often; or (4) always. Items focus on the meaning of rumination (e.g., “I write down what I am thinking about and analyze it”), subjective feelings related to the depressed mood, (e.g., “I think about how sad I feel”), symptoms (e.g., “I think about how hard it is to concentrate”), and consequences and causes of the mood (e.g., “I think I won’t be able to do my job if I don’t snap out of this”). Participants’ responses are totaled for a score ranging from 22 to 88. The RRS has demonstrated high internal validity, with Chronbach’s  $\alpha$  ranging from .88 to .92 (Bagby et al., 1999; Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema & Davis, 1999; Noel-Hoeksema, Parker, & Larson, 1994; Treynor, Gonzalez, & Nolen-Hoeksema, 2003).

### **Perceived Stress Scale (PSS)**

The Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) is the most widely used psychological instrument for measuring the perception of stress. The PSS is a multiple-choice, self-reported questionnaire designed to measure the degree to

which situations in one's life are appraised as stressful. The PSS consists of 14 items in which individuals are asked to indicate how often over the past month they have felt or thought a certain way. For example, "How often have you been upset because of something that happened unexpectedly?" Participants then answer on a scale of (0) never; (1) almost never; (2) sometimes; (3) fairly often; and (4) very often. Scores are obtained by reversing the scores on the seven positive items, e.g., 0=4, 1=3, 2=2, etc., and then summing across all 14 items for a total score. In a non-clinical population, the PSS has demonstrated strong test-retest reliability,  $r=.85$  and high reliability and concurrent validity (Cohen, et al., 1983; Levenstein et al., 1993).

### **Five Facet Mindfulness Questionnaire (FFMQ)**

The Five-Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) was used as a self-report measurement of mindfulness. It is currently the most frequently used mindfulness questionnaire. The FFMQ was developed based on a factor analysis of items from the most widely used mindfulness questionnaires including The Freiburg Mindfulness Inventory (Buchheld, Grossman, & Walach, 2001), Mindful Attention Awareness Scale (Brown & Ryan, 2003), and Kentucky Inventory of Mindfulness Skills (Baer, Smith, & Allen, 2004). The FFMQ consists of 39 items that are rated on a five-point Likert scale (1=never or very rarely true, 5=very often or always true). The FFMQ measures five facets of mindfulness including observing, describing, acting with awareness, non-judging, and non-reactivity. "Observing" measures the tendency to notice or attend to internal and external experiences, sensations, emotions, cognitions, sounds, sights, smells, etc. An example

item is, “I pay attention to sounds, such as clocks ticking, birds chirping or cars passing”. “Describing” measures the tendency to describe and label observed experiences with words. Items include, “My natural tendency is to put my experiences into words.” “Acting with awareness” items measure an individual’s ability to bring full awareness and undivided attention to a current activity or experience. For example, one item is, “I find it difficult to stay focused on what’s happening in the present.” “Non-judging” refers to an observation of internal experiences without evaluating or judging. An example of an item is, “I think some of my emotions are bad or inappropriate and I shouldn’t feel them.” “Non-reactivity” measures an individual’s ability to allow thoughts and feelings to come and go without getting caught up in them or carried away with them. Items include, “I perceive my feelings and emotions without having to react to them.”

Scores are obtained by reversing the scores on the 19 negative items, e.g., 1=5, 2=4, 3=3, and then summing across all 39 items for a total score. Higher scores reflect higher levels of mindfulness. The FFMQ has acceptable internal consistency (ranging from .72-.92) as evidenced in a study of experienced meditators and non-meditating comparison groups (Baer et al., 2008).

### **Quality of Life Enjoyment and Satisfaction Questionnaire- Short Form (Q-LES-Q SF)**

Quality of life was assessed using the short form of the Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q SF; Endicott, Nee, Harrison, Blumenthal, 1993). The Q-LES-Q SF is a self-report form composed of 16 items, each rated on a

five-point scale that indicates the degree of enjoyment or satisfaction experienced during the past week. A total score from items one to 14 is computed. The 14 items evaluate individuals' satisfaction with physical health, social relations, ability to function in daily life, ability to get around physically, mood, family relations, sexual drive and interest, ability to work on hobbies and work, leisure time activities, economic status, household activities, living/housing situation, and overall sense of well-being. The last two items are stand-alone items and are not included in the raw score. The Q-LES-Q SF has been found to be a reliable and valid measure of quality of life, specific to the depressed population (Endicott et al., 1993). In a community sample, the test-retest reliability was 0.86 and internal consistency (Chronbach's  $\alpha$ ) was 0.90 (Rapaport, Clary, Fayyad, & Endicott, 2005).

### **Pittsburgh Sleep Quality Index (PSQI)**

Sleep quality was examined using the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The PSQI is a self-rated questionnaire that assesses sleep quality and disturbances over a one-month time frame. There are a total of 19 items that measure subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction that generates seven component scores. The sum of these scores then yields one global sleep score. The PSQI demonstrates acceptable measures of internal consistency, test-retest reliability, and validity (Buysse, et al., 1989).

### **Body Mass Index (BMI)**

For the assessment of body fat percentage in epidemiological studies, a weight-height index is typically used. For this study, body mass index (BMI), also known as Quetelet's index, was defined as body-weight divided by height<sup>2</sup> (Deurenberg, Weststrate, & Seidell, 1991). Weight and height were self-reported by the participant.

## **Procedure**

Participants were recruited primarily through online recruitment procedures including targeted emails and Craig's List. Interested participants responded to the ad or email by sending an email to the primary investigator or calling the study line. Potential participants were screened for eligibility using a standard script to determine if they met the inclusion and/or exclusion criteria. Existence and severity of depressive symptoms was assessed at baseline using the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock & Erbaugh, 1961) and Patient Health Questionnaire (PHQ; Kroenke & Spitzer, 2002). Participants were also given information regarding the study, including the voluntary nature of the study and assurance of confidential procedures. Following determination of eligibility and interest, the participant was sent an informed consent letter, along with a demographics form to be signed, completed, and returned prior to randomization. The participant was instructed to return this consent form within one week to minimize time between screening and randomization.

Once written consent was obtained from the participant, the study investigator called the participant on the telephone and completed the baseline assessment. Upon successful completion of all baseline questionnaires (completed over the telephone), the

participant was randomized into the mindfulness-based yoga (i.e., yoga) or walking health education comparison (i.e., walking) condition utilizing simple randomization and computer-generated random numbers. The participants were placed in sequential order based on the randomization assignment. The participant was notified of group assignment immediately and given further instruction, depending on the condition assignment. The first telephonic education session was scheduled for a future time and date, convenient to the participant's schedule, and within three days of the randomization procedure. Program materials, including an educational booklet, DVD, and self-report activity calendars were mailed directly to the participant via US Postal Service. Additionally, participants were given a \$15.00 gift card for purchase of a yoga mat to be used with the DVD.

### **Mindfulness-based Yoga Condition**

The 12-week mindfulness-based yoga intervention involved twice-weekly home practice using a yoga DVD and eight telephonic mindfulness education sessions with the primary investigator. Participants were asked to use a calendar to track yoga and other physical activity. The use of the calendars in physical activity interventions have shown to be a relevant self-monitoring strategy, enhance self-regulation, and increase consistency and adherence to interventions (Kinser, Bourguignon, Whaley, Hauenstein & Taylor, 2013; Vealey, 2007). Weekly yoga frequency and time was reported (and recorded by the primary investigator) at each phone session.

The home practice was guided by a gentle yoga DVD that included postures (asanas), pranayama (breathing exercises), and relaxation (meditation) designed specifically to manage the symptoms associated with depression. The DVD was a commercially developed yoga program specifically designed for the management of depression and anxiety symptoms. The structure of the DVD allowed participants to adapt their yoga practice according to their current mood by picking from multiple 10-minute segments from the DVD menu (Weintraub & Duncan, 2007). Participants were asked to complete 60-75 minutes of the DVD practice twice weekly and were encouraged to do more if they were interested. Once they were familiar with the activities in the DVD, participants were allowed to do the practices on their own (self-led). Participants were strongly encouraged to listen to their body and to take it at their own pace. Questions and/or concerns regarding the practices introduced in the DVD were addressed during the telephonic sessions with the primary investigator.

Following the initial baseline assessment and randomization telephone interview, participants in the yoga group completed a total of eight mindfulness educational sessions over the telephone. Mindfulness education sessions were conducted by the primary investigator. The primary investigator had several years of training and experience in mindfulness-based practices and specialized training in designing and implementing mindfulness-based yoga practices to manage and alleviate depression and anxiety symptoms.

Education sessions were completed entirely over the phone, scheduled at a time convenient for the participant, and lasted approximately fifteen minutes. In general, each

session started with a brief check-in on the previous week's experience with the yoga DVD and mindfulness-based goal. The participant reported the frequency and duration of the week's yoga practice at that time and this information was recorded by the primary investigator. Then the current week's mindfulness topic was introduced and discussed. Before ending the call, the participant was asked to set a goal for implementing the week's mindfulness theme into their daily life and a goal related to their yoga practice with the DVD. The next education session was then scheduled at a time most convenient to the participant. Participants completed once weekly phone sessions for the first month and bi-weekly phone sessions for the second and third month of the 12-week intervention for a total of eight scheduled telephone mindfulness education sessions. No sessions were scheduled during the one month follow-up period.

The mindfulness telephone sessions were modified from the Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990) program which covers mindfulness principles of non-judging, patience, cultivating a beginner's mind, trust, non-striving, acceptance, and letting go. These strategies have been shown to be effective tools for managing depressive (Goldin & Gross, 2010; Grossman, Niemann, Schmidt, & Walach, 2004; Lengacher et al., 2009) and anxiety symptoms (Bohlmeijer, Prenger, Taal, & Cuijpers, 2010; Lengacher et al., 2009; Vollestad, Sivertsen, Nielsen, 2011) in addition to improvement of general mental health (Fjorback et al., 2011). See Table 3-2 for topics discussed at each mindfulness-based telephone session.

Table 3-2

*Timeline and Content of Mindfulness-based Telephone Sessions*

Session	Content	Mindfulness Principle Focus
1	Overview of yoga intervention/assessing initial questions on yoga & preparing plan for practicing yoga at home	Mindful Movement Strategies
2	History of yoga & introduction to mindfulness	Overview of all 7 principles- Non-Judging, Patience, Beginner's Mind, Trust, Non-striving, Acceptance, Letting Go
3	Introduction to mindful breathing practices	Non-Judging, Patience, Beginner's Mind, Trust, Non-striving, Acceptance, Letting Go
4	Mindfulness of mind (thoughts, judgments, reactions) & body-scan & observation journals	Trust, Non-Judging, Acceptance, Letting Go
5	Mindfulness of body, mind, thoughts, emotions in everyday activities- mindful eating exercise	Patience, Trust, Acceptance, Beginner's Mind
6	Practice of mindfulness of mind- sitting meditation	Letting Go, Patience, Non-striving, Acceptance
7	Mindfulness of mind- nine dots exercise & mindfulness lists	Beginner's Mind, Letting Go
8	Overview of mindfulness skills & wrap-up	Review all 7 Principles

*Note.* Sessions 1-4 were scheduled weekly during the first month of the intervention. Sessions 4-8 were scheduled bi-weekly during the second and third month of the intervention.

Following the 12-week intervention period, participants completed the post-intervention assessment questionnaires over the telephone. The follow-up assessment was completed one month later (four months from the time of randomization).

Questionnaires administered at baseline were repeated at both post-intervention and one-month follow-up assessments. Assessments were completed by an individual trained in

administering all questionnaires and who was blinded to the participants' group assignment. Upon completion of the one-month follow-up assessment, each participant was sent a thank you letter and a \$25.00 gift card for their participation in the study.

### **Walking Health Education Comparison Condition**

The 12-week walking health education comparison protocol involved both twice-weekly home practice with a walking DVD and eight telephonic health education sessions with the primary investigator. Participants were asked to use a calendar to track walking and any other physical activity. Weekly walking frequency and time was reported (and recorded by the primary investigator) at each telephone session.

A 65-minute walking DVD (Sansone, 2008) was used in the walking group. The DVD, designed for the beginner exerciser, led participants through an indoor walking routine and was broken down into 12-13 minute miles. Each mile consisted of five minutes of moderate walking, five minutes of brisk walking and, two-three minutes of vigorous walking. The DVD in full was a total of five miles; however, could be stopped at each mile to allow the individual to choose an appropriate duration, based on their current fitness level. The participants were encouraged to walk approximately 2.5 mile per hour pace to be a comparable metabolic equivalent activity to the yoga.

Participants were asked to complete 60 minutes of the DVD (or other walking) twice weekly and encouraged to do more if they were interested. Participants were instructed to exercise at their own pace and to monitor their body's signals and sensations

to avoid injury. Questions and/or concerns regarding the activity of walking were addressed during the telephonic sessions with the primary investigator.

Following the initial baseline questionnaire and randomization phone interview, participants in the walking group completed a total of eight health educational sessions over the phone. Health education sessions were conducted by the primary investigator. The primary investigator had several years of training and experience in health coaching.

Health education sessions were completed entirely over the phone, scheduled at a time convenient for the participant, and lasted approximately fifteen minutes. In general, each session started with a brief check-in regarding the previous week's experience with the walking DVD and health-related goal. The participant reported the frequency and duration of the week's walking, which was recorded by the primary investigator. Then the current week's health-related topic was introduced and discussed. Before ending the call, the participant was asked to set a goal for implementing the week's health theme related to their daily life. The next education session was then scheduled at a time most convenient to the participant. Like the yoga condition, participants completed one weekly phone session for the first month and bi-weekly phone sessions for the second and third months of the 12-week intervention for a total of eight scheduled telephonic health education sessions. No sessions were scheduled during the one-month follow-up period.

The education sessions covered a variety of health and wellness related topics. See Table 3-3 for topics discussed at each education session.

Table 3-3

*Timeline and Content of Health & Wellness Telephone Sessions*

Session	Content
1	Overview of walking intervention/ assessing initial questions & preparing plan for walking at home
2	Understanding stress
3	Stress prevention & management
4	Time management
5	Sleep management
6	Developing/maintaining strategies for safe weight loss and weight gain prevention
7	Nutrition overview & superfoods
8	Review of stress prevention & management and wrap-up

*Note.* Sessions 1-4 were scheduled weekly during the first month. Sessions 4-8 were scheduled bi-weekly during the second and third month.

Following the 12-week intervention period, participants completed the one-month post-intervention assessment questionnaires over the phone. The follow-up assessment was completed one month later (four months from the time of randomization). Post-intervention and one-month follow-up assessments were completed by an individual trained in administering all questionnaires and who was blinded to the participants' group assignment.

Upon completion of the four month assessment, each participant was sent a thank you letter and a \$25 gift card for their participation in the study.

## **Data Analysis**

All data were analyzed using SPSS (v21.0) for Windows and Microsoft Excel (Windows 2010).

Independent t-tests for continuous dependent variables and chi-square tests for categorical dependent variables were used to examine between group differences on demographic variables.

Between groups analysis of variance (ANOVA) was used to examine the effect of the intervention on the BDI (primary dependent variable), and several secondary variables of interest including the PHQ-9, RSS, PSS, Q-LES-Q SF, PSQI, and BMI at post-intervention and one-month follow-up. To examine the magnitude of the difference between the mean scores of each variable of the two conditions, effect size was calculated using Cohen's D. ANOVA was used to examine between group differences in retention and adherence.

Between groups analysis of variance (ANOVA) was also used to examine between group differences on the Physical Activity Recall (PAR) interview at post-intervention and at one-month follow-up. Repeated measures analysis was used to examine changes in physical activity from baseline to post-intervention and baseline to the one-month follow-up within each of the study conditions.

Between groups analysis of variance (ANOVA) was also used to examine between group differences on mindfulness scores (FFMQ) at post-intervention and one-month follow-up assessments. Pearson correlation was used to examine the relationship

between mindfulness and depression among participants in the yoga condition at post-intervention and one-month follow-up. Due to an observed increase of reported mindfulness mean scores for both conditions, an exploratory Pearson correction was used to examine the relationship between mindfulness and depression for both conditions at post-intervention and one-month follow-up.

# 4

## Results

## **Recruitment**

A flowchart of participant recruitment, enrollment, and completion of the study is shown in Figure 3-1. The 11-month recruitment period occurred from February 2013 to January 2014. Eighty-five women expressed interest in the study by calling or emailing. Of those, 41 individuals did not meet the eligibility criteria for the study and four women were not interested in participating. Forty women were randomized into the mindfulness-based yoga intervention group (n=20) or walking health education comparison condition (n=20). Six individuals dropped out at some point during the study (n=2 from mindfulness-based yoga group; n=4 from the walking health education comparison group). The majority of those who dropped out participated in the first eight to nine weeks of the intervention (n=2 from the mindfulness-based yoga group; n=3 from the walking group) and the remaining participant, who was from the walking group, dropped without participating in any aspect of the study other than the eligibility screening and baseline assessments.

## **Demographics**

The demographic data is summarized in Table 4-1. Group differences for the demographic and baseline variables were analyzed using independent t-tests for the continuous dependent variables and chi-square tests for the categorical dependent variables. There were no between groups differences for any of the demographic or baseline variables except for the PHQ-9. Specifically, the yoga condition scored significantly higher on the PHQ-9 at baseline than the walking condition.

Table 4-1

*Participant Characteristics*

Characteristic	Total sample (n=40)	Yoga (n= 20)	Walking Control (n=20)
Age (average in years)	42.68 (4.95)	45.55 (12.30)	39.8 (11.23)
Race (%)			
Caucasion	80.0%	90.0%	70.0%
American-Indian	2.5%	0.0%	5.0%
Asian	2.5%	0.0%	5.0%
African-American	10.0%	10.0%	10.0%
Other	5.0%	0.0%	10.0%
Ethnicity (%)			
Non-hispanic	95.0%	100.0%	95.0%
Hispanic	5.0%	0.0%	5.0%
Marital Status (% Married)	42.5%	50.0%	35.0%
Education			
High School Graduate	7.5%	5.0%	10.0%
Some College	40.0%	50.0%	30.0%
College Graduate	32.5%	35.0%	30.0%
Post-graduate Work	20.0%	10.0%	30.0%
Income			
Under 10,000	15.0%	15.0%	15.0%
Between \$10,000-19,999	7.5%	10.0%	5.0%
Between \$20,000-29,999	17.5%	10.0%	25.0%
Between \$30,000-39,999	2.5%	5.0%	0.0%
Between \$40,000-49,999	12.5%	10.0%	15.0%
Over \$50,000	45.0%	50.0%	40.0%
Currently Employed (%)	77.5%	85.0%	70.0%
1+ Children Under 18yrs (%)	30.0%	25.0%	35.0%
Family History of Depression (%)	80.0%	80.0%	80.0%
Current Antidepressant Usage(%)	52.5%	45.0%	60.0%
Current Psychotherapy	2.5%	5.0%	0.0%
BDI	26.35 (5.50)	26.20 (6.60)	26.50 (4.31)
PHQ-9	15.50 (3.29)	16.60 (3.65)	14.40 (2.52)

*Note.* BDI=Beck Depression Inventory; PHQ-9=Patient Health Questionnaire.

## Retention and Adherence

Thirty-four participants completed the study including 18 in the mindfulness-based yoga group and 16 in the walking health education comparison group. There was no differential drop-out between groups. There were no differences on the demographic variables between study completers (n=34) and dropouts (n=6) with the exception of marital status  $f(1,39)=5.70$ , ( $p<.05$ ). Specifically, more completers (n=17; 50%) and none of the non-completers reported being married.

The recommended “dose” of the mindfulness-based yoga or walking was minimum twice-weekly sessions or approximately 120 minutes per week of the assigned activity. Participants in the mindfulness-based yoga participated in yoga an average of 2.30 (1.03) times a week, 50.25 (17.05) minutes per session, and a total of 119.75 (58.95) minutes per week at three months. Participants in the walking group engaged in walking sessions 3.55 (3.22) times a week, 23.90 (14.25) minutes per session, and a total of 78.25 (52.50) minutes each week during the intervention (see Table 4-2). The yoga condition reported more minutes per session,  $f(1,39)=28.7$ ,  $p<.001$ ; effect size 1.67, and more weekly minutes of assigned activity,  $f(1,39)=5.53$ ,  $p<.05$ ; effect size .74, than the walking condition. At one-month follow-up, participants in the yoga condition reported more assigned activity than the walking condition,  $f(1,39)=4.228$ ,  $p<.05$ ; effect size .65. Specifically, yoga participants reported an average of 105.00 (50.52) minutes per week of yoga activity and walking participants reported 72.00 (50.96) minutes per week of walking.

Table 4-2

*Adherence to Assigned Activity Condition*

Study Arm	Randomized Activity Sessions		
	Frequency <sup>a</sup>	Duration <sup>b</sup>	Weekly Total <sup>c</sup>
Yoga (n=20)	2.30(1.03)	50.25(17.05)	119.75(58.95)
Walking (n=20)	3.55(3.22)	23.90(14.25)	78.25(52.50)
All Participants	2.93(2.44)	37.08(20.46)	99.00(58.97)

<sup>a</sup>Average weekly frequency of activity (yoga or walking). <sup>b</sup>Average duration of each activity by session. Average weekly total of activity. Standard deviations are in parentheses.

Participants in the mindfulness-based yoga condition completed a mean average of 6.25 (2.19) telephone counseling sessions (out of eight) with a duration of 17.10 (5.65) minutes per session on average. Participants in the walking health education condition completed an average of 5.70 (2.23) telephone counseling sessions with each session averaging 17.35 (5.50) minutes (see Table 4-3). There were no differences between groups on average number or length of telephone sessions.

Table 4-3

*Telephone Counseling Sessions by Study Arm*

Study Arm	Telephone Sessions	
	Sessions <sup>a</sup>	Minutes <sup>b</sup>
Yoga (n=20)	6.25(2.19)	17.10(5.65)
Walking (n=20)	5.70(2.23)	17.35(5.50)
All Participants	5.98(2.20)	17.23(5.50)

<sup>a</sup>Mean number of telephone sessions completed out of eight. <sup>b</sup>Mean minutes of each telephone session. Standard deviations are in parentheses.

**Physical Activity Recall (PAR)**

Repeated measures analysis was conducted to examine change in physical activity over time. Participants significantly increased their physical activity from baseline to

post-intervention assessment  $f(1,33)=22.07, p<.001$ , and from baseline to one-month follow-up,  $f(1,33)=26.67, p<.001$ . Repeated measures was used to examine change in physical activity for each group individually. Participants in the mindfulness-based yoga group significantly increased their physical activity from baseline to post-intervention,  $f(1,17)=10.12, p<.005$  and baseline to one-month follow-up,  $f(1,17)=15.10, p<.001$ . Participants in the walking health education group similarly reported significant increases in physical activity from baseline to post-intervention,  $f(1,15)=37.44, p<.001$  and baseline to one-month follow-up,  $f(1,15)=12.63, p<.05$ .

Between groups analysis of variance (ANOVA) was used to analyze Physical Activity Recall (PAR) mean scores between the mindfulness-based yoga and walking health education groups at post-intervention and one-follow-up. PAR minutes at baseline was entered as a covariate to control for baseline variability (see Table 4-4). There were no significant between group differences for participants' moderate intensity physical activity at post-intervention,  $f(1,31)=0.731, p > .05$ ; effect size .48, or one-month follow-up,  $f(1,31)=0.136, p > .05$ ; effect size .51.

Table 4-4

*Mean and Standard Deviation for PAR by Study Arm*

Study Arm	Assessment		
	Baseline	Post	Follow-up
Yoga (n=18)	20.75 (32.54)	175.28 (208.97)	149 (141.43)
Walking (n=16)	5.00 (22.36)	99.37 (74.54)	88.44 (90.66)
All (n=34)	12.87 (28.69)	139.56 (162.79)	120.94 (122.51)

*Note.* PAR=Physical Activity Recall. Standard deviations are in parentheses.

### **Primary Dependent Variable: Beck Depression Inventory (BDI)**

Repeated measures analysis was conducted to examine change in depressive scores over time. Participants significantly decreased their depressive symptoms from baseline to post-intervention  $f(1,33)=34.83, p<.001$ , and from baseline to one-month follow-up,  $f(1,33)=37.01, p<.001$ . Repeated measures was used to examine change in depressive scores for each group individually. Participants in the mindfulness-based yoga group exhibited significantly decreased depressive scores from baseline to post-intervention,  $f(1,17)=18.51, p<.001$  and baseline to one-month follow-up,  $f(1,17)=21.27, p<.001$ . Participants in the walking health education group similarly reported significant decreases of depressive symptoms from baseline to post-intervention,  $f(1,15)=16.5, p<.01$  and baseline to one-month follow-up,  $f(1,15)=15.5, p<.01$ .

Between groups analysis of variance (ANOVA) was used to analyze BDI mean scores between the mindfulness-based yoga and walking health education conditions at post-intervention and one-month follow-up. The baseline BDI score was entered as a covariate in order to control for baseline variability (see Table 4-5). There were no significant between group differences on depression scores at post-intervention,  $f(1,31)=0.61, p =0.44$ ; effect size .25, and one-month follow-up  $f(1,31)=0.80, p=0.78$ ; effect size .08.

Table 4-5

*Mean and Standard Deviation for BDI by Study Arm*

Study Arm	BDI		
	Baseline	Post	Follow-up
Yoga (n=18)	26.20 (6.60)	18.06 (10.86)	17.28 (11.23)
Walking (n=16)	26.50 (5.50)	15.69 (8.20)	16.50 (8.03)

*Note.* BDI=Beck Depression Inventory. Standard deviations are in parentheses.

**Patient Health Questionnaire (PHQ-9)**

Between groups analysis of variance (ANOVA) was used to analyze PHQ-9 mean scores between the mindfulness-based yoga and walking health education comparison conditions at post-intervention and one-month follow-up. Baseline PHQ-9 scores were entered as covariates in order to control for baseline variability (see Table 4-6). There were no significant differences in depression scores at post-intervention,  $f(1,31)=0.07$ ,  $p>0.79$ ; effect size of .23, or one-month follow-up,  $f(1,31)=0.00$ ,  $p>.05$ ; effect size of .31.

Table 4-6

*Mean and Standard Deviation for PHQ-9 by Study Arm*

Study Arm	PHQ-9		
	Baseline	Post	Follow-up
Yoga (n=18)	16.60 (3.65)	9.78 (6.15)	9.17 (6.06)
Walking (n=16)	14.40 (2.52)	8.50 (4.87)	7.56 (4.29)

*Note.* PHQ-9=Patient Health Questionnaire. Standard deviations are in parentheses.

**Ruminative Responses Scale (RRS)**

Between groups analysis of variance (ANOVA) was used to analyze RRS mean scores between the mindfulness-based yoga and walking health education comparison

conditions at post-intervention and one-month follow-up. The RRS score at baseline was entered as a covariate in order to control for baseline variability (see Table 4-7). The mindfulness-based yoga condition reported significantly lower levels of rumination than the walking control condition, after controlling for baseline levels of rumination, at post-intervention ( $f(1,31)=6.23, p<0.01$ ; effect size of .55). There were no significant between group differences in rumination scores at one-month follow-up; effect size of .40.

Table 4-7  
*Mean and Standard Deviation for RRS by Study Arm*

Study Arm	RRS		
	Baseline	Post	Follow-up
Yoga (n=18)	60.20 (10.38)	41.94 (8.04)	40.44 (7.76)
Walking (n=16)	58.45 (9.61)	47.56 (11.93)	44.50 (12.19)

*Note.* RRS=Ruminative Responses Scale. Standard deviations in parentheses.

### **Perceived Stress Scale (PSS)**

Between groups analysis of variance (ANOVA) was used to analyze PSS mean scores between the mindfulness-based yoga and walking health education comparison conditions at post-intervention and one-month follow-up. The PSS score was entered as a covariate in order to control for baseline variability (see Table 4-8). There were no significant between group differences in perceived stress scores at post-intervention or one-month follow-up assessments. Effect size of .22 and .02 was calculated at post-intervention and one-month follow-up, respectively.

Table 4-8

*Mean and Standard Deviation for PSS by Study Arm*

Study Arm	PSS		
	Baseline	Post	Follow-up
Yoga (n=18)	32.45 (3.34)	30.94 (3.92)	28.89 (5.30)
Walking (n=16)	32.95 (3.68)	30.19 (2.90)	29.00 (3.80)

*Note.* PSS=Perceived Stress Scale. Standard deviations are in parentheses.

**Five Facet Mindfulness Questionnaire (FFMQ)**

Between groups analysis of variance (ANOVA) was used to analyze FFMQ mean scores between the mindfulness-based yoga and walking health education comparison conditions at post-intervention and one-month follow-up. Separate analyses were conducted for total FFMQ score and each sub-scale. Baseline levels of each variable were entered as covariates in order to control for baseline variability (see Table 4-9). There were no significant between group differences in total mindfulness scores at post-intervention or one-month follow-up. Effect size of .04 and .01 was calculated at post-intervention and one-month follow-up, respectively. Similarly, no between group differences were observed on the subscales.

Table 4-9

*Mean and Standard Deviation for FFMQ Total & Subscales by Study Arm*

Variable	Yoga (n= 18)			Walking (n= 16)		
	Baseline	Post	Follow-up	Baseline	Post	Follow-up
Total FFMQ	106.55 (15.95)	121.67 (21.36)	123.67 (22.47)	107.45 (11.14)	122.50 (22.07)	123.44 (17.99)
Subscales:						
Non judging	21.10 (5.88)	22.78 (6.74)	25.11 (7.99)	22.60 (4.48)	25.70 (6.82)	26.75 (5.69)
Describing	23.40 (8.41)	26.78 (6.24)	27.39 (6.68)	25.00 (4.95)	26.94 (6.65)	28.00 (5.92)
Non reacting	17.40 (3.69)	20.89 (4.00)	20.56 (4.68)	16.95 (4.16)	20.94 (3.87)	19.69 (3.61)
Awareness	19.05 (5.28)	23.22 (7.88)	23.17 (6.85)	21.65 (3.86)	24.31 (5.15)	24.50 (5.39)
Observing	25.60 (6.62)	28.00 (7.75)	27.44 (7.86)	21.25 (5.09)	24.63 (7.20)	24.50 (6.27)

*Note.* FFMQ= Five Facet Mindfulness Questionnaire. Standard deviations are in parentheses.

To determine if change in depression scores was related to change in mindfulness scores among mindfulness-based yoga participants, change scores from baseline to post-intervention and baseline to one-month follow-up were computed for the BDI and FFMQ. A Pearson correlation was calculated to examine the relationship between the BDI (i.e., depression) and FFMQ (i.e., mindfulness). Results indicated that change in depression was not significantly related to change in mindfulness scores ( $r = -.447, p > .05$ ) at post-intervention. However, change in depression scores was significantly related to change in mindfulness scores at one-month follow-up ( $r = -.589, p < .01$ ). In other words,

a strong negative relationship between depression scores and mindfulness scores was observed for participants in the mindfulness-based yoga group at one-month follow-up.

Due to the increase in mindfulness scores for both groups from baseline to post-intervention and one-month follow-up, an exploratory Pearson correlation was conducted to examine the relationship between mindfulness and depression (as measured by the BDI) for all participants. Results indicated that change in depression was significantly related to change in mindfulness scores at post-intervention,  $r = -.543, p < 0.01$  and one-month follow-up,  $r = -.618, p < 0.01$ . Specifically, participants who reported greater decreases in depressive symptoms tended to report higher levels of mindfulness at post-intervention assessments and appeared to retain the effect at follow-up.

Exploratory analysis was conducted to examine if change in depression scores from baseline to post-intervention was related to change in the mindfulness subscales for the yoga condition. Decreases in BDI scores was related to increases in the non-judgment, ( $r = -.522, p < .05$ ), and non-reaction scores ( $r = -.745, p < .001$ ), both at post-intervention. In other words, participants in the mindfulness-based yoga group who reported greater decreases in depressive symptoms tended to report higher levels of non-judgmental thoughts and non-reaction to events and experiences.

These findings remained consistent for the one-month follow-up change scores with statistically significant relationships observed between depression scores and non-judgment,  $r = -.558, p < .01$ , and non-reaction,  $r = -.782, p < .001$  scores. Additionally, at one-month follow-up, decreases in depression scores was significantly related to

increasing acting with awareness scores,  $r = -.562, p < .01$ . In other words, participants in the mindfulness-based yoga group who reported greater decreases in depressive symptoms also reported higher levels of non-judgments thoughts, higher instances of non-reaction to events and experiences, and acting with greater awareness.

**Quality of Life Enjoyment and Satisfaction Questionnaire- Short Form (Q-LES-Q SF)**

Between groups analysis of variance (ANOVA) was used to analyze Q-LES-Q SF mean scores between the mindfulness-based yoga and walking health education comparison conditions at post-intervention and one-month follow-up. Baseline levels of each variable were entered as covariates in order to control for baseline variability (see Table 4-10). Participants reported increases in scores of quality of life from baseline to post-intervention and one-month follow-up. There were no significant differences in Q-LES-Q scores at post-intervention; effect size of .64. However, statistically significant between group differences were observed at one-month follow-up,  $f(1,31)=8.032, p < .001$ ; effect size of 1.04., with the mindfulness-based yoga condition reporting a greater increase in quality of life enjoyment and satisfaction than the walking group.

Table 4-10

*Mean and Standard Deviation for Q-LES-Q SF by Study Arm*

Study Arm	Q-LES-Q SF		
	Baseline	Post	Follow-up
Yoga (n=18)	37.05 (7.90)	50.61 (11.04)	54.06 (8.39)
Walking (n=16)	37.00 (6.63)	44.19 (8.88)	45.69 (7.91)

*Note.* Q-LES-Q SF= Quality of Life Enjoyment and Satisfaction Questionnaire- Short Form. Standard deviations are in parentheses.

### **Pittsburgh Sleep Quality Index (PSQI)**

Between groups analysis of variance (ANOVA) was used to analyze PSQI mean scores between the mindfulness-based yoga and walking health education comparison conditions at post-intervention and one-month follow-up. Baseline levels of each variable were entered as covariates in order to control for baseline variability (see Table 4-11). There were no significant between group differences in reported disturbed sleep scores at post-intervention or one-month follow-up. Effect size of .46 and .47 was calculated at post-intervention and one-month follow-up, respectively.

Table 4-11

#### *Mean and Standard Deviation for PSQI by Study Arm*

Study Arm	PSQI		
	Baseline	Post	Follow-up
Yoga (n=18)	11.05 (3.56)	7.28 (2.23)	7.61 (3.93)
Walking (n=16)	8.50 (3.64)	6.13 (2.66)	6.13 (2.28)

*Note.* PSQI=Pittsburgh Sleep Quality Index. Standard deviations are in parentheses.

### **Body Mass Index (BMI)**

Between groups analysis of variance (ANOVA) was used to analyze BMI mean scores between the mindfulness-based yoga and walking health education comparison conditions at post-intervention and one-month follow-up. Baseline levels of each variable were entered as covariates in order to control for baseline variability (see Table 4-12). There were no significant differences in reported BMI at post-intervention or one-month follow-up. Effect size of .48 and .56 was calculated at post-intervention and one-month follow-up, respectively.

Table 4-12

*Mean and Standard Deviation for BMI by Study Arm*

Study Arm	BMI		
	Baseline	Post	Follow-up
Yoga (n=18)	26.87(6.45)	27.29(6.94)	27.01(6.79)
Walking (n=16)	30.07(4.56)	30.15(4.54)	30.26(4.51)

*Note.* BMI=Body Mass Index. Standard deviations are in parentheses.

# 5

## Discussion

This randomized, controlled study examined the effect of a 12-week mindfulness-based yoga intervention on depressive symptoms and other wellness outcomes when compared to a walking health education comparison intervention among depressed, sedentary adult women. The yoga intervention did not decrease depressive symptoms as hypothesized relative to the walking intervention. However, participants in the yoga intervention did report fewer symptoms of rumination when compared to the walking group. Additionally, this study supports the acceptability of yoga and walking as possible ancillary therapies for managing depressive symptoms, as evidenced by good retention and adherence for both interventions.

Hatha yoga is the most widely practiced style of yoga in the United States and therefore, this type of yoga was used in the intervention (Quilty, Saper, Goldstein & Khalsa, 2013). Hatha yoga uses physical postures (asana), breathing (pranayama), and relaxation techniques and has been shown to be an effective method of managing depressive symptoms (Cramer, Lauche, Langhorst, & Dobos, 2013; Pilkington, Kirkwood, Rampes, & Richardson, 2005; Uebelacker et al., 2010). Mindfulness techniques are a central concept of most yoga styles (including Hatha yoga), and is incorporated into the physical postures, breathing, and relaxation. For this study, a specific emphasis was placed on reinforcing mindfulness techniques during the telephone-based sessions. These sessions were based on Mindfulness-Based Stress Reduction (MBSR), which has demonstrated to be effective in reducing psychological and physical symptoms associated with depression and anxiety (Bohlmeijer, Prenger,

Taal, & Cuijpers, 2010). Adult women were targeted for this study given they are two times more likely than men to report major depressive symptoms (Kessler et al., 2003). Additionally, the majority of yoga practitioners in the United States are women (Quilty et al., 2013; Ross, Friedmann, Bevens, & Thomas, 2013). The effectiveness of a home-based intervention (via DVD and over the telephone) was specifically chosen, as this has not been examined before. Additionally, adherence may be higher to a home-based intervention given the barriers associated with in-person sessions (e.g., transportation, time, childcare). To address several of the most common methodological problems in previous yoga research, this study included a well-validated measure of depression (BDI), longer intervention than most yoga-based studies (12 weeks), and a follow-up assessment period (one month later). Additionally, an active comparison group was used to control for the physical activity associated with the yoga postures. Additionally, the active comparison group with health education sessions controlled for the possible non-specific therapeutic effect that may occur when working with a health educator. Walking was chosen as it has been shown to be a comparable MET-matched activity to hatha yoga.

Participants in both conditions reported a comparable decrease in depressive scores over three months in that the mean depression scores decreased from “moderate depression” to “mild depression” for both groups at 12 weeks. The decreased mean depression scores were maintained at the one-month follow-up. There were no between group differences on depression scores at post-intervention or one-month follow-up. Similar findings have been observed in previous studies examining the effect of yoga on

depressive symptoms among women, in comparison to a control group (Dhananjai, Sadashiv, Tiwari, Dutt, & Kumar, 2013; Javnbakht, Kenar, & Ghasemi, 2009; Kinser et al., 2013; Woolery, Myers, Sternlieb & Zeltzer, 2004). However, one study did report lower mood and anxiety scores among participants in a three month yoga intervention relative to a walking intervention (Streeter et al., 2010). One problem is that the participants were not depressed at baseline. Additionally, mood was measured using the Exercise-Induced Feeling Inventory (EIFI), which is a general assessment of feeling states (e.g., refreshed, peaceful, fatigued) but not depressive symptoms.

Rumination significantly decreased in the yoga group at post-intervention relative to the walking group (effect size calculations indicated a moderate effect). This is consistent with Kinser and colleagues (2013) who found that depressed women did not report a decrease on depressive symptoms relative to an active control group; however, did report a greater reduction in rumination scores.

Treynor, Gonzalez, and Nolen-Hoeksema (2003) suggested that a low sense of mastery contributes to brooding, a factor of rumination, which involves repeatedly contemplating what is wrong in one's life. During yoga, mindfulness may decrease rumination by giving participants an opportunity to focus on alternative thoughts or sensations (i.e., breathing, physical activity of the poses). Additionally, the mindfulness-based education sessions in the yoga group were adapted from the Mindfulness-Based Stress Reduction Program (MBSR; Kabat-Zinn, 1990), which has been shown to decrease rumination in both clinical and non-clinical populations (Campbell, Labelle, Bacon, Faris, and Carlson, 2012; Jain et al., 2007). Uebelacker et al. (2010) suggests that

the mindfulness component of yoga (and MBSR) may change the content of thoughts or cognitions. The teachings of self-acceptance, contentment, and non-judgment may lead to increased self-mastery and self-efficacy, which then lead to more positive, affirming thoughts. These cognitions may assist in the management and/or prevention of depressive symptoms. There were no between group differences for rumination at one-month follow-up.

Previous studies have found multiple barriers to long-term continuation of yoga (Alexander, Taylor, Innes, Kulbok, & Selfe, 2008; Atkinson & Permeth-Levine, 2009; Quilty, Saper, Goldstein, and Khalsa, 2013), with the most cited barrier being lack of time. In a recent national survey of yoga practitioners, Friedmann, Bevans, and Thomas (2013) found that the more yoga participants practiced, the more likely they were to believe that yoga improved health. Therefore, perhaps the decrease in yoga practice from post-intervention to one-month follow-up contributed to the lack of rumination differences at four months.

Recruiting depressed women can be particularly challenging in intervention trials since symptoms such as anhedonia and fatigue can decrease motivation to participate in studies (Daly et al., 2002; Kemeny et al., 2003; Ross et al., 1999). Therefore, recruitment took longer than expected. Despite these barriers, there were 85 women who completed the eligibility screening interview. The most effective recruitment strategies were online advertisements and targeted emails. There were only four eligible women who declined to participate who stated they were not interested after obtaining additional study

requirement details. The convenience of the home-based program versus in-person sessions may have contributed to their willingness to participate in the study.

High retention (85%) of study participants in both conditions is potentially an indicator of acceptability for both study arms. Drop-out rates range from 9-85% in structured physical activity intervention trials (Marcus et al., 2006). This study is comparable to a recent trial examining a six month Iyengar yoga intervention for seniors, which reported a dropout rate of 13% (Flegal, Kishiyama, Zajdel, Haas & Oken, 2007). It is possible that the high retention rate was due to the home-based intervention design, making it easier for the participants to continue in the study.

Retention rate was slightly higher for the yoga condition (n=18) than the walking condition (n=16); however, there was no differential dropout between groups. Attrition is sometimes higher in control groups; however, the active nature of the control group may have decreased the likelihood of dropping out. The reasons for the drop-outs are unclear given all dropouts were lost prior to the post-intervention and one-month follow-up assessments. There were no between group differences between completers and non-completers on the demographic variables with the exception of marital status. Fifty percent of study completers reported being married and none of the non-completers reported being married. This is consistent with previous research indicating that non-married individuals are more likely to report depression than married individuals (Inaba et al., 2005). Additionally, individuals reporting anxiety and depression have a greater likelihood of dropping from physical activity intervention trials than individuals with lower anxiety and depression. (Herman et al., 2002). It is possible that non-completers

were experiencing severe depressive symptoms, which contributed to dropping out. Future research is needed to better understand factors that influence retention.

Adherence to the intervention was high in both conditions. Specifically, participants in the mindfulness-based yoga participated in yoga an average of 2.30 times a week, 50.25 minutes per session, and a total of 119.75 minutes per week at three months. Participants in the walking health education comparison group engaged in walking sessions 3.55 times a week, 23.90 minutes per session, and a total of 78.25 minutes of walking each week during the intervention. High adherence is important given it can increase the likelihood of a positive outcome in behavioral interventions (Flegal, et al., 2007). This is consistent with previous research which report high retention rates for home-based yoga and physical activity interventions (Kinser et al., 2013, Marcus et al., 2007).

At three months, participants in the yoga condition averaged 2.30 (1.03) sessions for a total of 119.75(58.95) minutes of yoga activity each week. There was not a significant relationship identified between “dose” of the intervention and depressive symptoms for participants in the yoga condition. In other words, individuals who participated in more yoga did not necessarily report greater decreases in depressive symptoms. Additional research is needed to better understand what the minimum effective dose of yoga may be to decrease depression and whether home-based practice or group-based classes are most optimal (Uebelacker, et al., 2010).

Participants in both study arms reported a significant increase in overall moderate intensity physical activity from baseline to the end of treatment and from baseline to the one-month follow-up. This result is promising for both yoga and walking-based interventions given that both interventions led to increased overall physical activity. Previous research indicates that depression is generally associated with low physical activity levels (Brosse, Sheets, Lett, & Blumenthal, 2002; Rejeski et al., 2001; Teychenne, Ball, Salmon, 2008). Additionally, increasing physical activity has the dual benefit of improving overall health and alleviating depression and anxiety (Dunn, Trivedi, Kampert, Clark, & Chambliss, 2005). Similar to aerobic exercise, hatha yoga is associated with improved cardiopulmonary fitness, muscular strength, and endurance (Raub, 2002; Ross & Thomas, 2010; Tran, Holly, Lashbrook, & Amsterdam, 2001). Perhaps the improvement in depression scores was a result of overall increased moderate intensity physical activity rather than yoga or walking in particular. Regular contact with the study health educator and completion of exercise logs may have contributed to the increase of physical activity in both study conditions.

Participants in both study conditions reported similar decreases in perceived stress from baseline to post-intervention and one-month follow-up; however, there was no significant difference between the two conditions. This finding differs from Woolery and colleagues (2004) who found a decrease in anxiety among yoga group participants relative to a wait-list control group. Similarly, Shapiro and colleagues (2007) observed a significant decrease in anxiety symptoms reported from participants in a five-week yoga intervention who had been diagnosed with major depressive disorder and were in partial

remission. Javnbakht, Kenari, and Ghasemi (2009) also reported a significant reduction in perceived levels of anxiety in a group of adult women participating in a two-month yoga intervention, in comparison to a wait-list control group. However, a more recent study reported similar reductions in perceived stress scores among depressed women who participated in either a yoga condition or a comparable health education control group (Kinser, Elswick, & Kornstein, 2014). Similar to the results of the current study, both conditions reported a decrease in perceived stress and depression scores from baseline to post-intervention. Additional studies indicate that exercise may be an effective adjunctive treatment for anxiety and stress disorders (Jayakody, Gunadasa, & Hosker, 2014). Since the current study incorporated a MET-matched exercise protocol in both study conditions, perhaps this explains the similar decrease in depressive symptoms for both the yoga and walking conditions.

Participants in both study conditions reported increases in quality of life scores and improvement in disturbed sleep from baseline to post-intervention and one-month follow-up. However, participants in the yoga condition reported a significant increase in quality of life scores at follow-up relative to the walking condition. Previous literature indicates that lower health-related quality of life scores are associated with more severe depressive symptoms and recurrent depressive episodes (Kohler et al., 2014). A similar relationship has been found between disturbed sleep and depression. (Lopresti, Hood, & Drummond, 2013). Perhaps the significant decrease in depressive symptoms observed in both groups over the three month intervention period positively influenced perceived quality of life and disturbed sleep scores. However, it is difficult to determine why the

yoga condition reported significantly higher quality of life scores in comparison to the walking condition at one-month follow-up. The yoga condition reported significantly more minutes of physical activity than the walking condition (149 vs. 91 minutes per week). Increased levels of moderate intensity physical activity is associated with improved mood and quality of life in adults (Reid et al., 2010) and this may explain the quality of life differences between the groups.

There was no change in body mass index scores for both conditions from baseline to post-intervention and one-month follow-up assessments. This is contrary to Dhananjai and colleagues (2013) who found a significant decrease in weight and BMI among participants completing a six month yoga intervention relative to a time-matched aerobics group. However, the intervention was three months longer than the current study and only included obese participants. BMI was not an exclusion criteria in the current study. Average BMI was  $28.47 \text{ kg m}^{-2}$ , which falls in the "overweight" category (BMI of 25-29.99  $\text{kg m}^{-2}$ ), as identified by the World Health Organization (WHO; World Health Organization, 2000). Previous literature indicates that lifestyle interventions lead to smaller changes in weight among individuals who are not obese compared to those who are obese (Barte, Veldwijk, Teixeira, Sacks, & Bemelmans, 2014). Additionally, the short intervention and small sample size may have limited the ability to observe BMI differences in the current study.

Contrary to what was hypothesized, there were no differences between the yoga and walking groups on mindfulness. Specifically, both groups increased their mindfulness scores from baseline to post-intervention and one-month follow-up.

Mindfulness-based therapies are effective for treating depressive symptoms in both clinical and non-clinical populations (Hofmann, Sawyer, & Witt, 2010). Perhaps the mindfulness and health education provided through the telephone-based sessions improved mindfulness scores for both groups. The process of self-reflection and attention provided by the health educator may have contributed to this increased mindfulness. Research indicates that regular exercisers have greater mindfulness and acceptance (Ulmer, Stetson, & Salmon, 2010). The increase in moderate intensity physical activity from baseline to post-intervention and maintained physical activity levels at one-month follow-up for both groups may explain the increase in mindfulness scores for both groups.

There was a significant negative relationship observed in the change scores between depression and mindfulness for all participants. In other words, participants reporting a greater increase in mindfulness scores also reported a greater decrease in depressive symptoms. This finding supports a growing body of literature suggesting that mindfulness has a variety of positive psychological effects, including reduced psychological symptoms, emotional reactivity, and increased subjective well-being (Baer, 2003; Brown & Ryan, 2003; Keng, Smoski, & Robins, 2011).

Contrary to the hypothesis, change in depression scores among participants in the yoga condition was not significantly related to change in mindfulness scores at post-intervention. However, this relationship was significant at one-month follow-up assessment. It is possible that the skills learned in mindfulness training, as with other types of learning, may require repetition and consistent practice for long-term integration

and adaptation. Mindfulness provides a way of processing information, thoughts, and feelings on an ongoing basis. Therefore, it might suggest that with continued practice over time, individuals may strengthen mindfulness skills and in turn, may decrease depression. This supports the findings of Mathew, Whitford, Kenny, & Denson (2010) who found that the more mindful an individual was, the lower reported rumination, which was correlated highly with depression scores. In other words, mindfulness provided a tool to manage ruminative thoughts, which was also associated with lower depression scores.

### Strengths of Study Design

The present study design has several strengths, adds to the growing body of literature on yoga and depression, and addresses some of the most significant methodological issues in previous studies. The methodological issues in the previous studies include the following: (1) Lack of standardized interviews to diagnose depression; (2) use of non-standardized depression outcome measures; (3) short treatment length; (4) small sample sizes; (5) lack of a control group; (6) assessment research assistant not blind to treatment assignment; (7) insufficient randomization procedures; (8) high attrition; and (9) low adherence (Uebelacker et al., 2010).

In the current study, well validated, reliable measurement tools were used to assess both the presence and severity of depressive symptoms. Additionally, the current study utilized a 12-week intervention, which is longer than most studies in the yoga and depression literature. The inclusion of an active comparison condition, in this case the

MET-matched physical activity of walking and health education sessions, controls the possible effect of exercise and non-specific therapeutic effect of time on depression symptoms. The only differential treatment factor between the two conditions was the focus on mindfulness training for the intervention (yoga) condition. Additionally, the individual conducting the assessments at three months and follow-up was blind to the condition assignment. The random allocation procedure used in the current study allowed for a more robust examination of the cause-effect relationship between mindfulness-based hatha yoga and depression. This study had high adherence to the study protocol and low attrition numbers, which has shown to be problematic to previous depression and yoga intervention studies (Alexander et al., 2012; Dunn, Trivedi, Kampert, Clark & Chambliss, 2005). This may have been, in part, due to the home-based design of the intervention.

### Study Limitations

Despite the strengths discussed above, there were some limitations of this study. As with any study that recruits volunteers, bias may occur among individuals who volunteer for studies, as they may be more motivated to make a behavior change than individuals who do not volunteer. This may threaten the generalizability of the study. Furthermore, the majority of participants were Caucasian, educated, employed, and were of mid-high socioeconomic status. It is unclear if the findings from this study would generalize to other types of individuals. It is important to examine other demographic groups given risk factors for depression include being minority, non-educated, unemployed, and of lower socioeconomic status.

The current study included a small sample size, which may lower the statistical power to find significance differences between groups. Also, the length of this intervention was short when compared to other general depression intervention studies. However, the intervention of this study was longer than several other yoga-specific depression treatment trials (Uebelacker et al., 2010). For example, five of the six previously mentioned yoga studies were eight weeks or less in length.

Reliable, valid, and user-friendly assessment measures were used in this study. However, the measures are still self-report, which is a limitation, specifically when evaluating adherence to the protocols and physical activity behavior. Research indicates that self-report methods of physical activity are consistently higher or lower than objectively measured levels of physical activity (Prince et al., 2008). The participants were aware of the purpose of the study and therefore, social desirability bias may have also influenced the results of the study.

### Future Directions

Future research in yoga and depression should include larger sample sizes, with diverse samples. Future studies should also include a longer intervention with an extended follow-up phase. The dose response of yoga with varying frequency, duration, intensity, and type should also be explored. The effect of yoga on varying degrees of depression should also be examined. These designs would allow researchers to determine if the severity of depressive symptoms plays a role in the efficacy of the yoga intervention and possible variances in dose response. This study incorporated a gentler

form of hatha yoga. Perhaps more vigorous styles of yoga would be more efficacious for mild to moderate levels of depression than gentler forms of yoga.

There is a growing interest in identifying the specific barriers to adopting and maintaining a regular hatha yoga regime. Barriers to adoption and adherence to home-based versus group-based interventions should be explored. Specifically, future studies should explore if group-based interventions are more efficacious than home-based interventions for decreasing depressive symptoms. Depressed individuals may lack the confidence and/or desire to attend group classes and therefore, home-based programs may be an attractive alternative. However, if the psychological outcomes are significantly improved in group-based classes when compared to home-based, it may be worthwhile to explore methods of motivating depressed individuals to attend in-person yoga sessions.

Future studies should continue to explore the benefits of yoga for depression relative to more traditional forms of treatment such as psychotherapy. To enhance the current study, a wait-list control group could be added to further examine the possibility of a non-specific therapeutic effect (i.e., placebo effect) accounting for changes in depressive symptoms and other outcomes of interest. To enhance the methodological rigor of yoga research, researchers should develop standardized yoga classes specifically tailored to managing depression. Yoga is a unique and highly individualized practice, so this approach may present unique challenges. However, it would be an opportunity to standardize yoga treatment protocols for depression. Finally, a majority of research studies rely on self-report measures. Future research should include biomarker measures

(e.g., cortisol) of depression and anxiety symptoms and objective measurements of physical activity.

### Practical Implications and Conclusion

Reduced depression scores and increased mindfulness scores were observed for all participants at post-intervention and at follow-up, regardless of group assignment. Additionally, all participants increased physical activity from baseline to post-intervention and retained activity at follow-up. These results suggest that an intervention focused on movement (regardless of modality) may be helpful in the management of depressive symptoms. Individuals that experience mild to moderate depressive and are non-responsive to traditional therapies (i.e., psychotherapy, antidepressants) may consider exploring yoga and/or walking as a possible alternative or adjunctive treatment.

Although there is preliminary scientific evidence that yoga may be helpful for managing depressive symptoms (Cramer, Lauche, Langhorst, & Dobos, 2013; Pilkington, Kirkwood, Rampes, & Richardson, 2005; Uebelacker, et al., 2010), the results of this study make it unclear whether or not yoga is efficacious for treating depression. The results were promising in that yoga was superior to the walking group on reducing rumination symptoms, which is often a key feature of depression. There is increased interest in alternative methods for treating depression; however, at this time individuals with depression should be encouraged to seek evidence-based treatment options. Hatha yoga may be a viable treatment option; however, additional rigorous intervention trials with large sample sizes are needed.

This study was carefully designed to address multiple methodological limitations of previous studies examining the effect of yoga on depression. This study supports the need for continued large-scale research studies to evaluate the effect of yoga on depressive symptoms relative to an active comparison condition. Participants in both conditions had a decrease in depression scores such that the mean depression score decreased from a “moderate” to “mild” level of depression at three months. Although the walking health education comparison condition had a similar decrease in depression scores from baseline to post-intervention and one-month follow-up, participants in the yoga condition reported fewer rumination symptoms than the walking group. Similar improvements for both groups were observed for increased moderate intensity physical activity, perceived stress, mindfulness, quality of life, and sleep disturbance. Although the results of the current study are compelling, it remains unclear the effect yoga has on depressive symptoms. Future studies are still needed to address the limitations of the studies examining the effect of yoga on depression and to build on the results of the current study.

# 6

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# **7**

## **Appendices**

APPENDIX A  
CONSENT FORM

Efficacy of a Yoga & Exercise Intervention for the Treatment of Depressive Symptoms

You are invited to be in a research study examining the effect of exercise on depressive symptoms. You were selected as a possible participant because you called the study telephone line. I invite you to review this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Katie Schuver, MA, PhD Candidate in the School of Kinesiology at the University of Minnesota.

### Background Information

The purpose of this study is to examine if exercise helps reduce the symptoms of depression.

### Procedures:

If you agree to be in this study, I would ask you to do the following things:

First, you will complete the forms included in this packet. Specifically, this includes signing this consent form and answering the questionnaires (demographics form). Once you have sent a copy of the signed consent form and completed demographics form in the prepaid postage envelope included, I will contact you to complete a telephone-based interview assessing physical activity, depressive symptoms, and other related factors. I will periodically tape your responses to the interviews. This is done for quality control and strict confidentiality will be maintained. Once you have completed this telephone-based interview, you will be assigned to either the mindfulness-based yoga program or the walking program. The assignment to each group is completely random. Both groups will participate in the program for 12 weeks and will consist of 24 sessions of yoga classes (instructed via DVD at your home) or 24 sessions of walking (instructed via DVD at your home). Additionally, I will schedule a weekly phone call (approximately 15 minutes) to address any specific questions or concerns and to review additional concepts related to your random assignment group. In order to participate in the study, you will need to have access to a DVD player and a telephone and have time throughout the week to participate in the intervention.

At the end of the twelve weeks, you will repeat the telephone-based assessment session including the interview assessing depressive symptoms and exercise and related factors. Again, the interviews will periodically be taped. One month after the completion of the

program, you will again participate in the telephone-based assessment session including the interview assessing depressive symptoms and exercise and related factors.

Throughout this process, there will be no expenses as I will provide all of the materials required for participation, as well as postage paid envelopes for the return of the questionnaires.

### Risks and Benefits of being in the Study

*Regarding risks of the study, there are risks associated with exercise including orthopedic injuries or exacerbation of a pre-existing medical condition. If an injury occurs or if exercise becomes unsafe, you will be asked to discontinue exercise until your healthcare provider provides written permission for you to continue to exercise again.*

There are no direct benefits to participation in the study.

#### Compensation:

Participation in the study will qualify you for a drawing (held at the completion of the study) that includes prizes of free yoga classes, apparel, and gift cards.

#### Confidentiality:

The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records. Beth Lewis, my advisor on the study, will listen to the audiotapes to ensure the interviews are done properly. She will erase the tapes after listening to them and nobody else will have access to these audiotapes.

#### Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

#### Contacts and Questions:

The researcher conducting this study is Katie Schuver, MA and is a PhD candidate at the University of Minnesota. Dr. Beth Lewis is the direct advisor for Katie Schuver. You may ask any questions you have by calling Katie Schuver at 612-626-4169 or [schuv007@umn.edu](mailto:schuv007@umn.edu) or Dr. Lewis at 612-625-0756 or contacting her via email at [blewis@umn.edu](mailto:blewis@umn.edu).

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

**Statement of Consent:**

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of Investigator: \_\_\_\_\_ Date: \_\_\_\_\_

APPENDIX B

**Telephone Screen**

Date of Contact:     /    /      
(mm / dd / yy)

Status at phone screen

- Eligible
- Ineligible
- Not interested
- Thinking about study

If ineligible, check reason for being ineligible:

- Not depressed
- Too much exercise (number of minutes)\_\_\_\_\_
- Currently participating in Yoga
- Health related (please list reason\_\_\_\_\_)
- Scheduling difficulties
- Currently enrolled in another exercise-related study
- Other\_\_\_\_\_

If at any time the caller **does not meet the eligibility criteria**, stop the screening, thank them for their interest, and refer to “C” at the end of the screen. *Check off ineligible.*

If at any time **you are unsure as to whether a caller is eligible** (e.g., ambiguous answer or poor instructions), complete the screen and refer to “B” at the end of the screen. Check off status above once eligibility is determined.

Hello, my name is \_\_\_\_\_ Katie Schuver and I'm calling from the University of Minnesota. The purpose of my call is to tell you a little about the research study to see if you might be interested in participating and to collect information about you to determine if you are eligible for the program. Do you have a few minutes now? *(If they do not have the time at that very moment, try to schedule another time to call back).*

Do I have your permission to keep the information I ask you during this interview? The information will remain confidential and will be kept without your name attached.

**YES NO**

Before I explain the program, I would like to ask some general questions to learn more about the individuals who are calling our program line. These questions will not impact your eligibility for the study.

1. How did you hear about the study? \_\_\_\_\_

2a. Which of the following do you consider to be your racial group?

- (1) White
- (2) American Indian/Alaskan Native
- (3) Asian
- (4) Native Hawaiian or Other Pacific Islander
- (5) Black or African American
- (6) Other (describe): \_\_\_\_\_.
- (88) Don't know/refuse

2b. Which of the following do you consider to be your ethnic group?

- (1) Hispanic or Latino
- (2) Not Hispanic or Latino

3. What is your Date of Birth? \_\_\_\_/\_\_\_\_/\_\_\_\_ (mm/dd/yy)  
(If less than 18 years of age, explain to them that the study is for individuals 18 and older)

### Study Description

Let me tell you a little more about the program. This program is designed to improve health and wellness among women who are currently depressed.

4. Have you been prescribed by a physician as having depression? **YES NO**

5. Conduct Patient Health Questionnaire (PHQ-9).

**If reporting score  $\geq 10$  and  $\leq 20$  on PHQ-9, then move on to question 6. If score is  $< 10$  or  $> 20$ , go to paragraph C.**

6. Conduct Beck Depression Inventory (BDI).

I have a few more eligibility questions to ask you but before I do, let me tell you a little bit more about the study to determine if you would be interested. The study would begin after I receive your written consent, which I will send to you in the mail if you are eligible for the study. After an initial telephone interview, you will be assigned to one of two groups: one group will receive mindfulness-based yoga sessions and the other group will participate in walking sessions. The assignment to each intervention is completely random. Both groups will participate in programs that last for 12 weeks and is entirely home-based. This means the sessions will be instructed via DVD in your home. You will be given all materials needed to participate fully in the study. You will be asked to complete the DVD at least two times each week, at your own convenience and to track your participation on physical activity logs. Additionally, you will participate in a weekly 15 minute telephone session (scheduled at your convenience) with the primary investigator for the first month of the study and then every other week for months two and three. The purpose of the telephone session is to address any questions or concerns that may arise, as well as discuss health-related topics relative to the group you have been randomized to.

At the end of the 12 weeks, you will do another telephone-based assessment session that lasts no longer than 20 minutes. Additionally, one month following the intervention, another telephone-based assessment will be conducted to assess your physical activity and mood. You will receive a small gift for participating in the study. You will be given all materials needed for participation in the study, as well as pre-paid postage envelopes for return of questionnaires and any other correspondence. You do not have to worry about remembering all of this – I know it is a lot of information. I will send you a full description of the program once I have determined your eligibility for the program. I just wanted to give you an idea of what the program entails at this point.

6. Does this study sound like something you would be interested in? **YES NO**

**6a.** Would you be able to commit to completing a yoga or walking DVD twice a week, as well as a 15 minute telephone session- both scheduled at your own convenience? **YES NO**

**If NO:** Thank you for considering the program. [End interview]

**If YES:** Since this is a research study, I need to ask you about your health and exercise habits to find out if you are eligible. **All of the information you give will be kept strictly confidential.**

*If at any time, the caller has reservations about being involved in research, please assure the person that after signing the consent form, he or she will be identified by a subject number to ensure confidentiality. If he or she is still not sure or if he or she has further questions, Katie can call him/her back.*

7. Are you currently participating in another research study on health or physical activity?

**If YES, finish interview but go to paragraph B and document what the study involves.**

\_\_\_\_\_

8. Is another member of your household participating in this study? **YES NO**

**If YES, go to paragraph C**

9. Do you read and write fluently in the English language? **YES NO**

**If NO, then go to paragraph C**

### **Exercise Questions**

10. Over the past month, did you participate in any moderate intensity physical activity? What I mean by moderate intensity activity is any activity that feels as hard or harder than a brisk walk. It gets your heart rate going faster and feels like you are running late for an appointment or walking to get out of the rain. For the activity to be counted, it needs to be for at least 10 continuous minutes without stopping. Some examples of activities that are at least of moderate intensity could include brisk walking 3-4 mph, running, aerobic dance, swimming, and bicycling.

**YES NO**

**If no, then continue to question 12**

*If yes, please remember to clarify that it was at least 10 continuous minutes without stopping and was at least of moderate intensity. For example, someone might say they did 60 minutes of housework but only 30 of those minutes were at the moderate intensity level and were at least 10 minutes at a time.*

**If yes:**

- a. What activities have you done? \_\_\_\_\_
- b. How many times per week? \_\_\_\_\_
- c. For how many minutes each time? \_\_\_\_\_
- d. How long have you been doing this activity? \_\_\_\_\_

*(Be specific: weekly, monthly, yearly)*

**If greater than 90 minutes per week of at least moderate intensity, then go to paragraph C.**

If there is a question if the activities are at the moderate intensity level, please let the potential participant know that you will call him/ her back.

11. Over the last two years, have you taken more than a total of 4 yoga classes?  
YES NO (If yes, then go to paragraph C).

12. Over the last month, have you taken 1 or more yoga classes or participated in yoga at home? YES NO (If yes, then go to paragraph C)

#### **GENERAL MEDICAL QUESTIONS**

13. Are you currently being treated for any medical conditions?  
**YES NO If no, then continue to question 14.**

**If yes,**

What are you being treated for? \_\_\_\_\_

**If participant's response is ON the exclusion list, then stop with the phonescreen and go to paragraph C.**

**If participant's response is NOT on the exclusion list, continue with the phonescreen and end with paragraph A.**

14. Have you been hospitalized for a psychiatric disorder in the past six months?  
**YES NO If YES, then go to paragraph C**

15. Do you currently have any muscular skeletal problems such as arthritis, gout,

osteoporosis, or back, hip or knee pain that may interfere with being physically active? **YES NO**

**If YES, then go to paragraph C**

16. Do you have diabetes?  
**YES NO If YES, then go to paragraph C**

17. Do you have high blood pressure?  
**YES NO If YES, continue with interview and ask what, if any, treatment they are receiving for this and how well controlled it is?**

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**If not well controlled, go to paragraph C. Otherwise, they are still eligible.**

18. Do you have asthma? **YES NO**  
If YES, is it exercise-induced asthma?  
**YES NO If YES, then go to paragraph C**

19. Is there anything else about your health that would make exercise unsafe or unwise? **YES NO** If yes, explain: \_\_\_\_\_  
**If anything significant emerges that would make the person unable to comply with the research protocol, then go to paragraph C. If you are unsure, continue phonescreen and end with paragraph B**

20. Are you taking any prescription medications? If yes: what prescription medications are you taking? What is it being taken for? How long have you been taking this medication? \_\_\_\_\_

**If the medication includes beta blockers, go to paragraph C. [See list of beta blockers and antidepressants].**

**Possible Beta Blockers:** Beta Blockers: Betapace/Sotalol, Blocadren/Timolol, Cartrol/Carateolol, Corgard/Nadolol, Coreg/Carvedilol, Inderal/Propranolol, Inderal LA/Propranolol, Kerlone/Betaxolol, Levatol/Penbutolol, Lopressor/Metoprolol, Normodyne/Labetalol, Sectral/Acebutolol, Tenormin/Atenolol, Toprol-XL/Metoprolol, Trandate/Labetalol, Visken/Pindolol, Zebeta/Bisoprolol

**A. Eligible**

You are eligible for the study. As we discussed earlier, I will need to contact your physician to see get their permission for you to participate.

21. What is your full name? \_\_\_\_\_

22. What is your mailing address?

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

23. What is your (check preferred method of contact):

28a. Home phone number ( ) \_\_\_\_\_

28b. Work phone number ( ) \_\_\_\_\_

28c. Cell phone ( ) \_\_\_\_\_

28d. Email address \_\_\_\_\_

24. Can we leave message at:

29a. Home                      **YES NO**

29b. Work                      **YES NO**

29c. Cell                      **YES NO**

25. (If yes to any item in 24) Can we call ourselves University of Minnesota when we call? **YES NO**

26. (If no to 25): OK, is there any other name you would like us to use?

\_\_\_\_\_

The next step is for you to read and sign a consent form. I will send this to you in the mail if you are still interested in the study, you will return it in a postage paid envelope. I will also send a hand-out with my contact information along with the consent form. Do you have any questions?

**B. Not sure if eligible**

I'm not sure if you are eligible for the study. I will have to check with my advisor and get back to you shortly to let you know. When is the best time to reach you? (Ask day and evening)

\_\_\_\_\_ Day  
\_\_\_\_\_ Evening

### **C. Not eligible**

I'm sorry, but you are not eligible for the study. If I have studies in the future that you might be eligible for based on the information you told me, could we contact you again?

Thank you for your time and interest.

**YES NO**

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### **List of Exclusion Criteria**

- No healthcare provider consent to participate
- Pre-existing diabetes and hypertension not well controlled
- Current regular participation in exercise (defined as exercising 90 or more minutes per week)
- Taken 4+ yoga classes in the last two years
- Taken 1+ yoga classes within the last month
- Currently enrolled in another exercise or weight management study
- Less than 18 years of age
- Another member of household participating in the study
- Unable to speak, comprehend, read, or write fluently in the English language
- Musculoskeletal problems such as arthritis, gout, osteoporosis, or back, hip or knee pain that may interfere with exercising
- Exercise induced asthma
- Any condition that would make exercise unsafe or unwise
- Taking medication that interferes with heart rate response to exercise such as beta blockers
- Hospitalization for a psychiatric disorder in the past six months

## APPENDIX C

### Yoga Intervention Protocol

#### Thrive Women's Physical Activity & Wellness Program: Yoga Intervention

#### Session #1: Overview of Yoga Intervention / Assessing Initial Questions on Yoga & Preparing Plan for Practicing Yoga at Home

- 1) "My name is Katie and I am going to be your health educator over the next six months." I am very excited that you are participating and I think you will find our program very helpful for you. The first thing we are going to do today is to find out which of the two groups you have been randomly assigned to. This is completely random and unfortunately I have no control over which of the programs you are in. Let me access my form here to determine which program you are in."
- 2) "You have been randomly assigned to the mindfulness-based yoga program. This is very exciting! This program is great. First, I will be sending to you (through the mail) all of the materials you need to participate in the program, including a yoga mat, DVD, physical activity logs and a handbook that covers mindfulness topics and includes exercises/activities to develop mindfulness skills. You will be using the yoga mat and DVD at least twice a week and the handbook will be used to guide our telephone sessions each week. In these telephone sessions, we will be covering a variety of topics related to mindfulness. You will also have the opportunity to discuss any questions you may have about the DVD or your yoga practice, as well as discuss any stressors you are experiencing. You will be using the physical activity logs to keep track of your participation with the yoga DVD. I know this is a lot to remember, but don't worry at all- you do not need to memorize everything! My job is to lead you through the program. Do you have any questions so far?"
- 3) *The next step is for you to get to know the participant a little more by asking the following questions. We want to make sure she is excited about the program so she continues to be compliant with the intervention calls. Start by asking the following questions.*
  - a. How are things going in general with work, family?
  - b. How are you feeling physically?
  - c. How have you been sleeping?
  - d. If you could rate your stress level from 1-10 what would it be?
  - e. What are you most excited about this program?
- 4) *You can work in the following during the questions above or go through the items after you have asked the questions.*

## 5) Introduction of Yoga Intervention

“The intervention you have been randomized into is the mindfulness-based yoga group. In addition to doing the yoga DVD two times/week, as I said, we will also be talking on the phone (scheduled at your convenience) once a week to check in and to also discuss basic mindfulness concepts and ways to incorporate mindfulness into your life. I will get more into the mindfulness piece after you have had a chance to get the handbook and look it over....we will be discussing that throughout the intervention. Today I would like to take some time to discuss the practice of Yoga with you and answer any questions you may have. Does that sound okay?”

### Response

“Great. So, first, I would love to hear what your experience (if any) with yoga has been in the past? Have you practiced yoga before? Breathing techniques or any meditation practices?”

If so, ask participant to describe.

“The yoga program you will be participating in for this study is considered a mindfulness-based yoga program, meaning that you will be taking time to check in with your body and how you are feeling as you move through the postures and breathing practices. As you practice the DVD at home, you will be reminded of this by the instructor. Basically, this style of yoga is based on consistently checking in with your body and modifying the poses as you see what fits best for your body and your experience. Rather than focusing on “perfecting” the pose, you will be asked to bring your awareness, focus to your breath, to move into postures without pushing, pulling or forcing, and observing your body and breath without analyzing or judging. Practicing yoga in this way is what makes yoga a practice in mindfulness. It is important not to stress or strain during your practice. If any position causes pain or discomfort, ease back on what you’re doing or stop completely. You should NOT feel pain or discomfort. Always be safe and do only what feels comfortable to YOU. Each person is different and in yoga you can celebrate that difference.”

“Additionally, here are a few tips to remember when you are ready to practice your yoga DVD:”

- One of the great things about yoga is that it can be practiced anywhere! When you are preparing for your practice, make sure you have a flat surface to place your mat on and enough room to move around.

- The best location is one where it's quiet and you can practice without distraction. The temperature should be comfortable- not too hot or cold.
- You can practice any time of day, just be sure to allow sufficient time. If you can't practice for one long period (the entire DVD), then practice in a couple of smaller periods. It's important that you do not rush, and that you allow time for relaxation.
- Yoga is most comfortably practiced when you are fully digested.
- Drink plenty of water and stay hydrated before, during and after.
- Wear comfortable, loose clothing while you are practicing. The yoga mat is most beneficial when you practice without socks on. This helps to avoid slipping or sliding in a pose.

Discuss with participant and address any questions based on previous paragraph.

“Great. So, one of the habits that has demonstrated to reinforce regular participation in any physical activity is scheduling. When do you see the yoga practice fitting in to your schedule? Day/Time? Perfect! What I would like you to do right now is to pencil that into your calendar (phone) for the next week. It will take me a few days to get the materials to ship to you, so let's plan out at least 4-5 days for your first session.”

Plan- assist in talking through schedule. Reinforce by reminding to “pencil” it in.

- 6) Address any additional concerns/questions about the study and/or Yoga DVD, physical activity logs, etc.
- 7) Talk about next steps:
  - a. “I will be sending out all of the materials (booklet, yoga DVD, mat) this afternoon so you should receive it over the next few days. Please feel free to call me if you haven't received anything by XXX date. We will have some time in our next phone session to address any questions you may have after you get a chance to look over the materials.”
  - b. “For the next three months, we will have regularly scheduled telephone calls focusing on mindfulness topics. For the first month, the calls will be weekly. Every other week for months 2 and 3. The call will be scheduled at a time that is convenient for you. The call will be scheduled at a time that is convenient for you. Do you have any questions before we schedule next week's call?”
- 8) Schedule next week's session (one week).

## **Session #2: History of Yoga & Introduction to Mindfulness**

Based on Mindfulness Principles of: Overview of all 7 principles- Non-Judging, Patience, Beginner's Mind, trust, Non-striving, Acceptance, Letting Go

- 1) Assess how things are going in general; assess stress level. Did they receive the materials?
- 2) Assess how their first few experiences with the yoga DVD went. Address any immediate questions. How is the Yoga DVD going? How often/when/how long have you been doing the Yoga dvd?
- 3) "Today we are going to talk a little bit about the practice of yoga, the history and start diving in to the association with mindfulness."
- 4) Review tip sheets #1 #2

"As we discussed in our last session, mindfulness-based yoga is practicing with the idea of becoming a neutral observer to your experience. Were you able to do that with the DVD in the last two sessions? Did you find any trouble practicing in that way? Did you find yourself judging yourself in any of the poses or breathing techniques? If so, why? How did you feel before, during, after?" Discuss

- 5) If applicable, the goal for the next week's yoga practices is to keep the idea of "mindfulness" in mind....can you remain an observer of sensations, thoughts, be present while doing the Yoga dvd.
- 6) Schedule next week's session (one week)

### **Session #3: Mindfulness (cont.d) & Introduction to Breathing**

Based on Mindfulness principles of: Non-Judging, Patience, Beginner's Mind, Trust, Non-striving, Acceptance, Letting go

- 1) Assess how things are going in general; assess stress level. How did it go last week with the mindfulness?
- 2) Assess adherence to Yoga dvd. When did they do their Yoga? How long? Record in notes. Experience? Address any immediate questions/concerns. How did it go practicing "mindfulness" during their Yoga dvd?
- 3) "Today we are going to continue our discussion on mindfulness and the role it may play in our life. As we discussed last week, there are many definitions to mindfulness....Jon Kabat Zinn, who you may have heard of, is known as a prolific advocate for the power of mindfulness in healing. He defines mindfulness as "paying attention on purpose". This paying attention on purpose is doing so without judgment of what you are paying attention to. It is noticing your thoughts, words, feelings, etc just as they are.

"One of the ways many experts encourage the practice of mindfulness is through an awakened awareness of breath. Breathing is something we do a lot of....but very often it is an unconscious activity. Thank goodness, right! Can you imagine how exhausting it would be if we had to think about each breath we take? We wouldn't get anything else done! Breathing is the only system in our body that is both voluntary and involuntary, and for that reason, it has a pretty intimate relationship with our central nervous system. Deep diaphragmatic breathing is one of the most powerful tools for us to utilize to fire up the parasympathetic nervous system (aka "rest and digest"). Deep, conscious breathing can also be a tool for developing mindfulness. Let's review tip sheets number 4 & 5 to identify some breathing techniques you may consider practicing, with the intention of further refining your mindfulness skills."

- 4) Review tip sheet #3, #4, #5
- 5) Set a goal related to mindfulness breathing, if applicable. Ask if they would like to try out any specific breathing practice(s) the next week.
- 9) Schedule next week's session (one week)

## **Session #4: Mindfulness of Mind & Body- Body Scan & Observation Journal**

Based on Mindfulness Principles of: Trust, Non-Judging, Acceptance, Letting go

- 1) Assess how things are going in general; assess stress level. How did it go last week with the mindfulness?
- 2) Assess adherence to Yoga dvd. When did they do their Yoga? How long? Record in notes. Experience? Address any immediate questions/concerns. How did it go practicing “mindfulness” during their Yoga dvd?
- 3) Assess mindfulness breathing goal from previous week (if applicable). Discuss.
- 4) “As you recall our discussion a couple of weeks ago, mindfulness is on many different levels. Today we are going to talk about mindfulness of your body and mind. One of the ways to practice mindfulness is to become more aware of your physical body and how your physical body is affected by outside influences. Sometimes we can be so overwhelmed with the activities/expectations of our lives that we don’t even realize when we are beginning to get run down from lack of sleep, poor nutrition...pretty soon we are sick and missing days of work/kids’ activities. The more mindful and aware we are of our body’s signals, the more likely we are to notice when our body is in trouble and then take steps to remedy the situation before it becomes serious. In other words, we become more aware of our body’s subtle signals and can take care of ourselves right away, rather than waiting for big problems to force us to take care of ourselves. I once heard a quote that really speaks to this idea...”If we listen to our body’s whispers, than we don’t have to listen to our body scream.” Through activities like body scans and progressive relaxation, we can learn to become more mindful of our physical bodies, take care of ourselves. These mindfulness skills also transfer over to other areas of our life.”
- 5) Review Tip sheet #6 and #7
- 6) “We are also going to discuss mindfulness of our mind’s thoughts and how our automatic thinking patterns can impact our fulfillment in life. When was the last time you truly believed a compliment that someone gave you? Did you brush it off, or did you accept it when your boss/colleague told you that you had done a good job? Or maybe think about the last time that you assumed someone else was thinking something bad about you? On the flip side, when is the last time you said something nice to yourself? Do you remember the last time you truly felt proud of your accomplishment? The more we participate in overly pessimistic

thinking (i.e. “I’ll never be a good cook”) or ten to be biased toward paying attention to negative thoughts, comments, and facial expressions (while ignoring positive ones), the more difficult it is to maintain a happy, open attitude, be creative, etc. Before we realize it, some of these tendencies may become automatic. Through observing these possible automatic thought patters, we can build some awareness as to how we are preventing ourselves from being happy. Researchers from McGill University have found evidence that with practice, you can begin to reverse those negative thought patterns and start becoming more confident and positive. To accomplish this, one of the most fundamental (and powerful) things we can do is become observers of our automatic thoughts. We are going to practice doing this using what I call an ‘Observing Your Thoughts Journal’. Let’s open up to Tip Sheet #8 and go over this. Keep in mind that as you become aware of and begin recording your thoughts, it is important to practice non-judgment and acceptance. No thoughts are bad and/or wrong- rather this journaling exercise will help you realize how your automatic thoughts may be preventing you from living with an attitude of gratitude. ”

- 7) Review Tip Sheet #8 and Tip sheet #9 and challenging thoughts template
  
- 8) “Well, we certainly have a lot of work for our next phone session, which will be in two weeks. Do you have a specific activity/goal for the body scan and/or observation journal? “ Discuss.
  
- 9) Schedule next session (two weeks).

## **Session #5: Mindfulness of Body, Mind, Thoughts, Emotions- Mindful Eating Exercise**

Based on Mindfulness Principles of: Patience, Trust, Acceptance, Beginner's Mind

- 1) Assess how things are going in general; assess stress level. How did it go last week with the mindfulness?
- 2) Assess adherence to Yoga dvd. When did they do their Yoga? How long? Record in notes. Experience? Address any immediate questions/concerns. How did it go practicing "mindfulness" during their Yoga dvd?
- 3) Assess their goal(s) with body scan and/or observation journal from previous session. Discuss as needed.
- 4) "Today's session focuses on the concepts of patience and non-judgment- both qualities that are required for living mindfully. We are going to practice this through an activity called 'mindful eating'. Have you ever heard of this term before? Have you ever practiced something like this? " Discuss as needed. "Well, let's turn to Tip Sheet #10 and review this session's activity.
- 5) Review Tip Sheet #10. Discuss as needed.
- 6) "Would you like to set a goal for mindful eating this week? Perhaps choosing a specific meal or snack that you could practice this exercise daily?" Discuss.
- 7) Schedule next session (two weeks).

## Session #6: Mindfulness of Mind- Sitting Meditation

Based on Mindfulness Principles of: Letting Go, Patience, Non-striving, acceptance

- 1) Assess how things are going in general; assess stress level. How did it go last week with the mindfulness?
- 2) Assess adherence to Yoga dvd. When did they do their Yoga? How long? Record in notes. Experience? Address any immediate questions/concerns. How did it go practicing “mindfulness” during their Yoga dvd?
- 3) Assess goal from last session (if applicable). Were they able to practice mindful eating. How did that impact their experience during the meal? After? Discuss.
- 4) “Today we are going to discuss the mindfulness practice of meditation. Many wisdom traditions and philosophies practice meditation as a form of increasing awareness, developing trust, and practicing patience. These skills are definitely helpful when living mindfully. As we review this activity, keep in mind that just because it is called a “seated” meditation does not mean you have to wind yourself up in a pretzel-like position and sit absolutely still....meditation is not about what you look like, but what you can do to control your mind’s wanderings. If you are physically uncomfortable, then it is going to be extremely difficult to still your mind. So, for that reason, as you practice this meditation exercise, feel free to take any physical posture you would like....seated on the floor, seated on a chair, standing, lying down, etc.” Let’s turn to tip sheet #11 and #12 and review the exercise. We can also discuss some history of meditation and health benefits that have been linked to meditation practice.”
- 5) Review Tip Sheet #11 and #12
- 6) “Does this meditation exercises seem like something you could practice once or twice (or more) over the next couple of weeks? If you like the idea of meditation, but don’t necessarily like this specific activity, there are many resources available. I have several websites and books you could look into if you are interested.” Discuss as needed and set goal if applicable.
- 7) Schedule next session (two weeks).

## **Session #7: Mindfulness of Mind-Nine Dots Exercise & Mindfulness Lists Exercise**

Based on Mindfulness Principles of: Beginner's Mind, Letting Go

- 1) Assess how things are going in general; assess stress level. How did it go last week with the mindfulness?
- 2) Assess adherence to Yoga dvd. When did they do their Yoga? How long? Record in notes. Experience? Address any immediate questions/concerns. How did it go practicing "mindfulness" during their Yoga dvd? Record their adherence to Yoga practice. Are they keeping track in their journals?
- 3) Assess goal from last session (meditation). Were they able to practice the meditation exercise? Why or why not? Discuss.
- 4) "Today we are going to focus on the mindfulness skill of creating a "beginner's mind." According to John Kabat-Zinn (discussed in previous sessions), a way to establish mindfulness to be open to new things, people, experiences. Very often, we allow our past experiences, knowledge, etc. cloud our current environment and circumstances which can lead to a feeling of being stuck. The more open we are to our surroundings, the more creative we can be and more efficient at problem solving! Two activities that are really fun and may help us practice a 'beginner's mind' are on Tip sheets # 13 and #14. Let's review those!"
- 5) Review Tip Sheets #13 and #14.
- 6) Set goal (if applicable) to practice using lists exercise throughout the week to practice mindfulness and to exercise mind. Discuss.
- 7) Schedule for next week's session (two weeks). Next week's session is the last session.

## **Session #8: Final Session: Spider Mindfulness Exercise**

Based on Mindfulness Principles of: Review of all 7 principles- Non-Judging, Patience, Beginner's Mind, trust, Non-striving, Acceptance, Letting Go

- 1) Assess how things are going in general; assess stress level. How did it go last week with the mindfulness?

- 2) Assess adherence to Yoga dvd. When did they do their Yoga? How long? Record in notes. Experience? Address any immediate questions/concerns. How did it go practicing “mindfulness” during their Yoga dvd? Record their adherence to Yoga practice. Are they keeping track in their journals?
- 3) Assess goal from last session. Were they able to practice the lists exercise? Why or why not? Did they find it particularly helpful? Discuss as needed.
- 4) “Well, this is our last session, so I thought it would be fun to take the time to review what we have discussed the last 12 weeks and to also finish with an activity called Spider Mindfulness. How do you feel you have been doing with sticking with your goals each week? Has any of our discussions influenced your thoughts, behaviors, interactions, feelings, etc?” Discuss as needed. “Let’s turn to Tip Sheet #15- entitle Spider Mindfulness. This activity is meant to be done when you have some time to sit quietly and think and record your thoughts, so on the phone today, we will go through the exercise, and then, if you feel like it works for you, take some time later today, tomorrow- whenever to complete the activity.”
- 5) Review Tip Sheet #15 as well as final tip sheet #16 (additional mindfulness activities to consider and further reading/resources)
- 6) End with specific goals for completing spider mindfulness activity and/or any other goals pertaining to the twelve weeks of tip sheets/exercises. Discuss as needed.
- 7) Final Session- schedule final assessments in one week.

## APPENDIX D

### Walking Control Condition Protocol

#### Thrive Women's Physical Activity & Wellness Program: Walking Intervention

##### Session #1: Overview of Walking Intervention / Assessing Initial Questions on Walking & Preparing Plan for Walking at Home

- 10) "My name is Katie and I am going to be your health educator over the next six months." I am very excited that you are participating and I think you will find our program very helpful for you. The first thing we are going to do today is to find out which of the two groups you have been randomly assigned to. This is completely random and unfortunately I have no control over which of the programs you are in. Let me access my form here to determine which program you are in."
- 11) "You have been randomly assigned to the walking health and wellness program. This is very exciting! This program is great. First, I will be sending to you (through the mail) all of the materials you need to participate in the program, including a walking DVD, physical activity logs and a handbook. You will be using the DVD at least twice a week and the handbook will be used to guide our telephone sessions each week. In these telephone sessions, we will cover a wide variety of topics including how to manage stress, how to manage sleep deprivation, nutrition, weight management tips, time management, and keeping a healthy home. You will also have the opportunity to discuss any stressors you are experiencing. You will be using the physical activity logs to keep track of your participation with the walking DVD. I know this is a lot to remember, but don't worry at all- you do not need to memorize everything! My job is to lead you through the program. Do you have any questions so far?"
- 12) *The next step is for you to get to know the participant a little more by asking the following questions. We want to make sure she is excited about the program so she continues to be compliant with the intervention calls. Start by asking the following questions.*
- a. How are things going in general with work, family?
  - b. How are you feeling physically?
  - c. How have you been sleeping?
  - d. If you could rate your stress level from 1-10 what would it be?
  - e. What are you most excited about this program?
- 13) *You can work in the following during the questions above or go through the items after you have asked the questions.*

#### 14) Introduction of Walking Intervention

“The intervention you have been randomized into is the walking health and wellness group. In addition to doing the walking DVD two times/week, as I said, we will also be talking on the phone (scheduled at your convenience) once a week to check in and to also discuss basic health and wellness topics and ways to incorporate into your life. I will get more into the this piece after you have had a chance to get the handbook and look it over...we will be discussing that throughout the intervention. Today I would like to take some time to discuss the walking DVD with you and answer any questions you may have. Does that sound okay?”

Response

“Great. So, first, I would love to hear what your experience (if any) with walking and/or exercise in the past? Have you done regular exercise or walking before?

If not, why? What are the barriers?

If so, ask participant to describe.

“The walking program you will be participating in for this study is considered a home-based program, meaning that you will have the DVD to practice with at home. However, you can also do your walking outside (if weather permits) or at the mall, etc. The full DVD is approximately 60 minutes in length. Please be sure to check in with your body continuously and be gentle with your body. As you practice the DVD at home, you will be reminded of this by the instructor.

“Additionally, here are a few tips to remember when you are ready to practice your walking DVD:”

- Drink plenty of fluids while you are active.
- Be gentle with your body. The saying “no pain, no gain” is not true. If at anytime you feel pain, stop your activity.
- Invest in a good pair of shoes for your walking. This will make the exercise more enjoyable and help prevent injury.
- Always take time to warm-up and cool-down (these segments are included in the DVD).

Discuss with participant and address any questions based on previous paragraph.

“Great. So, one of the habits that has demonstrated to reinforce regular participation in any physical activity is scheduling. When do you see the walking

dvd fitting in to your schedule? Day/Time? Perfect! What I would like you to do right now is to pencil that into your calendar (phone) for the next week. It will take me a few days to get the materials to ship to you, so let's plan out at least 4-5 days for your first session."

Plan- assist in talking through schedule. Reinforce by reminding to "pencil" it in.

15) Address any additional concerns/questions about the study and/or walking DVD, physical activity logs, etc.

16) Talk about next steps:

- a. "I will be sending out all of the materials (booklet, walking DVD, activity logs) this afternoon so you should receive it over the next few days. Please feel free to call me if you haven't received anything by XXX date. We will have some time in our next phone session to address any questions you may have after you get a chance to look over the materials."
- b. "For the next three months, we will have regularly scheduled telephone calls focusing on health and wellness topics. For the first month, the calls will be weekly. Every other week for months 2 and 3. The call will be scheduled at a time that is convenient for you. Do you have any questions before we schedule next week's call?"

17) Schedule next week's session (one week).

## Session #2: Stress Prevention

- 7) Assess how things are going in general; assess stress level. Did they receive the materials? Physical activity Logs?
- 8) Assess how their first few experiences with the walking DVD went. Address any immediate questions/concerns....review Tip Sheet #1, topic is exercise safety/concerns.
- 9) “Today we are going to talk about understanding stress and it’s relationship without our health and overall wellness. Very often stress can cause havoc in our physical, mental and emotional health.”  
“I’m sure you have thought about stress before and the role it plays in your life. When you hear the word stress, what are your first initial reactions? What do you notice happens in your body when you think about your stress (or stressors)?”  
Discuss based on response.  
“Yes. Modern life is full of hassles, deadlines, frustrations, and demands. For many people, stress is so commonplace that it has become a way of life. Stress isn’t always bad. In small doses, it can help you perform under pressure and motivate you to do your best. But when you’re constantly running in emergency mode, your mind and body pay the price. One of the most important things you can do is to recognize when your stress levels are out of control. What do you notice happens when you become “stressed”? Physically, emotionally, mentally? Do you notice these particular feelings tied to any specific event or circumstance?”  
Discuss based on response.  
“I often get the question of “how much stress is too much stress?” The answer is very unique to every individual. This is the same for you...your ability to tolerate stressful situations can be very different from your family, friends, etc. We are going to discuss in upcoming sessions some ways to build up your “tolerance” or create a buffer to stress and ways to prevent stress.”
- 10) Review tip sheet #2 (understanding stress)
- 11) Assign “Homework”: “Next time you notice you are becoming stressed, take just take a moment and notice the signs and symptoms.
- 12) Schedule next week’s session (one week)

### Session #3: Stress Prevention

- 1) Assess how things are going in general; assess stress level. How did it go through the week observing stress and symptoms?
- 2) Assess adherence to walking DVD. When did they do their walking? How long? Record in notes. Experience? Address any immediate questions/concerns.
- 3) “Today we are going to talk about stress prevention. As we discussed in our previous telephone session, very often stress can cause havoc in our physical, mental and emotional health. As we discussed, not all stress is “bad” stress, it is just when we are stuck in this chronic “stress response” when it becomes most harmful. One of the most beneficial things you can do is be proactive in your approach to managing stress. You can do this by practicing some stress PREVENTION techniques. Here are a few suggestions:”  
Suggestions for stress prevention
  - a. Try to set aside at least 15 minutes per day to relax and do whatever relaxes you like reading a book or watching television. It is important to do something you enjoy and have this time to yourself.
  - b. Stay in touch with family members and friends – a quick phone call to de-stress about your day can do wonders.
  - c. Schedule something that is relaxing such as a massage, facial, or meeting with a friend
  - d. If you are a worrier, it can be helpful to get a “worry notebook.” Try writing worries down as a way to stop yourself from thinking about the worries – give yourself 15 minutes per day with your “worry notebook” and tell yourself you can think of the worries during the 15 minute worry but not during the rest of the day
    - i. When a worry occurs outside the 15 minutes, write it down and tell yourself you will get back to it during your 15 minute worry time
- 4) Review tip sheet #2 (if needed) and #3
- 5) If applicable, choose one (or more) of the above techniques to implement into daily life- discuss why, how, when.
- 6) Schedule next week’s session (one week)

#### **Session #4: Time Management**

- 1) Assess how things are going in general; assess stress level. How is the walking dvd going? Any concerns or questions? How often/when/how long have they been doing walking dvd (or walking elsewhere)?
- 2) (If applicable) Were they able to implement stress prevention technique from previous week's telephone session.
- 3) Today we are going to talk about Time management, or in the case of many folks, the lack of time and ways to deal with stress associated with time crunches. Do you ever feel stressed out about getting everything you need to get done?" Discuss.
- 4) Here are some tips to help you manage time and associated stress
  - a. Learn how to say no to unnecessary commitments or nonessential tasks. Consider your goals and schedule before agreeing to take on additional work.
  - b. Make lists with different priority rankings – determine what has to get done today, tomorrow, this week, this month, and this year. Prioritizing tasks is important as time-consuming, but relatively unimportant tasks can consume a lot of your day.
  - c. Plan each day. Make a to-do list, putting the most important tasks at the top. Keep a schedule of your daily activities to minimize conflicts and last-minute rushes.
  - d. BUT avoid over-scheduling the day – be realistic in what you can get done or you may risk getting nothing done
  - e. Take the time you need to do a quality job. Doing work right the first time may take more time at first, but errors usually result in time spent making corrections, which takes more time overall!
  - f. Break large, time-consuming tasks into smaller tasks. Work on them a few minutes at a time until you get them all done.
  - g. Practice the 10-minute rule. Work on a dreaded task for 10 minutes each day. Once you get started, you may find you can finish it.
  - h. Find a hideaway – maybe a library or coffee shop to relax while your [INSERT SIGNIFICANT OTHER'S NAME] stays home with the kids (if applicable)
  - i. Learn how to delegate tasks to family members if possible
  - j. Avoid perfectionism – sometimes things just have to be “good enough”
  - k. Set limits on how much time you take to make a decision
  - l. Concentrate on the task at hand – don't get caught up in what needs to happen next

- m. Try to handle paper only once – immediately recycle
- n. If something is stressing you out, write it down and ask yourself if you can think about it later. Evaluate how you're spending your time by keeping a diary of everything you do for three days. Look for time that can be used more wisely. For example, could you take a bus or train to work and use the commute to catch up on reading?
- o. Limit distractions. Block out time on your calendar for big projects. During that time, close your door and turn off your phone and email.
- p. Having a pen and paper by the telephone can be helpful so that when you worry about needing to get something done, you can write it down and get to it when you get to it
- q. Get plenty of sleep (we will talk about this more later), eat a healthy diet (also will talk about this in more detail later) and exercise regularly. A healthy lifestyle can improve your focus and concentration, which will help improve your efficiency so that you can complete your work in less time.
- r. Don't forget to take breaks when needed! Too much stress can derail your attempts at getting organized. When you need a break, take one! Take a walk. Do some quick stretches at your workstation. Take a day of vacation to rest and re-energize.

5) Review tip sheet #4

6) If applicable, the goal for the next week is to change at least one behavior related to the tips above in order to improve time management.

7) Schedule next week's session (two weeks)

### **Session #5: Sleep Management**

1) Assess how things are going in general; assess stress level. How is the walking dvd going? Any concerns or questions? How often/when/how long have they been doing walking dvd (or walking elsewhere)? Record. Have they been keeping up with their physical activity logs?

2)(If applicable) Were they able to implement time management technique from previous week's telephone session?

6) "Today we are going to talk about sleep and how the lack of sleep may be impacting your functioning. How well do you/are you sleeping?" "How is your daily functioning affected by your sleep (or lack thereof)?" Discuss.

- a. “I am sure you are probably at least somewhat familiar with some of the health consequences associated with lack of sleep and the health benefits associated with getting plenty of sleep. For example, stress, weight gain, trouble concentrating, depression, heart disease, and many other health-related factors have been shown to be correlated with sleep deprivation or lack of sleep.”
  - b. “Think about all the factors that can interfere with a good night’s sleep- from pressure at work and family responsibilities to unexpected challenges, such as layoffs, relationship issues or illnesses. It’s no wonder that quality sleep is sometimes elusive.” Discuss.
  - c. “Although you may not be able to control all of the factors that interfere with your sleep, you can adopt habits that encourage better sleep.” Refer to tip sheet #4 while discussing the following:
- 7) Sleep tips to discuss (as appropriate) with participant:
- a. Stick to a sleep schedule- Go to bed and get up at the same time every day, even on weekends, holidays and days off. Being consistent reinforces your body’s sleep-wake cycle and helps promote better sleep at night. There’s a caveat, though. If you don’t fall asleep within about 15 minutes, get up and do something relaxing. Go back to bed when you’re tired. If you agonize over falling asleep, you might find it even tougher to nod off.
  - b. Pay attention to what you eat and drink:
    - i. Don’t eat too much just before bed or drink before bed
    - ii. Avoid nicotine, caffeine and alcohol before bed or even in the afternoon. Can take hours for stimulating effect of nicotine and caffeine to wear off. Alcohol may help you fall asleep, but may disrupt later.
  - c. Create a bedtime ritual:
    - i. Do same things each night
    - ii. Warm bath or shower, reading a book, listening to music
    - iii. Dim lights
    - iv. Avoid TV or other electronic devices as part of your bedtime ritual. Research indicates that screen time or other media use before bed may interfere with sleep.
  - d. Get comfortable
    - i. Create environment ideal for sleeping
      - 1. Cool, dark, quiet
      - 2. Evaluate mattress and pillow. Make sure there is enough room
  - e. Limit daytime naps
  - f. Include physical activity in your daily routine
    - i. Can promote better sleep, aids in falling asleep faster and deeper sleep
    - ii. Consider timing, though- not too close to bed, may be too energized to fall asleep.

- g. Manage stress
  - i. Recall conversation from session #2 & 3
- 8) Review tip sheet #5
- 9) Set a goal related to sleep if applicable
- 7) Schedule next week's session (one week)

### **Session #6: Safe Weight Loss and Weight Gain Prevention**

- 1) Assess how things are going in general; assess stress level. How is the walking dvd going? Any concerns or questions? How often/when/how long have they been doing walking dvd (or walking elsewhere)? Record. Have they been keeping up with their physical activity logs?
- 2) (If applicable) Were they able to implement sleep technique/goal from previous week's telephone session?
- 3) "Today we are going to be discussing safe/effective weight loss and/or weight gain prevention." Assess if they would like to lose weight or maintain their weight. "Whether you need to shed some extra pounds, or maintain...it is important to recognize that healthy weight management is pivotal in steering clear of potential diseases and conditions. Maintaining a safe weight for your body type and age greatly reduces the likelihood of having to deal with many negative health consequences- including (but not limited to!!) high cholesterol, diabetes, heart disease, certain cancers (specifically breast and colon), depression, etc."

"BUT, losing weight quickly isn't nearly as important as losing weight in a healthy way. Keeping in mind some of the following tips may help you in either dropping the pounds or maintaining your ideal weight."

- 4) Strategies for safe weight loss
  - a. diet should include highly nutritious foods (will talk about this more in later sessions) to maintain (or to avoid decrease) in energy level and deprivation. Encourage them to be proactive in education on nutrition rather than just weight loss so it becomes a lifestyle rather than a quick fix for getting rid of weight.
  - b. Be cautious of giving *specific* nutrition advice- be sure they are following doctor's specific nutrition/dietary orders (if applicable)
  - c. 1-2 pound loss per week is about right

- d. You should think of it as a lifestyle change rather than a “diet.” The changes you make to lose weight should also be implemented during the weight maintenance phase.
- e. Avoid fad diets. Stress the importance of eating a nutritionally sound diet: low in fat (not fat-free), nutrient-dense (full of vitamins & minerals), and high in fiber.
- f. If you use a commercial weight loss program such as Weight Watchers, make sure you clearly understand the fee structure, etc. Be sure to ask for help, support, and guidance when needed.
- g. The main focus for weight loss should be calorie counting. You can access many websites to calculate how many calories you should consume to lose or maintain your weight (e.g., caloriecontrol.org)
- h. Stay hydrated. Drinking 6- 8 oz glasses of water a day will not only keep you well hydrated but will also help with appetite control.
- i. Relax- stress encourages your body to produce a hormone called cortisol that may cause people to hold on to weight, especially around the belly. Be sure to take time to relax and to the best of your ability, find time to sleep. Sleep is essential to your health and well-being.
- j. Be patient and realistic. Individuals that set realistic goals and reward themselves for making small steps will be more likely to succeed in their weight loss efforts.

5) Review tip sheet #6

6) If applicable, set a weight loss goal or weight maintenance technique for the next two weeks.

7) Schedule next session (two weeks).

### **Session #7: Nutrition– Nutrition Overview & Superfoods**

- 1) Assess how things are going in general; assess stress level. How is the walking dvd going? Any concerns or questions? How often/when/how long have they been doing walking dvd (or walking elsewhere)? Record. Have they been keeping up with their physical activity logs?
- 2) (If applicable) Were they able to implement sleep weight loss/maintenance goal from previous week’s telephone session?
- 3) “Today’s session focuses on nutrition. I know it can be difficult to eat healthy when you rarely have time to sit down. Do you ever feel like you can’t keep up with the changes in technology? Sometimes it seems that way with dietary advice, as if things are always changing! While it’s true that the fields of diet and nutrition are areas of evolving research, there are some basic concepts that you can keep in mind. By knowing these basics, you will be better equipped to sort

through nutrition research and dietary advice. I probably do not need to remind you how important a healthy diet is and the pivotal role it plays in your overall health. A healthy diet not only helps to control/manage weight and prevent diseases (i.e. diabetes, heart disease, certain cancers), but it also helps to stabilize mood. There is no cookie-cutter approach when it comes to “eating healthy,” however, adults can follow a healthy diet plan by following some basic nutrition guidelines from USDA. The FDA’s Food Guide Pyramid offers a basic framework to help you decide what and how much to eat of each food group!” “Adults seeking to eat healthy can find success by making lifestyle changes that will offer lasting results. Many nutrition experts recommend focusing on general concepts and strategies instead of getting too caught up on exact calorie and portion counting at first. For example, strive to incorporate a variety of colors, shapes, and textures of foods in your diet and you will most likely be getting a variety of nutrients. Experts recommend (in general) that a nutritious diet plan is not (and does not have to be ) a complicated endeavor. Basically, it should be based on a plant-based diet rich in fruits, vegetables and whole grains.”

- 4) Review Tip Sheet #7
- 5) “In addition to these great healthy eating tips, it is also useful to know general guidelines for nutrition intake. There are five handouts in your packet including nutrition information” Review Tip Sheets:
  - Tip Sheet #8: Healthy Refrigerator
  - Tip Sheet #9: Fruits and Vegetables
  - Tip Sheet #10: Grains
  - Tip Sheet #11: Meat and Dairy
  - Tip Sheet #12: Reading food labels
  - Tip Sheet #13: Superfoods
- 6) “If you would like to know more or investigate additional tips, a nutrition expert can help you develop a personal action plan for improving your eating habits while keeping the fun in food. A registered dietitian (R.D.) is an authority on food, nutrition and health, and can provide valuable information and advice. To locate a registered dietitian in your area, ask your physician, or call the consumer nutrition hot line (800/366-1655) of the National Center for Nutrition and Dietetics, the public education center of The American Dietetic Association. Registered dietitians are available to answer your food and nutrition questions Monday through Friday from 9 a.m. to 4 p.m. central time.”
- 7) If applicable, set goal relating to nutrition....off tip sheet or otherwise.
- 8) Schedule next session (two weeks).

### **Session #8: Stress Management (FINAL)**

- 1) Assess how things are going in general; assess stress level. How is the walking dvd going? Any concerns or questions? How often/when/how long have they

been doing walking dvd (or walking elsewhere)? Record. Have they been keeping up with their physical activity logs?

- 2) (If applicable) Were they able to implement nutrition goal from previous week's telephone session? Have they noticed any differences in their walking sessions when/if they are making healthier food options?
- 3) "Today we are going to revisit our stress discussion we had several weeks ago. At that time, our discussion was focused on prevention of stress. How have you been doing in implementing some of those techniques we discussed? Well, today we are going to focus our discussion on stress management. In other words, how can we manage stress once it makes its presence known? One of the first things you can do is to recognize how stress shows up in your body"
  - a. Can you feel it in your head, neck, or back
  - b. Is your appetite and sleep affected?
  - c. Additional physical, mental, emotional signals/signs/symptoms of stress"Once we know stress is influencing our physical, mental, emotional state, we can take proactive steps in managing the stress, thus minimizing the detrimental effects it may have on our overall health and happiness"
- 4) Strategies to help alleviate stress
  - a. Take 5 deep breaths
  - b. Close your eyes and take a cat nap if you can
  - c. Vent to a friend
  - d. Crank up the music
  - e. Keep a journal
  - f. Turn on relaxing music
  - g. Distract yourself as much as possible
  - h. Caffeine, alcohol, and excessive sugar can aggravate stress
- 5) Review tip sheet #14
- 6) End with specific goals for stress management. Possibly discuss how these goals/techniques work with the stress prevention techniques discussed a few weeks ago. Is there an area that needs more attention? Stress prevention or stress management or both?
- 7) Schedule next session- final assessments.

APPENDIX E



Physical Activity Log  
August 2013

ID# \_\_\_\_\_

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
<p><b>Directions:</b> Enter total minutes of activity on the first line and type of activity (e.g., walking, swimming) on the second line. Activity feels as hard or harder than a brisk walk and is done for at least 10 continuous minutes. Your heart and breathing rate should be elevated. Please fill in a zero on the days when no activity is done. Finally, please rate your fatigue for the day.</p>				<p>1 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>2 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>3 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>
<p>4 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>5 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>6 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>7 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>8 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>9 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>10 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>
<p>11 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>12 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>13 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>14 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>15 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>16 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>17 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>
<p>18 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>19 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>20 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>21 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>22 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>23 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>24 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>
<p>25 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>26 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>27 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>28 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>29 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>30 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>	<p>31 Total Minutes _____ Activity _____ Fatigue 0 1 2 3 4</p>

## APPENDIX F

### THE BECK DEPRESSION INVENTORY (BDI)

This questionnaire consists of 21 groups of statements. After reading each group of statements carefully, circle the number (0, 1, 2, or 3) next to the one statement in each group which **best** describes the way you have been feeling the **past week including today**. If several statements within a group seem to apply equally well, circle each one. **Be sure to read all the statements in each group before making your choice.**

1.   0     I do not feel sad.  
      1     I feel sad.  
      2     I am sad all the time and I can't snap out of it.  
      3     I am so sad or unhappy that I can't stand it.
  
2.   0     I am not particularly discouraged about the future.  
      1     I feel discouraged about the future.  
      2     I feel I have nothing to look forward to.  
      3     I feel that the future is hopeless and that things cannot improve.
  
3.   0     I do not feel like a failure.  
      1     I feel I have failed more than the average person.  
      2     As I look back on my life, all I can see is a lot of failures.  
      3     I feel I am a complete failure as a person.
  
4.   0     I get as much satisfaction out of things as I used to  
      1     I don't enjoy things the way that I used to.  
      2     I don't get real satisfaction out of anything anymore.  
      3     I am dissatisfied or bored with everything.
  
5.   0     I don't feel particularly guilty.  
      1     I feel guilty a good part of the time.  
      2     I feel quite guilty most of the time.  
      3     I feel guilty all of the time.

6. 0 I don't feel I am being punished.  
 1 I feel I may be punished.  
 2 I expect to be punished.  
 3 I feel I am being punished.
7. 0 I don't feel disappointed in myself.  
 1 I am disappointed in myself.  
 2 I am disgusted with myself.  
 3 I hate myself.
8. 0 I don't feel I am worse than anybody else.  
 1 I am critical of myself for my weaknesses or mistakes.  
 2 I blame myself for all my faults.  
 3 I blame myself for everything bad that happens.
9. 0 I don't have any thoughts of killing myself.  
 1 I have thoughts of killing myself, but I would not carry them out.  
 2 I would like to kill myself.  
 3 I would kill myself if I had the chance.
10. 0 I don't cry any more than usual.  
 1 I cry now more than I used to.  
 2 I cry all the time now.  
 3 I used to be able to cry, not now I can't cry even though I want to.
11. 0 I am no more irritated now than I ever am.  
 1 I get annoyed or irritated more easily than I used to.  
 2 I feel irritated all the time now.  
 3 I don't get irritated at all by the things that used to irritate me.
12. 0 I have not lost interest in other people.  
 1 I am less interested in other people than I used to be.  
 2 I have lost most of my interest in other people.  
 3 I have lost all of my interest in other people.
13. 0 I make decisions now about as well as I ever could.  
 1 I put off making decisions more than I used to.  
 2 I have greater difficulty in making decisions than before.  
 3 I can't make decisions at all anymore.

14. 0 I don't feel I look any worse than I used to.  
 1 I am worried that I am looking old or unattractive.  
 2 I feel that there are permanent changes in my appearance that make me look unattractive.  
 3 I believe that I look ugly.
15. 0 I can work about as well as before.  
 1 It takes an extra effort to get started at doing something.  
 2 I have to push myself very hard to do anything  
 3 I can't do any work at all.
16. 0 I can sleep as well as usual.  
 1 I don't sleep as well as I used to.  
 2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.  
 3 I wake up several hours earlier than I used to and cannot get back to sleep
17. 0 I don't get more tired than usual.  
 1 I get tired more easily than I used to.  
 2 I get tired from doing almost anything.  
 3 I am too tired to do anything.
18. 0 My appetite is no worse than usual.  
 1 My appetite is not as good as it used to be.  
 2 My appetite is much worse now.  
 3 I have no appetite at all anymore.
19. 0 I haven't lost much weight, if any, lately.  
 1 I have not lost more than 5 pounds.  
 2 I have lost more than 10 pounds.  
 3 I have lost more than 15 pounds.
- I am purposely trying to lose weight by eating less. Yes \_\_\_\_\_ No \_\_\_\_\_
20. 0 I am no more worried about my health than usual.  
 1 I am worried about my physical problems such as aches and pains; or upset stomach; or constipation.  
 2 I am very worried about physical problems and it's hard to think about much else.  
 3 I am so worried about my physical problems that I cannot think about anything else.

21. 0 I have not noticed any recent changes in my interest in sex.  
1 I am less interested in sex than I used to be.  
2 I am much less interested in sex now.  
3 I have lost interest in sex completely.

APPENDIX G

**PHQ-9 — Nine Symptom Checklist**

Over the last 2 weeks, how often have you been bothered by any of the following problems?

	<b>Not at all</b>	<b>Several Days</b>	<b>More than half the days</b>	<b>Nearly Every Day</b>
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling asleep, staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself - or that you're a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or, the opposite - being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

10. If you checked off any problems, how difficult have those problems made it for you to do your work, take care of things at home, or get along with other people (circle one)?

**Not Difficult at All    Somewhat Difficult    Very Difficult    Extremely Difficult**

*May be currently depressed if:*

- *Items 1 and/or 2 are checked as "More than half the days"*
- *5 or more of the nine items are checked as, at least, "More than half the days,"*
- *If both of the above are true, they may be currently depressed and could be ineligible. Need to repeat the questionnaire at the first session prior to randomization.*

## APPENDIX H

### Cohen Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

<b>IN THE PAST MONTH:</b>	<b>Never</b>	<b>Almost never</b>	<b>Some-times</b>	<b>Fairly Often</b>	<b>Very Often</b>
1. How often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2. How often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3. How often have you felt nervous and "stressed"?	0	1	2	3	4
4. How often have you dealt successfully with irritating life hassles?	0	1	2	3	4
5. How often have you felt that you were effectively coping with important changes that were occurring in your life?	0	1	2	3	4
6. How often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
7. How often have you felt that things were going your way?	0	1	2	3	4
8. How often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
9. How often have you been able to control irritations in your life?	0	1	2	3	4
10. How often have you felt that you were	0	1	2	3	4

on top of things?					
11. How often have you been angered because of things that happened that were outside of your control?	0	1	2	3	4
12. How often have you found yourself thin about things that you have to accomplish?	0	1	2	3	4
13. How often have you been able to control the way you spend your time?	0	1	2	3	4
14. How often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

## APPENDIX I

### Rumination Scale

People think and do many different things when they feel depressed. Please read each of the items below and indicate whether you almost never, sometimes, often, or almost always think or do each one when you feel down, sad, or depressed. Please indicate what you *generally* do, not what you think you should do.

1 almost never      2 sometimes      3 often      4 almost always

1. think about how alone you feel
2. think "I won't be able to do my job if I don't snap out of this"
3. think about your feelings of fatigue and achiness
4. think about how hard it is to concentrate
5. think "What am I doing to deserve this?"
6. think about how passive and unmotivated you feel.
7. analyze recent events to try to understand why you are depressed
8. think about how you don't seem to feel anything anymore
9. think "Why can't I get going?"
10. think "Why do I always react this way?"
11. go away by yourself and think about why you feel this way
12. write down what you are thinking about and analyze it
13. think about a recent situation, wishing it had gone better
14. think "I won't be able to concentrate if I keep feeling this way."
15. think "Why do I have problems other people don't have?"
16. think "Why can't I handle things better?"
17. think about how sad you feel.
18. think about all your shortcomings, failings, faults, mistakes
19. think about how you don't feel up to doing anything
20. analyze your personality to try to understand why you are depressed

## APPENDIX J

### **Five Facet Mindfulness Questionnaire**

#### **Description:**

This instrument is based on a factor analytic study of five independently developed mindfulness questionnaires. The analysis yielded five factors that appear to represent elements of mindfulness as it is currently conceptualized. The five facets are observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience. More information is available in:

Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is generally true for you.

1= never or very rarely; 2= rarely true; 3= sometimes true

4=often true; 5= very often or always true

- \_\_\_\_\_ 1. When I'm walking, I deliberately notice the sensations of my body moving.
- \_\_\_\_\_ 2. I'm good at finding words to describe my feelings.
- \_\_\_\_\_ 3. I criticize myself for having irrational or inappropriate emotions.
- \_\_\_\_\_ 4. I perceive my feelings and emotions without having to react to them.
- \_\_\_\_\_ 5. When I do things, my mind wanders off and I'm easily distracted.
- \_\_\_\_\_ 6. When I take a shower or bath, I stay alert to the sensations of water on my body.
- \_\_\_\_\_ 7. I can easily put my beliefs, opinions, and expectations into words.
- \_\_\_\_\_ 8. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.
- \_\_\_\_\_ 9. I watch my feelings without getting lost in them.
- \_\_\_\_\_ 10. I tell myself I shouldn't be feeling the way I'm feeling.
- \_\_\_\_\_ 11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.
- \_\_\_\_\_ 12. It's hard for me to find the words to describe what I'm thinking.
- \_\_\_\_\_ 13. I am easily distracted.
- \_\_\_\_\_ 14. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.

- \_\_\_\_\_ 15. I pay attention to sensations, such as the wind in my hair or sun on my face.
- \_\_\_\_\_ 16. I have trouble thinking of the right words to express how I feel about things
- \_\_\_\_\_ 17. I make judgments about whether my thoughts are good or bad.
- \_\_\_\_\_ 18. I find it difficult to stay focused on what's happening in the present.
- \_\_\_\_\_ 19. When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it.
- \_\_\_\_\_ 20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.
- \_\_\_\_\_ 21. In difficult situations, I can pause without immediately reacting.
- \_\_\_\_\_ 22. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words.
- \_\_\_\_\_ 23. It seems I am "running on automatic" without much awareness of what I'm doing.
- \_\_\_\_\_ 24. When I have distressing thoughts or images, I feel calm soon after.
- \_\_\_\_\_ 25. I tell myself that I shouldn't be thinking the way I'm thinking.
- \_\_\_\_\_ 26. I notice the smells and aromas of things.
- \_\_\_\_\_ 27. Even when I'm feeling terribly upset, I can find a way to put it into words.
- \_\_\_\_\_ 28. I rush through activities without being really attentive to them.
- \_\_\_\_\_ 29. When I have distressing thoughts or images I am able just to notice them without reacting.
- \_\_\_\_\_ 30. I think some of my emotions are bad or inappropriate and I shouldn't feel them.
- \_\_\_\_\_ 31. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.
- \_\_\_\_\_ 32. My natural tendency is to put my experiences into words.
- \_\_\_\_\_ 33. When I have distressing thoughts or images, I just notice them and let them go.
- \_\_\_\_\_ 34. I do jobs or tasks automatically without being aware of what I'm doing.
- \_\_\_\_\_ 35. When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about.
- \_\_\_\_\_ 36. I pay attention to how my emotions affect my thoughts and behavior.
- \_\_\_\_\_ 37. I can usually describe how I feel at the moment in considerable detail.
- \_\_\_\_\_ 38. I find myself doing things without paying attention.
- \_\_\_\_\_ 39. I disapprove of myself when I have irrational ideas.

APPENDIX K

Quality of Life Enjoyment and Satisfaction Questionnaire- Short Form  
(Q-LES-Q-SF)

Taking everything into consideration, during the past week how satisfied have you been with your.....

	<b>Very Poor</b>	<b>Poor</b>	<b>Fair</b>	<b>Good</b>	<b>Very Good</b>
....physical health?	1	2	3	4	5
....mood?	1	2	3	4	5
.....work?	1	2	3	4	5
....household activities?	1	2	3	4	5
....social relationships?	1	2	3	4	5
....family relationships?	1	2	3	4	5
....leisure time activities?	1	2	3	4	5
....ability to function in daily life?	1	2	3	4	5
....sexual drive, interest and/or performance?*	1	2	3	4	5
....economic status?	1	2	3	4	5
....living/housing situation?	1	2	3	4	5
....ability to get around physically without feeling dizzy or unsteady or falling?*	1	2	3	4	5
....your vision in terms of ability to do work or hobbies?	1	2	3	4	5
....overall sense of well-being?	1	2	3	4	5
.....medication? (If not taking any, check here _____ and leave item blank.	1	2	3	4	5
....How would you rate your overall life satisfaction and contentment during the past week?	1	2	3	4	5

\*If satisfaction is very poor, poor or fair on these items, please UNDERLINE the factor(s) associated with a lack of satisfaction.

APPENDIX L

**The Pittsburgh Sleep Quality Index (PSQI)**

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

During the past month,

1. When have you usually gone to bed?\_\_\_\_\_
2. How long (in minutes) has it taken you to fall asleep each night?\_\_\_\_\_
3. When have you usually gotten up in the morning?\_\_\_\_\_
4. How many hours of actual sleep do you get at night? (This may be different than the number of hours you spend in bed)\_\_\_\_\_

5. During the past month, how often have you had trouble sleeping because you.....	Not during the past month (0)	Less than once a week (1)	Once or twice a week (2)	Three or more times a week (3)
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breath comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe, including how often you have had trouble sleeping because of this reason(s):				
6. During the past month, how often have you taken medicine (prescribed or “over the counter”) to help you sleep?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?				
	Very good (0)	Fairly good (1)	Fairly bad (2)	Very bad (3)
9. During the past month, how would you rate your sleep quality overall?				

## APPENDIX M

### Physical Activity Recall (PAR)

		Yesterday						One Week Ago					
	Days of the Week	HRS		MIN		HRS		MIN		HRS		MIN	
<b>S L E E P</b>	Night												
	Naps												
	<b>Total</b>	:		:		:		:		:		:	
<b>M O R N I N G</b>	Sitting												
		:		:		:		:		:		:	
	Moderate												
		:		:		:		:		:		:	
<b>H A R D</b>	Hard												
		:		:		:		:		:		:	
	Very Hard												
		:		:		:		:		:		:	
<b>A F T E R N O O N</b>	Sitting												
		:		:		:		:		:		:	
	Moderate												
		:		:		:		:		:		:	
<b>H A R D</b>	Hard												
		:		:		:		:		:		:	
	Very Hard												
		:		:		:		:		:		:	
<b>E V E N I N G</b>	Sitting												
		:		:		:		:		:		:	
	Moderate												
		:		:		:		:		:		:	
<b>H A R D</b>	Hard												
		:		:		:		:		:		:	
	Very Hard												
		:		:		:		:		:		:	