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Examining Performance, Maintenance, and Mental Health Benefits of Mindfulness-based Practices: Applying the Transtheoretical Model (TTM) of Behavior Change

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2010

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An abstract of  
A thesis submitted to the Faculty of the  
Rollins School of Public Health of Emory University  
in partial fulfillment of the requirements for the degree of  
Master of Public Health  
in Behavioral Sciences and Health Education  
2013

## Abstract

### Examining Performance, Maintenance, and Mental Health Benefits of Mindfulness-based Practices: Applying the Transtheoretical Model (TTM) of Behavior Change By Elisa B. Storyk

Mindfulness meditation, especially Mindfulness-Based Stress Reduction (MBSR), has become an increasingly researched means of helping people cope with stress (Kabat-Zinn, 1990). At present, however, it is unclear what influences one's likelihood of maintaining a routine mindfulness practice, and its associated benefits to overall mental health and well-being.

This study used the Transtheoretical Model (TTM) to examine long-term maintenance of mindfulness meditation. A sample of 132 adults with previous MBSR training completed a self-administered, online survey. TTM's constructs of cognitive and behavioral processes of change, decisional balance, and self-efficacy were examined for their influence on maintenance of a regular mindfulness practice. The study also applied TTM to explore how maintenance of mindfulness practice was related to overall mental health and well-being. Differences in the TTM constructs between maintainers versus non-maintainers were assessed via t-tests and multiple logistic regression. The association between readiness to maintain a mindfulness practice and mental health was assessed via a chi-square test.

Consistent with theory, behavioral processes were more important than experiential processes for maintaining mindfulness practice (O'Conner, Carbonari, & DiClemente, 1996; Prochaska, Redding, & Evers, 2008). In a fully controlled model, helping relationships and stimulus control were the only two significant behavioral processes that were positively associated with maintenance. Self-liberation and counter-conditioning were not associated with maintenance, and use of reinforcement management was significantly negatively associated with maintenance. High levels of self-efficacy were also found to increase the odds of maintaining mindfulness practice. Regarding mental health, maintainers were significantly more likely to have flourishing mental health than non-maintainers, who had more frequent moderate or languishing mental health.

This study demonstrated that constructs of the TTM are associated with maintaining a mindfulness meditation practice and that a significant and positive association exists between maintaining mindfulness practice and mental health. Based on these results, constructs of the TTM can aid in facilitating an ongoing mindfulness practice, which can be a means to attaining positive mental health. The results of this study can inspire new and unique ideas for promoting, and increasing, long-term maintenance of mindfulness-based mediation techniques. This can increase overall mental health in our community, as a result.

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## Acknowledgements

A major research project like this is never the work of anyone alone. The contributions of many different people, in their different ways, have made this possible. I would like to extend my appreciation especially to the following.

It is with immense gratitude that I acknowledge the support and help of my Thesis Chair, Dr. Nancy Thompson, for making this research possible. Her guidance and advice throughout the research project, as well as her pain-staking effort in proof reading the drafts, are greatly appreciated. Indeed, without her guidance, I would not be able to put the topic together. Thanks Dr. Thompson!

I would also like to thank my Thesis Committee Member, Heather Zesiger, for encouraging my desire to undertake this thesis and for all of the support along the way. The experience has truly been an interesting and rewarding one.

Last but not least, I would like to thank my parents for their unconditional support, both financially and emotionally throughout my degree. In particular, the patience and understanding shown by my Mom during the last two years is greatly appreciated. I couldn't have done it without you!

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## Chapter I. Introduction

According to the National Institute of Mental Health, today upwards of 50 percent of adults are likely to experience a serious mental illness sometime in their lifetime, and about 14.8 million American adults experience clinical depression in any given year, or about 6.7% of the U.S. adult population (Kessler et al., 1994; Kessler, Chiu, Demler, & Walters, 2005; U.S. Department of Health and Human Services, 1999). For public health professionals, and especially those interested in the specific area of public *mental health*, there are many legitimate reasons for concern about the growing prevalence rate and etiology of “mental illness.”

According to the Surgeon General (U.S. Department of Health and Human Services, 1999), mental health is “... a state of successful performance of mental function, resulting in productive activities, fulfilling relationships with people, and the ability to adapt to change and to cope with adversity” (p. 4). In short, mental health is not merely the absence of mental illness. The paradigm has now shifted to realize that an understanding of our health has to be more than just the absence of disease diagnosis (Keyes, 2003a; 2003b). Mental health has been conceptualized, and now commonly accepted, to be a distinct aspect apart from mental illness. The diagnosis of positive mental health (flourishing) has been identified as a key component of our overall complete physical and mental health (Keyes, 1998; 2002; 2003a; 2003b).

The use of mindfulness meditation (and other relaxation techniques) is a behavioral strategy for combating emotional distress. One program in particular, Mindfulness-Based Stress Reduction (MBSR) has become an increasingly popular (and validated and researched) means of helping people cope with the stress inherent in their

lives (Kabat-Zinn, 1990). At present, however, we do not know for whom participation in a formal mindfulness training program may be most beneficial, nor what influences an individual's likelihood of maintaining an ongoing, routine practice of mindfulness meditation. How can we identify and better comprehend why some people choose to initiate and continue a regular practice of mindfulness meditation, while others do not? And most importantly, what are the potential benefits to one's overall mental health and well-being that are associated with practicing and maintaining a regular mindfulness meditation routine? These questions have not been formally addressed in the growing literature pertaining to mindfulness-based therapies.

This study uses the Transtheoretical Model (TTM) as a framework for understanding the behavior of practicing mindfulness meditation. In particular, The TTM proposes five stages of readiness, of which the final stage is maintenance. Ten experiential and behavioral processes of change influence movement between these stages. In addition, self-efficacy (belief in one's ability to perform the behavior) and decisional balance (weighing the pros and cons of the behavior) are associated with one's stage of readiness (Prochaska & DiClemente, 1985; Prochaska et al., 1991). The fundamental TTM concept of stages of readiness (in this case, to maintain an ongoing, regular routine of mindfulness-based meditation practice) represented a central variable of interest. In addition, the TTM constructs of individual self-efficacy, decisional balance, and the processes of change were also included in the study.

In seeking to determine the characteristics of those who maintain a mindfulness practice the stages construct allows exploration of how those in the stage of maintenance differ from those in other stages. Likewise, it is possible to investigate how the TTM

stages of readiness to maintain a mindfulness practice are related to mental health and well-being. This is in line with the significant relationship alluded to in previous literature, i.e., the relationship between mindfulness and various factors of subjective well-being and good psychological, social, and emotional functioning (Brown & Ryans, 2003; Keyes, 2002; 2007).

Guided by the TTM, this study was designed to examine factors associated with maintenance of a mindfulness practice and the potential benefits of mindfulness-based practices in relation to positive mental health. The specific research questions follow.

*Research Questions (and related hypotheses):*

1. What is the distribution of *current* mindfulness meditation practices (and stage of readiness to continue regular, ongoing mindfulness meditation practice) among individuals with *previous exposure to formal MBSR training*?
  - Overall most individuals are hypothesized to have currently (or at least, recently) practiced mindfulness meditation techniques to some extent.
  - Overall more individuals are hypothesized to be currently maintaining a regular, ongoing practice of mindfulness meditation, as opposed to not maintaining.
2. Do the processes of change, decisional balance, and self-efficacy differentiate between those who *maintain* an ongoing practice of mindfulness meditation versus those who do not (those in any earlier *stages of readiness*)?
  - The TTM principles and processes of change are hypothesized to be statistically significantly greater for maintainers versus non-maintainers on average.

- Specifically, behavioral processes of change and self-efficacy are hypothesized to be significant predictors of maintenance versus non-maintenance.
3. Are levels of *mental health* associated with an individual's *stage of readiness* to practice ongoing, regular mindfulness meditation?
- Readiness to maintain (specifically, comparing those who maintain versus those who do not maintain) is hypothesized to be significantly associated with level of mental health (with maintainers being more likely to be flourishing and less likely to be languishing, compared with non-maintainers).

## Chapter II: Review of the Literature

Bringing the practice of “mindfulness” into play as a tool for examining the promotion of positive mental health and well-being was the overarching motivation for this study. In order to explore the connection between positive mental health and mindfulness, three general topic areas of study intersected in this paper. First, in the following literature review, the understanding and study of mental health versus mental illness as two separate concepts is considered. Previous literature highlighting connections between mindfulness and aspects of general subjective well-being will be explored following ‘guidelines’ for conceptualizing and assessing general mental health—as something more than merely the absence of mental illness (Keyes, 2003; 2005).

This leads to the second area of interest addressed: previous research on the study of mindfulness and the use of mindfulness-based techniques, MBSR in particular. The use of mindfulness-based therapies in the development of treatment programs for a variety of disorders was reviewed, as well as the current research surrounding the beneficial impact of regular mindfulness practice on a variety of health-related concerns. Additionally, certain psychosocial and cognitive variables that have been found to be related to mindfulness-based practices are also discussed, as are mindfulness-based influences on psychological, emotional, and social aspects of well-being and positive functioning in life.

Finally, in attempting to explain some limitations of previous research and how the current study accounts for them, the association between mindfulness-based practices

and mental health is considered through applying theoretical concepts from the Transtheoretical Model (TTM) stage theory of behavior change.

*Conceptualizing Mental Health Versus Mental Illness:*

In spite of the high prevalence of mental illness today, many more adults will not be diagnosed with a mental disorder. About one-half of the adult population remain free of any serious mental illness diagnoses over their lifespan, and approximately 87 percent of adults remain free of major depression, annually (Kessler et al., 1999). Can these adults who remain free of a diagnosed mental illness annually and over their lifetime be, therefore, automatically considered mentally healthy and productive? This is a key question for many proponents of the study of general mental health and well-being (Keyes & Shapiro, 2004). It was also the guiding question for understanding and studying the general concept of mental health and well-being in this particular investigation; the notions of mental health versus mental illness were examined as two distinct constructs in this study.

Given the theoretical understanding of the concept of positive mental health as representing something more within the individual than simply the nonexistence of a diagnosed mental illness, the construct of overall, complete mental health is not simply defined by the presence of high levels of subjective well-being. Overall complete mental health is best viewed as a mental wellness state consisting of both the absence of mental illness diagnoses (low mental illness), as well as the presence of positive mental health symptoms (high mental health).

So, what constitutes living *mentally well* in adult life? Keyes (2002) has introduced and applied a unique operationalization of mental health for individuals. He

describes mental health as comprised of symptoms of positive feelings and positive functioning in life. This definition of mental health is summarized by the scales and dimensions of subjective well-being, psychological functioning, and sociological functioning; which are all symptoms of mental health. Whereas he describes the presence of mental health as “flourishing,” he characterizes the absence of mental health as “languishing” in life (Keyes, 2003a; 2003b).

Evidence to date suggests that flourishing, a central component of complete mental health is a desirable condition that anyone would want to protect and promote (Keyes, 1998; 2007; Ryff & Keyes, 1995). According to Keyes (2003b), “The mental health continuum consists of complete and incomplete mental health. Adults with complete mental health are flourishing in life with high levels of well-being. Adults with incomplete mental health are languishing in life with low well-being” (p. 264). To be flourishing, then, is to be filled with positive emotion and to be functioning well psychologically and socially; to be languishing may be conceived of as being filled with emptiness, stagnation, and quiet despair (Keyes, 2002; Keyes, 2003b).

Indeed, previous empirical tests within the U.S. adult population have shown that anything less than flourishing is associated with increased impairment and burden. Specifically, results have confirmed that adults who are completely mental healthy (flourishing) report the lowest number of chronic physical diseases with age, the lowest risk of cardiovascular disease, the fewest limitations of activities of daily living (less disability), and the lowest rate of healthcare utilization, among many other benefits and positive outcomes (Keyes, 2002; 2007; Keyes & Grzywacz, 2002; 2005). In light of these findings, effort should be made to better understand and actively improve aspects of



general mental health within individuals. Mindfulness-based practices offer one such technique that may prove beneficial to this important public health effort.

*Research Evidence for the Use of Mindfulness-Based Practices:*

Mindfulness-based interventions aimed at decreasing negative psychological symptoms of distress, as well as enhancement of various health-related quality of life indicators (such as positive states of mind and pain management), are gaining prominence in recent health research (Fang et al., 2010; Geschwind, Peeters, Drukker, van Os, & Wichers, 2011; Jain, Shapiro, & Swanick, 2007). Mindfulness-based practices have increasingly been advocated as potential treatments for many health-related problems (Kabat-Zinn, Massion, & Kristeller, 1992; Speca, Carlson, Goodey, & Angen, 2000).

Mindfulness and meditation have been associated with states of physiological relaxation that can be utilized to alleviate stress, anxiety, and other physical symptoms. The effects of mindfulness-based practices as complementary treatments for medical conditions other than mental illness have been substantially evaluated using a variety of conditions and health outcomes. These clinical conditions include hypertension and other cardiovascular disorders (Barnes, Davis, Murzynowski, & Treiber, 2004; Low, Stanton, & Bower, 2008), chronic pain syndromes (McCracken & Thompson, 2009; Rosenzweig et al., 2010), immunological functioning (Davidson et al., 2003; Fang et al., 2010), and treatment-related symptoms of breast and prostate cancer (Carlson, Speca, Faris, & Patel, 2007; Witek-Janusek et al., 2008), among many others.

Secondly, there is a growing body of scientific literature on the effects of meditation practices for a variety of psychiatric disorders such as depression (Segal,

Williams, & Teasdale, 2002), anxiety (Evans et al., 2008; Roemer, Orsillo, & Salters-Pedneault, 2008), and substance abuse (Bowen et al., 2006), among others (e.g., Kristeller & Hallett, 1999; Thompson et al., 2010). The construct of mindfulness has also become a very strong influence in current interventions in the area of stress and anxiety reduction (Kristeller, 2007), depression and substance-use (addiction) relapse prevention (Kuyken et al., 2008; Mathew, Whitford, Kenney, & Denson, 2010), and management of co-morbidity of chronic health conditions, such as depression and another health condition like epilepsy or cancer (Thompson et al, 2010). In a study of psychotherapy clients, Elkins, Marcus, Rajab and Durgam (2005) found the use of mindfulness meditation was most useful (and thus arguably, most appropriate) in clients dealing with stress, anxiety, and depression.

Additionally, effects of meditation practices have also been explored using measures of emotional distress for stress reduction, as well as for improving cognitive abilities (Vieten & Astin, 2008). Along with depression and anxiety, changes in negative and positive affect have also been observed as a result of mindfulness-based training (Schroevers & Brandsma, 2010). In attempts to explore promotion of positive mental health (as opposed to reduction of mental illness), such outcomes as general psychological well-being, satisfaction with life, general mood states, and other subjective feelings of well-being have also been investigated (Brown & Ryan, 2003; Geschwind et al., 2011). Mindfulness-based practices have also been associated with increased experience of momentary positive emotions, and greater appreciation of, and enhanced responsiveness to, pleasant daily-life activities (Geschwind et al., 2011). Based on these

findings, mindfulness-based practices have now begun to be advocated as methods to attain or maintain an overall state of positive mental wellness.

*The Construct of Mindfulness:*

Bishop and colleagues (Bishop et al., 2004) sought to develop an all-encompassing construct for modeling research of mindfulness. As a result, they defined mindfulness as follows:

The first component involves the self-regulation of attention so that it is maintained on immediate experience, thereby allowing for increased recognition of mental events in the present moment. The second component involves adopting a particular orientation toward one's experiences in the present moment, an orientation that is characterized by curiosity, openness, and acceptance... (p. 234).

Mindfulness is, thus, seen as a characteristic of mental states that focuses on observing and intentionally attending to current experiences, particularly including internal experiences such as thoughts, feelings, and emotions (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Bishop et al., 2004; Brown & Ryan, 2003; Germer, Siegel, & Fulton, 2005). One of the underlying concepts of mindfulness is that it serves ultimately to alleviate psychological suffering (Germer et al., 2005). The cultivation of mindfulness traits such as open forgiveness, non-judgmental acceptance, and loving kindness can all work to moderate and lessen the languishing qualities of psychological turmoil such as grief, anxiety, guilt, or fear that build up during the more stress-inducing moments that we face in daily life. Taking a more mindful stance towards experiences, thoughts, and emotions may be helpful in how we think, view, and even react to the

world around us through enhancing emotional regulation (Barrett et al., 2001). This state of heightened awareness and acceptance cultivated through mindfulness-based techniques is highly relevant to the advancement of positive mental health and functioning (Keyes, 2002; 2007).

As adapted from Kabat-Zinn (1990), the main attitudes of mindfulness are considered to be non-judging, patience, beginner's mind, trust, non-striving, acceptance, and letting go. Within this framework, one should ultimately view mindfulness as a *process* of regulating attention towards accepting awareness, as well as a *process* of gaining insight into the nature of one's own mind and thought patterns. When one considers the attitudes of mindfulness as a constant state of being and a continually-developing skill of the individual, one can see that mindfulness is much more than just the individual practice of moment-by-moment awareness (Miller, Fletcher, & Kabat-Zinn, 1995; Bishop et al., 2004). Successfully learning to be "mindful," as well as reaping individual benefits from personal mindfulness practice, does not happen in just one sitting or over a few days. However, the *repeated, regular practice* of mindfulness techniques starts to retrain the way the mind operates (Davidson et al., 2003; Van den Hurk, 2010). Mindfulness-based techniques can serve to bring about subtle shifts in our own cognitions and thought processes that can be applied to behavioral self-observation and management. This in turn, can be applied to better understanding our own self-damaging or self-limiting cognitive patterns (Barrett, Gross, Christiansen, & Benvenuto, 2001; Valgo & Silbersweig, 2012).

*Mindfulness-based Stress Reduction (MBSR):*

The 8-week, structured, MBSR training program, developed by Kabat-Zinn (1990) and his colleagues at the University of Massachusetts Medical Center three decades ago, teaches participants how to face life's challenges through various means. These include meditation, yoga, inquiry, and dialogue with group members. The formal MBSR training program includes eight sessions (once a week), an all-day retreat, and comprises 27 total hours of class time (Kabat-Zinn, Massion, & Kristeller, 1992).

The MBSR training program has not only strived to teach individuals the fundamentals of practicing mindfulness-based techniques, but also to encourage individuals to incorporate regular mindfulness meditation into their daily routine in order to enhance their personal lives, their work, and their ability to relate to others. Studies of various populations point to positive outcomes of receiving formal MBSR training (Matchim & Armer, 2007; Rosenzweig et al., 2003; Rosenzweig et al., 2010; Shapiro et al., 2005). To date, however, this promising mindfulness training program has not been examined sufficiently regarding positive outcomes related to *long-term* mindfulness practices.

Since the basic claim is that mindfulness practice, and specifically the ongoing practice of mindfulness meditation, improves the ability to be present with acceptance, researchers should next begin to explore this concept of maintenance of mindfulness meditation practice. They should further explore the differential, complete mental health benefits that may occur between those who do maintain an ongoing practice versus those who do not.

According to the mindfulness literature, with proper (sufficient/appropriate) mindfulness training and practice, individuals go through a *process* of transformation

with respect to their thought development (Kabat-Zinn, 1990; Kabat-Zinn et al., Kabat-Zinn, Massion, & Kristeller, 1992). These studies suggest that the practice of mindfulness over time results in a transformation, or *change* in one's relationship to thoughts and way of being. Mindfulness practitioners *continually* practice being in the moment and aware of their thoughts in a non-judgmental, patient, trusting, and accepting way so that they can begin to see each moment as it actually is (and not necessarily how they initially perceived it).

It would be valuable to make use of theories of behavior change to better understand people's readiness to initiate and maintain mindfulness meditation practice behavior. Applying a theoretical framework is valid and well-researched would be beneficial for future research.

*Applying Principles of the Transtheoretical Model (TTM):*

The Transtheoretical Model (TTM) (Prochaska & DiClemente, 1983) is one of the leading theories of behavior change. TTM has been used previously to understand the 'stages of change' individuals progress through in changing a variety of health behaviors such as reducing or stopping smoking and alcohol consumption and adopting eating habits like fruit consumption, and exercise and upkeep of physical activity (Callaghan, Taylor, & Cunningham, 2007; DeVet, DeNooijer, DeVries, & Brug, 2008; Plotnikoff, Lippke, Johnson, & Courneya, 2010; Prochaska, DiClemente, & Norcross, 1992; Prochaska, Redding, & Evers, 2002). According to the TTM, behavior change is conceptualized as a temporal process. It entails a progression through five distinct stages of change: pre-contemplation (not ready), contemplation (thinking about getting ready), preparation (getting ready), action, and maintenance (Prochaska, DiClemente, &

Norcross, 1992; Prochaska, Redding, & Evers, 2002). An individual ultimately changes behavior by passing through these stages, but people may not always pass in a linear or sequential pattern; people may often relapse back into earlier stages, for example, before being able to finally reach true maintenance of a behavior (Prochaska & DiClemente, 1985; Prochaska, Redding, & Evers, 2002). The importance of this model lies in the recognition that strategies and activities to promote change may differ significantly across the stages (DiClemente, 1991; Prochaska, DiClemente, & Norcross, 1992). Additional TTM constructs such as processes of change, decisional balance, and self-efficacy are found to facilitate stage transitions.

Prochaska and colleagues have described ten processes of change that are the “covert and overt activities that people use to progress through the stages.” These processes represent cognitive, affective, behavioral, and environmental activities that appear to help people to change their behavior. The processes seem to cluster into two larger higher-order factors; one represents a cognitive-experiential component and the other a behavioral-environmental component (Prochaska, DiClemente, & Norcross, 1992; Prochaska, Redding, & Evers, 2002). The five experiential processes of change include more internal experiences: consciousness-raising (increasing awareness), dramatic relief (reacting emotionally to warnings about the unhealthy behavior), environmental re-evaluation (considering how the practice or lack of healthy behavior affects others), social liberation (acknowledging how society is changing to encourage the healthy behavior) and self re-evaluation (realizing that the behavior change can enhance one’s identity). The five behavioral processes include more external experiences: self-liberation (making a commitment for behavior change), stimulus control (restructuring

one's environment to facilitate the healthy behavior), counter conditioning (substituting new and positive behavioral choices), helping relationships (listing and utilizing support), and reinforcement management (using positive reinforcement and reward; Prochaska & DiClemente, 1985; Prochaska, DiClemente, & Norcross, 1992; Prochaska, Redding, & Evers, 2002).

The behavioral processes of change may be directly related to the successful development of mindfulness meditation practice maintenance. For instance, self-liberation, according to the TTM, is classified as intentional commitment towards a health behavior change; this is another key component of mindfulness-based training (DiClemente, 1991; Prochaska, DiClemente, & Norcross, 1992). The notion of most mindfulness-based therapies and interventions is to support individuals to find their own motivational cues and to develop their own level of commitment to the change process of being more mindfully aware and open (Prochaska, Redding, & Evers, 2002). Self-liberation naturally occurs within individuals who choose to commence in some formal mindfulness-based treatment, intervention, course, or other formal training session (as well as even with some informal methods of mindfulness development). This is because the individual must commit some level of *repeated effort* toward mindfulness procedures over a period of time. Thus, self-liberation would seem to be directly associated with mindfulness (and thus also positive mental health).

According to the TTM, the construct of self-efficacy is defined as the confidence that one possesses to engage in the healthy behavior across different challenging situations without relapsing to their former behaviors (Prochaska & Veliver, 1997). Self-efficacy for mindfulness can be seen as the combination of both the confidence of



individuals to perform mindfulness techniques, as well as the temptation or attraction to not exert the extra effort to be mindful across all contexts and situations that individuals may encounter (Horn, 1976; Prochaska, Redding, & Evers, 2002). A sense of control and dominance over one's various cognitions and thought patterns falls in line as another key component of a successful mindfulness-based intervention, supporting the hypothesis that self-efficacy will be a significant influencing factor in whether or not mindfulness techniques are being utilized (Van den Hurk, Janssen, Giommi, Barendregt, & Gielen, 2010).

According to the TTM, decisional balance "reflects the individual's relative weighing of the pros and cons of changing" (Prochaska, Redding, & Evers, 2008; p.103). The decisional balance scale involves weighing the *importance* of the pros (benefits of changing behavior) and cons (the costs of changing behavior) for the individual. Research suggests that progression through the stages of change involves the pros of changing a behavior beginning to (increasingly) outweigh the cons of the behavior change, and the construct was included in this study as a prominent construct of the theory (Prochaska & Veliver, 1997; Prochaska, Redding, & Evers, 2002; 2008).

One of the assumptions of the TTM is that there is a systematic interaction between stages of change and experiential and behavioral processes of change, decisional balance, and self-efficacy. Different ones of these constructs peak in frequency of use in different stages of change (Prochaska, DiClemente, & Norcross, 1992; Prochaska, Redding, & Evers, 2002). Cognitive-experiential processes are generally most used in the early stages of contemplation and preparation and then decrease in the action and maintenance stages. In contrast, behavioral processes tend to be most employed in the

action and maintenance stages (Prochaska, & Veliver, 1997). In addition, use of decisional balance appears to peak in earlier stages and decrease as individuals move into later stages. In contrast, self-efficacy is lowest in earlier stages and tends to increase as individuals progress into later stages (Prochaska, & Veliver, 1997). Therefore, self-efficacy for mindfulness practice and certain processes of change—particularly behavioral processes—may be hypothesized to play a prominent role in the initial action and continued maintenance over time of mindfulness-based practices among individuals (Prochaska, Redding, & Evers, 2002). To date, however, no research studies have examined mindfulness meditation using the TTM.

While a variety of factors may influence stages of readiness for maintaining mindfulness meditation practice, these stages may, in turn, be associated with overall positive mental health. Previous literature has described the relationship between mindfulness and subjective well-being, as well as good psychological, social, and emotional functioning (Brown & Ryans, 2003; Keyes, 2002; 2007). However, to date no study has specifically explored aspects of mindfulness in relation to a measure of overall mental health, as defined by Keyes (2002).

In an effort to address these gaps, this study was designed to investigate—within a normal population of adults who have *already had* previous exposure to mindfulness-based training and practice—issues related to the *maintenance* of regular, ongoing mindfulness-based practices in daily life. The goal of the study was two-fold: to examine which processes and principles of change are associated with maintaining an ongoing routine of mindfulness meditation practice; as well as to examine the association between readiness to maintain ongoing practice and overall mental health and well-being.

## Chapter III: Methods

### A. Study Participants

*Target Population:* A total of 178 surveys were received, of which 132 were completed by individuals 18 years of age or older. No vulnerable populations were intentionally recruited or used in this research, although students, pregnant women and prisoners (with email access) may have participated. The recruitment efforts of this study involved utilizing listservs of mindfulness practitioners *currently based* in the U.S. Only American adults who had previously received *formal* Mindfulness-Based Stress Reduction (MBSR) training were targeted for inclusion. The study definition of a *formal* MBSR training program entailed using the curriculum developed by Jon Kabat-Zinn and his colleagues (Kabat-Zinn, Massion, & Kristeller, 1992) and taught by either himself and his direct staff, or other trained and certified MBSR practitioners (UMass Center for Mindfulness, 2012). Only those individuals with this mindfulness meditation training (MBSR) were targeted in order to maintain validity and consistency of previous mindfulness exposure across the study subjects.

*Inclusion/Exclusion Criteria:* The main eligibility criterion for this study was that participants must have had previous exposure to formal training in MBSR at least six months ago or longer. In addition, individuals must have been 18 years of age or older, had access to a computer and internet access to complete an online questionnaire, and have been *willing* and *agreed* to complete a single one-time online survey taking approximately 15-20 minutes of their time to complete (and with an incentive of entering into a \$50 gift-card drawing upon survey completion)

Potential participants were excluded from this study if they currently had a serious medical or neurological condition or if they had a recent history (in the past six months) of a serious medical or neurological condition. Additional exclusion criteria included if the individual was currently (or if they had a history in the past six months of) receiving psychiatric/psychological counseling and/or were taking psychiatric medications. Table 1 describes the demographic characteristics of the study participants.

*Sampling Technique:* At the time of recruitment, there were 822 practitioners recognized and listed in the UMass Center for Mindfulness online directory. All 822 practitioners were sent instructions on forwarding the email invitation to potential participants on their individual listservs.

*Response Rate:* Because it is not possible to determine the number of persons to whom the email invitation was forwarded, it was not possible to determine a response rate. The only denominator estimate available is based upon the initial number of certified MBSR practitioners who were contacted. This number was 822 (based on the number of available active email accounts found on the online UMass Center for Mindfulness directory (UMass Center for Mindfulness, 2012). Using this denominator, the response rate for completing the survey was 16.1%.

## B. Procedures

*Research Design:* Participants completed a self-administered questionnaire at *only one time-point*, constituting a *cross-sectional* survey research design (Mann, 2003). The cross-section survey design was a means for the researchers to take a single look back in time to study events (MBSR training and practices) that had already occurred.

Table 1. Demographic Characteristics of the Sample

Variable		n(%)
Age	N	132 (100)
	25 to 34	16 (12.1)
	35 to 44	35 (26.5)
	45 to 54	28 (21.2)
	55 to 64	42 (31.8)
	65 to 74	11 (8.3)
Gender	N	130 (100)
	Male	23 (17.7)
	Female	107 (82.3)
Race/Ethnicity	N	130 (100)
	Asian	2 (1.5)
	Hispanic	6 (4.6)
	White/Caucasian	120 (92.3)
	Other	2 (1.5)
Education Level	N	132 (100)
	Did not graduate high school	1 (0.8)
	High school or equivalent	1 (0.8)
	Some college without degree	10 (7.6)
	Associate degree	7 (5.3)
	Bachelor degree	33 (25.0)
	Graduate degree	80 (60.6)
Relationship Status	N	131 (100)
	Single	13 (9.9)
	Casual Relationship	7 (5.3)
	Committed Relationship	7 (5.3)
	Long-term Partnership	7 (5.3)
	Married	78 (59.5)
	Widowed	5 (3.8)
	Divorced	13 (9.9)
	Separated	1 (0.8)
Average Household Income	N	128 (100)
	\$0-\$24,999	9 (7.0)
	\$25,000-\$49,999	20 (15.6)
	\$50,000-\$74,999	21 (16.4)
	\$75,000-\$99,999	17 (13.3)
	\$100,000-\$124,999	19 (14.8)
	\$125,000-\$149,999	12 (9.4)
	\$150,000-\$174,999	10 (7.8)
	\$175,000-\$199,999	2 (1.6)
	\$200,000 and up	18 (14.1)

*IRB Requirement:* Individuals who were recruited for this study had already participated in the formal MBSR training. The protocol for this study proposal received IRB approval through Expedited Review (IRB Study - IRB00061681) on November 9, 2012.

*Recruitment Strategy:* Only individuals who had previously participated in *and completed* a formal MBSR intervention program were desired for participation in this study. Therefore, the recruitment strategy involved a mass distribution of email invitations to individuals who had already gone through the formal MBSR training (at least once six months ago or more). Potential participants were recruited through MBSR practitioner listservs, which were supplied by either *direct staff* of the UMass Center for Mindfulness or those trained MBSR practitioners *listed* in the UMass Center for Mindfulness online directory; an open, online directory of formally recognized MBSR practitioners and teachers who have participated in UMass Center for Mindfulness approved training classes and seminars, and are therefore certified and licensed (UMass Center for Mindfulness, 2012). These individuals are officially accredited UMass Center for Mindfulness MBSR practitioners, and connected with MBSR training nationally.

*Recruitment Methods:* While email invitations to participate in this study were specifically targeted from secondary listservs provided by formal MBSR practitioners, the researchers of this study did not recruit participants directly. They sent email invitations to the MBSR practitioners listed in the directory cited above—with an attached invitation to participate to be forwarded on to potential participants—asking the MBSR practitioners if they were willing to forward the email invitation to their former MBSR students (see Appendix A). If willing, they were directed to forward the email invitation

to other people—those having completed MBSR training (either from themselves or others—that might be good potential participants for this research study). As a result, no names or email addresses were exchanged directly between the researcher and each potential study participant, and no identifiable indicators (such as names or email addresses) were collected or used for this study.

*Recruitment Material:* The recruitment email forwarded for this study had a survey link attached to the email (see Appendix A). There was also a \$50 gift-card drawing incentive upon completion of the online survey. Participants who completed the entire survey were compensated for their time (if they so chose) by being entered into a pool for a chance to win one of five \$50 gift-card certificates.

*Study Procedures for Participants:* Potential participants were provided with an email invitation consisting of an account of the research study, a direct link to the survey instrument online, and instructions on how to enter the survey monkey link at times that were convenient for them. The main study procedures for participants consisted of completing a self-administered, online questionnaire by following the link to the survey monkey. Upon following the link, participants were immediately directed to an online informed consent page, prior to entering the main survey questionnaire. If on the consent page the participant agreed to take part in the study, he/she was screened to determine eligibility for the study. Those who met the criteria for inclusion were then directed to the questionnaire. The first 170 individuals who responded to the email invitation, gave informed consent, completed the initial screening instruments, and met the screening criteria, would be included as active participants in this study.

If willing and able, participants completed a one-time online questionnaire taking about 15-20 minutes to complete. The questionnaire asked about participants' their current mindfulness meditation practices, as well as their stage of readiness to keep up an ongoing routine of mindfulness practice. It also asked about processes that participants used to keep up their mindfulness practices, as well as other factors (decisional balance and self-efficacy) involved in keeping up a regular practice of mindfulness meditation. In addition, the questionnaire included open-ended questions about their beliefs and expectations regarding mindfulness practice, as well as their beliefs about how useful their previous MBSR trainings and current mindfulness meditation practice were to them. Finally, the participants were asked about their general state of mental health and well-being.

*Respondent Burden:* Total respondent burden consisted of time allotted to complete the study survey. The time was estimated at approximately 15-20 minutes. The researchers intended that no sensitive questions were used for the purposes of this study.

*Human Subjects Protection:* Procedures used to protect human subjects within this study included, firstly, an informed consent page, given to participants prior to beginning the main survey questionnaire. Once initially selecting to possibly participate in this study, all potential participants were first shown the confidentiality agreement page that explained the study in detail, including the purpose of the study, the participants' roles in the study, study requirements, time commitments and risks to participation. In addition to walking participants through the study procedures, all participants were thoroughly informed of confidentiality issues and risks to participants that existed for this study design. For example, participants were informed that study



staff members (only the principle investigator and co-facilitators) would be seeing their responses, but that this information would be de-identified beforehand since no identifiable indicators (such as names or personal email addresses) were collected or used for the purposes of this study. Finally, all participants were also given multiple telephone numbers and email addresses to which they could direct any questions or concerns they had about participation in the study.

Participants who met inclusion criteria were asked to provide consent through the participant consent form (see Appendix B), and were told they could save a copy of this document (from the online page) for their records. Written informed consent was obtained from all participants by having them click either an “I Agree” button or an “I Don’t Agree” button before being able to proceed to rest of the survey. In addition, agreeing to the consent form was immediately followed by verification of the main inclusion criteria of being a legal adult (no children under 18 were allowed to continue past this inclusion question). Only after all of these human subjects protection procedures took place did actual participant interaction with the main questionnaire survey instrument occur.

Finally, protection of the privacy of subjects involved collecting all data anonymously and eliminating the need to collect any identifying information. An assigned study number, rather than the participant’s name or contact information, was used on all study records, further eliminating the potential for breaches in confidentiality. These procedures used to protect human subjects also ensured that no identifiable or personal health information of participants would ever be shared or presented when researchers presented or published the study results.

*Data Collection Procedures:* Data were collected through a single, anonymous, respondent-completed survey. Data collection procedures involved online, computer-assisted administration of the survey instrument, with study variables presented through the written questionnaire in electronic survey format. The survey instrument consisted of mostly quantitative, close-ended questions, with a few qualitative, open-ended questions included as well. The full draft questionnaire instrument can be viewed in Appendix C, and the general scope of the survey topics are described in further detail below.

Quality control procedures used during data collection involved beginning the online survey questionnaire with the unsigned participant consent form described above. The consent form was immediately followed by verification of the inclusion and exclusion criteria. This was accomplished by asking items specifically designed to confirm that participants met the inclusion and exclusion criteria of the study design (i.e., American, age 18 or older, formal training in MBSR, training six months ago or more), before they could enter the body of the questionnaire. Only after all of these steps took place could the participant then be allowed to complete the main survey questions.

*Data Safety Monitoring:* Recruitment of participants and collection of data were conducted through a computer survey distributed online across the U.S. Participants received the email invitation and chose to fill out the online survey in any location of their choice, and no identifiers were included among the data collection procedures. This makes it impossible to coordinate communication with participants—about unanticipated problems or concerns involving risks to subjects or others, results, and protocol modifications (if any). Because the potential for unanticipated problems involving risks to subjects or others was considered negligible, this was deemed not to be an issue. In

addition, participants were always able to contact the researchers directly with any questions or concerns that arose at any time.

Finally, with regards to protections in place during their retrieval and storage, the de-identified survey data were uploaded directly from the survey monkey instrument online into a secured SPSS dataset by the primary investigator. The created dataset was password protected, and stored on the principle investigator's personal computer. Only the study investigators had access to the dataset information. Survey data were compiled and entered into a dataset for further analysis from a secure remote desktop (Citrix) located on the Emory Rollins School of Public Health network.

*Setting:* The location for completing the online survey instrument was the sole choice of each individual participant. Therefore, the setting in which data collection took place for this study was theoretically anywhere in the U. S. where a potential participant had internet access and chose to accept the invitation to participate. All analyses and handling of the data were done from a secure remote desktop (Citrix) located on the Emory Rollins School of Public Health network.

### C. Measures

*General Scope of Topic Areas:* A single, written computer-administered questionnaire was completed by each participant. Content of the survey instrument (see Appendix C) included a) basic demographic information, b) an assessment of previous formal MBSR training, c) an assessment of each participant's current level of individual mindfulness meditation practices, d) an assessment of each individual's current stage of readiness to practice and maintain an ongoing, regular mindfulness-based meditation, e) the processes of change and other TTM constructs (decisional balance and self-efficacy)

associated with one's readiness for maintaining regular, ongoing mindfulness meditation practice, and f) a brief examination of each individual's general overall state of mental health and well-being. Most questions presented in the questionnaire were formatted as either yes/no questions, or 7- or 5-point Likert scale formatted questions, although a few open-ended questions were also explored for more in-depth inquiry.

*Sample Demographics:* Demographics collected for this study included age (in 10-year increments), sex (male/female), and race/ethnicity (categories). Additionally, level of education, relationship status, and household income level of each participant were also collected. Levels of education and household income were both measured on an ordinal scale of measurement, and relationship status was categorized and treated as a nominal variable.

*Previous Formal MBSR Training:* Measures of previous MBSR training examined the time of one's very first formal MBSR training program completed, as well as the time of the most recent MBSR training program completed (if different). In addition, the number of total formal MBSR training programs previously completed, and the locations (states) where each of these individual class programs were taken was also documented. To complete this assessment of previous MBSR trainings, the participants were also asked a few open-ended questions about their general beliefs and opinions regarding how useful their previous MBSR trainings were to them.

*Current Mindfulness Meditation Practices:* Three parts of the instrument were designed to assess the current levels of individual mindfulness meditation practices. The first part examined *frequency* of mindful-based techniques, the second part examined *duration* of these 'ongoing' mindfulness meditation practices, and the third part examined

the *types* of mindfulness-based techniques currently practiced. In addition, participants were also asked a few open-ended questions about their general beliefs and opinions regarding mindfulness practice in general, as well as how useful their current mindfulness meditation practices are to them.

The *frequency* of mindfulness meditation practices was measured by first asking, “On average, how often do you CURRENTLY practice mindfulness meditation?” with response options ranging from 1) “Never,” 2) “Monthly,” 3) “Weekly,” 4) “About every other day,” 5) “Daily,” and 6) “Multiple times a day.” In addition, another question asked participants, “In the last 7 days, on how many days did you practice some form of mindfulness-based technique?”

The *duration* of each individual’s current mindfulness meditation practices was calculated by asking, “On an average day when you do practice mindfulness meditation, for how long on average do you practice?” Response options were presented on a 8-point ordinal scale; 1) “Less than 5 minutes,” 2) “5 to 10 minutes,” 3) “11 to 20 minutes,” 4) “21 to 30 minutes,” 5) “31 to 45 minutes,” 6) “46 to 60 minutes,” 7) “61 to 75 minutes,” and 8) “More than 75 minutes.”

Finally, the *type* of mindfulness-based techniques currently used by participants was assessed by asking first, “On a typical day when you do practice mindfulness meditation, what form(s) of meditation practice do you use? (check all that apply)” Response options included, “Sitting,” “Lying Down,” and “Walking.” Additionally, participants were also asked, “On a typical day when you do practice mindfulness meditation, what is/are the object(s) of your mindfulness practice (check all that apply).”

Response options included, “Sights,” “Sounds,” “Breath,” “Thoughts,” “Objects (Touch),” “Body (Body Scan),” and “Eating.”

*Stage of Readiness to Maintain (Ongoing, Regular Mindfulness Meditation Practices)*: The fourth section of the questionnaire analyzed the TTM stage of change (as applied to the behavior of regular mindfulness meditation practice). This measure assessed each individual’s current stage of readiness to maintain (long-term) some *personal*, ongoing routine of mindfulness meditation practice in their daily lives. ‘Personal’ was determined by each individual’s standards of mindfulness-based practice, as indicated in the algorithm below.

The algorithm was created from previous adaptations by N. J. Thompson from DiClemente, C. C., & Prochaska, J. O. (1985). A diagram of the algorithm for regular mindfulness meditation practice can be seen in Appendix D. The participants were first asked the question, “Would you say you CURRENTLY MAINTAIN some ongoing, REGULAR ROUTINE of mindfulness meditation practice in your daily living? (for example, practicing for at least 5-10 minutes, at least 2-3 times per week on average?)”

The stage of readiness measure divided the study population into five distinct groups consisting of those classified into either the pre-contemplation, contemplation, preparation, action or maintenance stages. Additionally, this measure was also used to divide the study population by those who maintain versus those who do not maintain a regular, ongoing routine of mindfulness meditation practice. For the classification of maintenance, participants who answered yes to the question about currently maintaining some ongoing, regular routine of mindfulness meditation were then asked to indicate for how long they had been keeping this up. Those participants who also answered “6

months or more” were categorized as “maintainers,” and all others were categorized as “non-maintainers.”

*Processes of Change:* After an individual’s stage of readiness was determined, the next section of the instrument assessed the ten TTM processes of change—*consciousness raising, dramatic relief, environmental re-evaluation, social liberation, self re-evaluation, self-liberation, counter-conditioning, reinforcement management, helping relationships and stimulus control*—as well as the two additional TTM constructs of *decisional balance* and *self-efficacy*. The scales used in this study for measuring the processes of change, as well as decisional balance and self-efficacy, were all created from previous adaptations by N. J. Thompson from DiClemente, C. C., & Prochaska, J. O. (1985).

Each of the ten TTM processes of change variables was measured using a 4-items subscale within a 40-item process of change scale. Each item was measured on a 7-point Likert scale: 1) “Strongly Disagree,” 2) “Disagree,” 3) “Somewhat Disagree,” 4) “Neither Agree Nor Disagree,” 5) “Somewhat Agree,” 6) “Agree,” or 7) “Strongly Agree.”

In order to compute a total score for each process of change variable, a number value of 1-7 was first assigned to each item. A total score for each process of change was then first calculated by summing all items together for each individual process of change variable (each with a range of 4-28). All items were coded so that a higher score would mean greater levels of that process of change construct. In addition, reliability checks were also performed for each scale measure using Cronbach’s alpha calculations, in order to examine internal consistency of the scale items for each variable. Each process scale is described below.

For *consciousness raising*, a sample statement is, “I recall information people have personally given me on how to practice ongoing mindful meditation techniques.” For the consciousness raising process of change scale, Cronbach’s alpha reliability was .769, suggesting adequate to good internal consistency of the scale items.

For *dramatic relief*, a sample statement is, “Stories and shows about people who regularly practice mindful meditation move me emotionally.” For the dramatic relief process of change scale, Cronbach’s alpha reliability was .733, suggesting adequate to good internal consistency of the scale items.

For *environmental re-evaluation*, a sample statement is, “I have stopped before to think about how my lack of mindfulness might negatively affect the people around me.” For the environmental re-evaluation process of change scale, Cronbach’s alpha reliability was .738, suggesting adequate to good internal consistency of the scale items.

For *social liberation*, a sample statement is, “I find society changing in ways that make it easier for those who want to practice regular, ongoing mindfulness meditation.” For the social liberation process of change scale, Cronbach’s alpha reliability was .741, suggesting adequate to good internal consistency of the scale items.

For *self re-evaluation*, a sample statement is, “I constantly struggle with the issue that not being more mindful contradicts with my view of myself as a healthy person.” For the self re-evaluation process of change scale, Cronbach’s alpha reliability was .716, suggesting adequate internal consistency of the scale items.

For *self-liberation*, a sample item is, “I make commitments to continually practice mindfulness meditation and to be more mindful in my everyday living.” For the self-



liberation process of change scale, Cronbach's alpha reliability was .742, suggesting adequate to good internal consistency of the scale items.

For *counter-conditioning*, a sample item is, "When I am tempted to not practice mindful meditation, I have begun to identify things I can do to help me be more mindful instead." For the counter-conditioning process of change scale, Cronbach's alpha reliability was .618, suggesting a slightly less-than-adequate internal consistency of the scale items. Reliability scores should be .70 or above, however, scales with alpha = .60 are acceptable for preliminary research and for short scales (Lester & Bishop, 2000).

For *reinforcement management*, a sample item is, "I can expect to be rewarded (encouraged) by others if I practice mindfulness meditation." For the reinforcement management process of change scale, Cronbach's alpha reliability was .719, suggesting adequate internal consistency of the scale items.

For *helping relationships*, a sample item is, "I can be open with at least one special person about my experience with mindfulness meditation." For the helping relationships process of change scale, Cronbach's alpha reliability was .877, suggesting good to high internal consistency of the scale items.

For *stimulus control*, a sample item is, "I purposely place things in my home and/or workplace that remind me to be more mindful." For the stimulus control process of change scale, Cronbach's alpha reliability was .729, suggesting adequate to good internal consistency of the scale items.

*Other TTM Constructs:* The *decisional balance* variable was assessed with nine questions, and each item was measured on a 7-point Likert scale: 1) "Strongly Disagree," 2) "Disagree," 3) "Somewhat Disagree," 4) "Neither Agree Nor Disagree," 5)

“Somewhat Agree,” 6) “Agree,” or 7) “Strongly Agree.” In order to compute a total decisional balance score, a numeric value of 1-7 was assigned to each item. Four items were negatively worded and, thus, were reverse coded for analysis. Total decisional balance was then calculated by summing all items together (range of 9-63). All items were coded so that a higher score would mean the balance was in favor of practicing mindfulness meditation. For the decisional balance scale, Cronbach’s alpha reliability was .834, suggesting good to high internal consistency of the scale items.

The *self-efficacy* variable was assessed with six questions, and each item was also measured on a 7-point Likert scale ranging from 1) “Strongly Disagree” to 7) “Strongly Agree.” In order to compute a total self-efficacy score, a numeric value of 1-7 was assigned to each item. Total self-efficacy was then calculated by summing all items together (range of 7-49). All items were coded so that a higher score would mean greater self-efficacy. For the self-efficacy scale, Cronbach’s alpha reliability was .893, suggesting good to high internal consistency of the scale items.

*Overall Mental Health:* The last section of the questionnaire assessed each individual’s state of overall mental health and well-being, using the previously developed Mental Health Continuum-Short Form (MHC-SF) scale for adults (Keyes, 2006; Keyes et al., 2008; Lamers et al., 2011). The MHC-SF was derived from the Mental Health Continuum-Long Form (MHC-LF), which consists of seven items measuring *emotional* well-being, six 3-item scales (or 18 items total) that measure the six dimensions of Ryff’s (1989) model of *psychological* well-being, and five 3-item scales (or 15 items total) that measure the five dimensions of Keyes’ (1998) model of *social* well-being. Accordingly, the overall mental health variable is calculated by a process of clustering items around

dimensions of emotional, psychological and social well-being; with the ultimate categorical diagnosis classification of overall mental health operationalized as either *Flourishing*, *Moderate* or *Languishing* (to form a nominal variable with three levels) (Keyes, 2006; Keyes et al., 2008).

While the MHC-LF consists of 40 items, the MHC-SF consists of only 14 items that were chosen as the most prototypical items representing the construct definition for each facet of well-being (Keyes, 2002; Keyes, 2006). Three items (happy, interested in life, and satisfied) serve to represent emotional well-being, six items (one item from each of the six psychological dimensions) serve to represent psychological well-being, and finally five items (one item from each of the five sociological dimensions) serve to represent social well-being (Keyes, 2006). The response option for the short form measures the frequency with which respondents experienced each symptom of positive mental health in the past month. To answer the question, “During the past month, how often did you feel...” responses for each item were measured on a 5-point Likert scale: 1) “Never,” 2) “Once or Twice,” 3) “About 2 or 3 Times a Week,” 4) “Almost Every Day,” or 5) “Everyday.”

The MHC-SF has also been repeatedly shown to be equally as reliable and valid for examining states of complete overall mental health across various populations as the longer MHC-LF (Keyes et al., 2008; Lamers et al., 2011; Robitschek, & Keyes, 2009). The estimates of internal consistency reliability for each of the three sets of measures—emotional, psychological, and social well-being—in both the MHC short and long forms have all been high ( $> .80$ ; see e.g., Keyes, 2005a). The MHC-LF measures of social and psychological well-being have repeatedly been validated (Keyes, 1998; Ryff, 1989, Ryff

& Keyes, 1995) and used in hundreds of studies over the past few decades. However, from many previous research studies, the MHC-SF in comparison has also shown excellent internal consistency ( $> .80$ ) and discriminant validity in adolescents (ages 12-18) and adults in the U.S., in the Netherlands, and in South Africa (Keyes, 2005b, 2006; Keyes et al., 2008; Lamers et al., 2011; Westerhof & Keyes, 2009).

The 4-week test-retest reliability estimates for the MHC-LF scales ranged from .57 for the overall psychological well-being domain, .64 for the overall emotional well-being domain, and .71 for the overall social well-being domain (Robitschek & Keyes, 2006, 2009). In comparison, the test-retest reliability of the MHC-SF over three successive, 3-month periods averaged .68 and the 9-month test-retest was .65 (Lamers et al., 2011). Additionally, the three factor structure of the long and short forms of the MHC—emotional, psychological, and social well-being—has been confirmed in nationally representative samples of US adults (Gallagher, Lopez & Preacher, 2009), college students (Robitschek & Keyes, 2009), and in a nationally representative sample of adolescents between the ages of 12 and 18 (Keyes, 2005b, 2009) as well as in South Africa (Keyes et al., 2008) and the Netherlands (Lamers et al., 2011).

In this study, *flourishing* was defined as having at least 1 of the 3 emotional well-being symptoms “every day” or “almost every day” and feeling at least 6 of the 11 positive functioning symptoms (psychological and social well-being) “every day” or “almost every day” in the past month. *Languishing* was defined as having at least 1 of the 3 emotional well-being symptoms “never” or “once or twice” and feeling at least 6 of the 11 positive functioning symptoms (psychological and social well-being) “never” or “once or twice” in the past month. Individuals who did not meet criteria for either

languishing nor flourishing were coded as *moderately* mentally healthy. The full Adult MHC-SF (ages 18 or older) can be seen in Appendix E.

#### D. Data Analysis

*Plans for Data Management and Statistical Analysis:* The software used for all data analyses was IBM SPSS Statistics, version 20.0 statistical software package, and for all bivariate and multivariate analyses the significance level was set at  $p < .05$ .

Additionally, all appropriate descriptive statistics were determined for each of the study variables, as well as for demographic characteristics of the study participants.

*Research Question 1: “What is the distribution of current ongoing mindfulness meditation practice (and current stage of readiness to continue regular, ongoing mindfulness meditation practice) among individuals with previous exposure to formal MBSR training?”* Descriptive statistics were used to describe the participants’ current personal mindfulness practices. Measurements such as type of mindfulness meditation practice, length of practice time (e.g. min/session), and frequency of overall practice (e.g. total min/week) were described. In addition, a frequency distribution of participants’ current stages of readiness to practice routine mindfulness meditation was created using all five stages, and using a maintenance versus non-maintenance split.

*Research Question 2: “Do the processes of change, decisional balance and self-efficacy differentiate between those who maintain ongoing mindfulness meditation practices versus those who do not (those in other stages of readiness)?”* The main outcome of interest for was the dichotomized stage of change variable that distinguished maintainers from those who did not maintain (i.e., in any other stage of readiness). Each of the independent variables (i.e., the ten processes of change, decisional balance, and

self-efficacy) was measured on a continuous scale of measurement. The initial analyses of this research question involved bivariate tests of association between the dichotomous variable (maintainer/other stage) and each of the 12 continuous variables.

Independent samples t-tests were performed for each of these bivariate analyses. The bivariate analyses compared differences in the mean scores of the maintainers and the non-maintainers for each continuous scale variable (processes of change, decisional balance and self-efficacy).

The second step was to test for collinearity among the 12 independent variables (i.e., the ten processes of change variables, as well as the decisional balance and self-efficacy variables). Finally, a multivariate logistic regression model that served to distinguish maintainers versus non-maintainers (i.e., calculate the odds of maintenance) was performed for the purposes of this analyzing this research question. Separate multivariate logistic regression analyses were performed to regress an individual's stage of change onto first, only the processes of change scales (grouped by either experiential or behavioral processes for step model analysis), next, only decisional balance and self-efficacy scales, and finally, all twelve predictor variables examined together in one model. Additionally, control variables that were found to be correlated with the ongoing maintenance of mindfulness meditation practices (outcome of interest) were also included in the multiple regression models for the purposes of this analysis. These control variables were specifically the age of the participant, and the number of previous MBSR trainings completed by the participant.

*Research Question 3: "Are levels of overall mental health associated with an individual's stage of readiness to practice ongoing, regular mindfulness meditation?"*

*Additionally, what is the association specifically between one's readiness to maintain ongoing mindfulness meditation practices and varying classifications of overall mental health?"* The dependent variable of interest was each individual's category of overall mental health (i.e., flourishing, moderate, or languishing mental health), and the independent variable of interest was an individual's stage of readiness to practice regular, ongoing mindfulness-based techniques—measured as either maintainer/other stage, or as one of the five stages. Both variables were measured on a nominal scale of measurement. Regardless of whether the readiness to change variable was examined with five levels or with two levels, a Pearson chi-square test of independence was most appropriate to use in this analysis.

A chi-square test of independence was first conducted to test for significant differences in the proportions of those individuals in each stage of readiness who were flourishing, moderate, or languishing. Another chi-square test was then conducted to determine if there were differences in the proportions of flourishing, moderate, or languishing between those individuals in the maintenance stage, versus everyone else.

*Rationale for Proposed Number of Subjects:* The number of subjects needed for this study was determined by referring to Cohen's (1992) table for estimating the sample sizes required for small, medium and large population effect sizes at power = .80 for  $\alpha = .01, .05, \text{ and } .10$ . For chi-square tests of independence, degrees of freedom ( $df$ ) =  $(a - 1)(b - 1)$ , where  $a$  and  $b$  are the number of levels in the two variables. For this study,  $df = (\text{stages of readiness} - 1)(\text{mental health categories} - 1) = (5 - 1)(3 - 1) = 8$ . Unfortunately, Cohen's table only provides sample size requirements for a maximum of six  $df$ , so individual approximations had to be made. Referring to Cohen's table

calculations for  $ES=medium$ ,  $\alpha=.05$  and  $df=6$ , the required sample size was 151. A reasonable approximation of the sample size needed for  $df=8$  was estimated at 161. Finally, the risk of incomplete data was also accounted for in the final total. It was estimated that five percent of participants in this research would have incomplete data, and therefore the approximation of 161 needed to be inflated to compensate. This was calculated by  $161/.95 = 170$ .



## Chapter IV: Results

### A. Study Population Basic Demographics

The final sample (n=132) consisted of mostly females (n=107, 81.1%), and were majority White/Caucasian (n=120, 90.9%). The sample ranged in age from 25 to 74, and the largest proportion of participants was between 55 and 64 (n=42, 31.8%), followed by 35 to 44 (n=35, 26.5%), and then 45 to 54 (n=28, 21.2%). Over half of the sample indicated that their relationship status was married (n=78, 59.1%), and the majority of participants completed a graduate degree (n=80, 60.6%). The average household income of participants ranged from \$0-\$24,999 (n=9, 6.8%) to \$200,000 and up (n=18, 13.6%) with the greatest proportion in the \$50,000-\$74,999 (n=21, 15.9%) range. For a full description of the income distribution, as well as all other demographic variables, refer back to Table 1.

The majority of participants indicated that they completed either the 8-week MBSR program, taught by the Center for Mindfulness (n=40, 30.3%), or another official MBSR program taught by a certified MBSR practitioner (n=80, 60.6%). See Appendix F for a full description of participants' previously completed MBSR training. In addition, most participants had only completed one previous MBSR training program (n=98, 74.2%); those who indicated they had multiple previous trainings were fairly evenly split between completing two different MBSR training programs (n=18, 13.6%), or three or more (n=16, 12.1%).

The largest proportions of participants indicated that their very first MBSR training program was completed either 1-2 years (n=42, 31.8%), or 2-5 years ago (n=28, 21.2%). Similarly, most participants indicated that their most recent MBSR training

program was completed either 1-2 years (n=42, 31.8%), or 2-5 years ago (n=22, 16.7%). However, more than a third of participants indicated that their most recent MBSR training program was completed within the past year; with the program being completed 10-12 months ago (n=16, 12.1%), 6-9 months ago (n=21, 15.9%), or only 0-5 months ago (n=21, 15.9%). See Appendix F for a complete list of participants' first and most recent MBSR training completed.

#### B. Descriptive Statistics for Current Mindfulness Practices of the Sample

Over 90% of the sample indicated that they currently practice mindfulness meditation, with the average frequency of practice for the greatest proportions of participants ranging from weekly (n=24, 18.2%) to daily practice (n=34, 25.8%) on average. Additionally, in the last seven days, over a third of the sample indicated that they practiced some form of mindfulness-based technique all seven days (n=47, 35.6%), with one to six days each representing about 10% of the sample population. Participants' average mindfulness practice duration most frequently ranged from 5-10 minutes (n=25, 18.9%) or from 31-45 minutes (n=23, 17.4%), with the greatest proportion of participants indicating that they practiced an average of 11-20 minutes (n=32, 24.2%). See Appendix G for a complete description of participants' current duration and frequency of mindfulness practices. In addition, the majority of participants (n=106, 80.3%) practiced the sitting position form of mindfulness practice, and over half of participants (n=67, 50.8%) practiced the lying down position. Only 35.6% (n=47) of participants practiced the walking position form of mindfulness practice. Finally, the vast majority of participants (n=125, 94.7%) indicated that they use a breath focus for the object of mindfulness practice, 59.8% (n=79) use body scan as an object of mindfulness practice,

and 57.6% (n=76) used mindfulness of thoughts as a focus. Less than half of participants (n=60, 45.5%) indicated that they use mindfulness of sounds, 24.2% (n=32) use mindfulness of sights, 18.2% (n=24) use mindful eating techniques, and only 8.3% (n=11) of participants indicated that they use mindfulness of touch as an object of focus for their mindfulness practices.

### C. Descriptive Statistics of Key Study Variables of Interest

*Stage of Readiness to Maintain Ongoing, Regular Mindfulness Meditation Practices:* The main variable of interest was the participant's stage of readiness to maintain an ongoing, regular routine of mindfulness meditation practice. This was measured both as a five-category, nominal variable, and as a dichotomized (maintenance versus non-maintenance) variable. Out of a total of 132 participants, the sample consisted of slightly more maintainers (n=80, 60.8%) than non-maintainers. Within the sample, 13.6% (n=18) of participants were in the action stage, 15.2% (n=20) were in the preparation stage, 6.8% (n=9) were in the contemplation stage, and the remaining 3.8% (n=5) of the participants were in pre-contemplation.

*Processes of Change and Other TTM Constructs:* For the ten processes of change, mean scale scores ranged between 3.57 (reinforcement management) and 5.61 (environmental re-evaluation); all but two of the processes of change variables were normally distributed within the sample. The exceptions were consciousness raising and self-liberation. The mean consciousness raising score in this sample was 5.36 (sd=1.22); skewness (-1.34) and kurtosis (2.16) were both outside the desired range (-1 to 1) for normality (Hopkins & Weeks, 1990). The mean self-liberation score in this sample was 5.23 (sd=1.18); skewness (-1.48) and kurtosis (2.09) were also both outside the desired

range (-1 to 1) for normality. However, since both variables would ultimately be used in a logistic regression model, which does not require normality, for the purposes of this analysis they were treated as if they were normally distributed (Agresti, 2002). See Table 2 for a complete listing of descriptive statistics for all of the processes of change variables by maintainers versus non-maintainers.

The mean decisional balance score in this sample was 6.13 (sd=0.79): skewness (-1.20) and kurtosis (1.25) were both outside the desired range (-1 to 1) for normality (Hopkins & Weeks, 1990). Similarly, the mean self-efficacy score in this sample was 5.49 (sd=1.23); skewness (-1.42) and kurtosis (2.39) of this variable were also both outside the desired range (-1 to 1) for normality. However, again, since both of these variables were also to be used in a logistic regression model which does not require normality, for the purposes of this analysis they were also treated as if they were normally distributed (Agresti, 2002).

*Overall Mental Health:* The study also looked at the current state of general overall mental health and well-being, defined as flourishing, languishing, or moderate. The majority of the sample was categorized as flourishing (n=77, 59.2%), with only a few languishing participants (n=10, 7.7%), and the remainder classified as moderately mentally healthy (n=43, 33.1%).

#### D. Results for Research Question 2

For Research Question 2, the outcome variable of interest is stage of readiness to maintain ongoing, regular mindfulness meditation practice, which is categorized as a dichotomous, nominal scale of measurement. The independent predictor variables of interest are the processes and principles of change, which are all measured on a

continuous, interval scale of measurement. Therefore for first examining this research question, an independent samples t-test was performed for each process of change variable as well as decisional balance and self-efficacy to determine if there was a significant difference in mean scores between those who maintained a regular, ongoing practice of mindfulness meditation and those who did not.

The results of the bivariate analyses are presented in Table 2. As shown in the table, all but four of the variables significantly differed for maintainers and non-maintainers, with maintainers having a higher mean. Mean for consciousness raising was significantly greater for maintainers ( $m=5.68$ ,  $sd=1.00$ ), compared to non-maintainers ( $m=4.89$ ,  $sd=1.36$ ). Mean environmental re-evaluation was also significantly greater for maintainers ( $m=5.87$ ,  $sd=0.86$ ), compared to non-maintainers ( $m=5.22$ ,  $sd=1.16$ ). For the social liberation process of change, mean was significantly greater for maintainers ( $m=4.83$ ,  $sd=1.11$ ), compared to non-maintainers ( $m=4.26$ ,  $sd=1.13$ ). Likewise, mean for self-liberation was significantly greater for maintainers ( $m=5.51$ ,  $sd=0.86$ ), compared to non-maintainers ( $m=4.82$ ,  $sd=1.44$ ). For the counter-conditioning process of change variable, the Levene's test for equality of variances did not fail ( $F=2.02$ ,  $p=.158$ , so equal variances was assumed for this t-test result. The difference in mean counter-conditioning approached, but did not achieve, statistical significance ( $t=1.94$ ,  $df=130$ ,  $p=.055$ ). Mean counter-conditioning was 4.84 ( $sd=0.98$ ) for maintainers compared to 4.46 ( $sd=1.28$ ) for non-maintainers. Mean for helping relationships was also significantly greater for maintainers ( $m=5.39$ ,  $sd=1.40$ ), compared to non-maintainers ( $m=4.15$ ,  $sd=1.54$ ), as was also the case for stimulus control; the mean was significantly greater for maintainers ( $m=4.99$ ,  $sd=1.15$ ), compared to non-maintainers ( $m=3.58$ ,  $sd=1.28$ ).

Likewise, mean decisional balance was significantly greater for maintainers (m=6.35, sd=0.59), compared to non-maintainers (m=5.81, sd=0.93). Finally, mean self-efficacy was significantly greater for maintainers (m=5.90, sd=1.03), compared to non-maintainers (m=4.83, sd=1.26).

Table 2. Results of Independent T-Tests (N=132)

TTM Variable	Means (sd)		Levene's test		t test	
	Maintainers (n=80)	Non-Maintainers (n=52)	F	p-value	t	p-value
Consciousness Raising <sup>a</sup>	5.68 (1.00) <sup>d</sup>	4.89 (1.36)	6.19	0.014	3.60	<b>0.001</b>
Dramatic Relief	4.44 (1.09) <sup>d</sup>	4.51 (1.25)	0.50	0.481	-0.29	0.773
Environmental Re-evaluation	5.87 (0.86)	5.22 (1.16)	8.42	0.004	3.47	<b>0.001</b>
Social Liberation	4.83 (1.11)	4.26 (1.13) <sup>c</sup>	0.16	0.686	2.81	<b>0.006</b>
Self Re-evaluation	4.06 (1.08) <sup>b</sup>	4.29 (1.40)	5.53	0.020	-1.02	0.311
Self-Liberation <sup>a</sup>	5.51 (0.86) <sup>d</sup>	4.82 (1.44)	21.79	0.001	3.12	<b>0.003</b>
Counter-conditioning	4.84 (0.98)	4.46 (1.28)	2.02	0.158	1.94	<b>0.055</b>
Helping Relationships	5.39 (1.40) <sup>b</sup>	4.15 (1.54)	1.21	0.273	4.75	<b>&lt;0.001</b>
Reinforcement Management	3.59 (1.14) <sup>d</sup>	3.53 (1.32) <sup>b</sup>	1.69	0.196	0.295	0.768
Stimulus Control	4.99 (1.15) <sup>d</sup>	3.58 (1.28)	2.38	0.126	6.56	<b>&lt;0.001</b>
Decisional Balance <sup>a</sup>	6.35 (0.59) <sup>f</sup>	5.81 (0.93) <sup>e</sup>	13.88	0.001	3.53	<b>0.001</b>
Self Efficacy <sup>a</sup>	5.90 (1.03) <sup>b</sup>	4.83 (1.26) <sup>d</sup>	4.31	0.040	5.01	<b>&lt;0.001</b>

<sup>a</sup> not normally distributed; positively skewed

<sup>b</sup> missing 1, <sup>c</sup> missing 2, <sup>d</sup> missing 3, <sup>e</sup> missing 4, <sup>f</sup> missing 8

Further examining Research Question 2, the variables were entered into a series of multivariate logistic regression models to determine if there were statistically significant differences between maintainers and non-maintainers when other variables were controlled. These results are presented in Table 3.

Model 1 included background variables only. The only background variable that was significantly associated with maintaining mindfulness practice was having 3 or more prior MBSR trainings (OR=14.30; 95% CI 1.73-118.31), but the estimate was not stable.

Model 2 included the five experiential processes with the background variables. In this model, environmental re-evaluation was the only significant experiential process, and it increased the odds of maintaining mindfulness practice (OR=2.38; 95% CI 1.26-4.49). Model 3 included the five behavioral processes with the background variables. In Model 3, the behavioral processes of reinforcement management (OR=0.43; 95% CI 0.24-0.78), helping relationships (OR=1.76; 95% CI 1.12-2.77), and stimulus control (OR=2.42; 95% CI 1.50-3.90) were all significantly associated with maintaining mindfulness practice, although reinforcement management reduced the odds of maintaining. Model 4 included all 10 processes with the background variables. In Model 4, once again reinforcement management (OR=0.42; 95% CI 0.22-0.79), helping relationships (OR=1.84; 95% CI 1.12-3.03), and stimulus control (OR=2.60; 95% CI 1.46-4.62) were all significantly associated with maintaining mindfulness practice, and RM reduced the odds of maintaining. Model 5 included decisional balance and self-efficacy with the background variables. In Model 5, being age 65 to 74 increased the odds of maintaining mindfulness practice (OR=25.18; 95% CI 1.21-552.17), but the estimate was

not stable. In addition, self-efficacy also increased the odds of maintaining mindfulness practice more than two-fold (OR=2.43; 95% ci 1.40-4.23).

In the full model (Model 6), with all variables controlled, five variables were significantly related to maintaining mindfulness practice. Being age 65 to 74 increased the odds of maintaining 53-fold, but the estimate was not stable (95% ci 1.21-2321.99). Among the processes of change, reinforcement management (OR=0.28; 95% ci 0.11-0.68), helping relationships (OR=2.27; 95% ci 1.17-4.39), and stimulus control (OR=2.74; 95% ci 1.59-5.65) were all significantly associated with maintaining mindfulness practice. While helping relationships and stimulus control increased the odds of maintaining more than two-fold, reinforcement management reduced the odds of maintaining by 72%. Finally, self-efficacy was significantly associated with maintaining mindfulness practice, and increased the odds more than four-fold (OR=4.11; 95% ci 1.59-10.59). Thus, among the theoretical variables, self-efficacy had the strongest effect when controlling for all other variables.



**Table 3. Logistic regression results for control and TTM construct variables for predicting maintenance of regular mindfulness meditation practice**

Stage of Readiness to Maintain Ongoing, Regular Mindfulness Meditation Practice (Maintenance versus Non-Maintenance) (N=132)						
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	OR (CI <sub>95</sub> )	SE t	Adjusted OR (CI <sub>95</sub> )	Adjusted OR (CI <sub>95</sub> )	Adjusted OR (CI <sub>95</sub> )	Adjusted OR (CI <sub>95</sub> )
Constant	1.37		0.04*	0.01**	0.01**	0.01 <sup>^</sup>
<b>Control Variables</b>						
Age <sup>a</sup>						
35 to 44	0.46 (0.13, 1.63)		0.62 (0.13, 3.01)	0.60 (0.10, 3.67)	0.49 (0.12, 2.06)	0.78 (0.11, 5.38)
45 to 54	1.51 (0.38, 6.05)		1.46 (0.25, 8.69)	1.65 (0.24, 11.24)	1.96 (0.41, 9.47)	1.54 (0.17, 13.76)
55 to 64	0.59 (0.17, 2.06)		0.74 (0.16, 3.47)	0.88 (0.16, 4.96)	0.77 (0.19, 3.13)	1.21 (0.18, 8.21)
65 to 74	5.29 (0.51, 54.60)		7.40 (0.53, 103.75)	11.88 (0.56, 249.92)	15.05 (0.87, 259.21) <sup>^</sup>	52.95 (1.21, 2321.99)*
# Previous MBSR Trainings <sup>b</sup>						
2	2.76 (0.78, 9.76)		1.57 (0.30, 8.16)	0.62 (0.11, 3.63)	1.34 (0.29, 6.09)	0.38 (0.04, 3.71)
3 or more	14.30 (1.73, 118.31)**		6.16 (0.55, 69.11)	3.80 (0.29, 50.04)	25.18 (1.21, 552.17)*	8.03 (0.28, 228.85)
<b>TTM Construct Variables</b>						
<b>Processes of Change</b>						
Consciousness Raising		1.41 (0.83, 2.40)		1.11 (0.53, 2.29)		1.05 (0.45, 2.42)
Dramatic Relief		0.61 (0.36, 1.06) <sup>^</sup>		0.63 (0.33, 1.24)		0.71 (0.32, 1.56)
Environmental Re-evaluation		2.38 (1.26, 4.49)***		1.73 (0.79, 3.77)		1.47 (0.59, 3.68)
Social Liberation		1.15 (0.72, 1.82)		1.02 (0.59, 1.77)		0.80 (0.42, 1.51)
Self Re-evaluation		0.83 (0.54, 1.29)		1.30 (0.75, 2.25)		1.33 (0.62, 2.85)
Self Liberation			0.92 (0.51, 1.64)	0.73 (0.36, 1.51)		0.40 (0.14, 1.13) <sup>^</sup>
Counter-conditioning			1.10 (0.63, 1.93)	1.04 (0.57, 1.90)		1.35 (0.56, 3.21)
Reinforcement Management			0.43 (0.24, 0.78)***	0.42 (0.22, 0.79)***		0.28 (0.11, 0.68)****
Helping Relationships			1.76 (1.12, 2.77)**	1.84 (1.12, 3.03)**		2.27 (1.17, 4.39)**
Stimulus Control			2.42 (1.50, 3.90)*****	2.60 (1.46, 4.62)*****		2.74 (1.33, 5.65)****
<b>Other TTM Constructs</b>						
Decisional Balance					1.16 (0.56, 2.43)	0.57 (0.17, 1.89)
Self-Efficacy					2.43 (1.40, 4.23)*****	4.11 (1.59, 10.59)*****

<sup>a</sup> Reference category is 25 to 34

<sup>b</sup> Reference category is 1

<sup>^</sup>p < .10, \*p < .05, \*\*p < .025, \*\*\*p < .01, \*\*\*\*p < .005, \*\*\*\*\*p < .001

### E. Results for Research Question 3

For Research Question 3, a crosstab of the 5-category stage of readiness with mental health produced seven cell counts below five, resulting in an invalid chi-square. The dichotomized stage of readiness to maintain ongoing, regular mindfulness meditation practice was the independent variable of interest. The dependent variable of interest was overall mental health and well-being, categorized as flourishing, moderate, or languishing. Results of the Pearson chi-square (see Table 4) demonstrated a significant association between maintenance of a regular, ongoing practice of mindfulness meditation and overall mental health and well-being ( $\chi^2=9.93$ ,  $df=2$ ,  $p=.007$ ). A greater percentage of maintainers than non-maintainers were flourishing. Conversely, a greater percentage of non-maintainers than maintainers were languishing.

Table 4. Test of the Association Between Maintaining and Mental Health

	Flourishing	Moderate	Languishing	Total
Maintainer	53 (67.9%)	23 (29.5%)	2 (2.6%)	78 (100%)
Other Stage	24 (46.2%)	20 (38.5%)	8 (15.4%)	52 (100%)

$\chi^2=9.93$ ,  $df=2$ ,  $p=.007$

## Ch. V: Discussion

### *Findings and Conclusions:*

This is one of the first studies to examine long-term maintenance of mindfulness meditation practices through an application of a ‘stages of behavior change’ theoretical framework. This study applied TTM constructs to explore factors of potential influence for one’s ‘readiness to maintain’ a long-term practice of regular mindfulness meditation. In turn, it explored how readiness to maintain a mindfulness practice was related to overall mental health and well-being.

Participants were found to be in all stages of readiness to maintain an ongoing, regular routine of mindfulness meditation practice. The majority of participants were found to be in maintenance, however.

When comparing the use of processes of change for those in the maintenance stage compared to those not in this stage, almost all of the TTM constructs were associated with maintenance at the bivariate level. The processes of consciousness raising, environmental re-evaluation, social liberation, self liberation, counter-conditioning, helping relationships and stimulus control were all significantly greater for maintainers than non-maintainers. The use of (positive) decisional balance and self-efficacy were also both significantly greater for maintainers than non-maintainers. However, no significant difference was found between those in the maintenance stage and those in other stages for dramatic relief, self re-evaluation, and reinforcement management. These results suggest that the use of certain processes of change do not diminish as individuals begin to maintain mindfulness meditation practice long-term. Other authors have suggested that the use of particular processes of change (e.g.,

consciousness raising) may be more important for progressing through earlier stages of change, but may still be used frequently in action and maintenance of healthy routine behaviors, while not influencing progress through these later stages (Horwath, 1999; Prochaska, Reddings, & Evers, 2002; Rosen, 2000). In other words, perhaps some processes increase rapidly in the earlier stages, but then reach a plateau of sorts that remains high in later stages and do not have as much influence on movement through those later stages. Regarding dramatic relief, self-re-evaluation, and reinforcement management, perhaps these processes are not especially important or helpful processes for maintaining mindfulness meditation practice. In addition, of all the principles and processes of change that were used with mindfulness meditation, no matter their stage of change, participants reported using self re-evaluation and reinforcement management processes the least.

Next the study examined the use of the principles and processes of change as significant correlates of being in the maintenance stage compared to all other stages. With regard to experiential processes, it was hypothesized that those processes are more frequently used in the earlier stages (e.g., contemplation or preparation), and less in the later (action and maintenance) stages. In contrast, it was hypothesized that behavioral processes are most frequently used in the later (action and maintenance) stages. In the full model multivariate logistic regression analysis, when controlling all other variables, the study found that, indeed, no experiential processes of change were significant correlates of maintenance. Supporting previous theory, behavioral processes were found to be more important for maintenance of mindfulness meditation practice (O'Conner, Carbonari, & DiClemente, 1996; Prochaska, Redding, & Evers, 2008). The specific

behavioral processes associated with maintenance were helping relationships, stimulus control, and reinforcement management. Helping relationships and stimulus control were the only two processes found to be statistically significant positive correlates of maintenance versus other stages combined. In contrast, the behavioral processes of self-liberation and counter-conditioning were not associated with maintenance, and use of reinforcement management was actually significantly negatively associated with maintenance.

The finding that high levels of reinforcement management reduced the odds of maintaining mindfulness practice may be explained by the fact that mindfulness meditation practice in itself may be seen as its own reward; thus, encouragement to continue mindfulness practice in the form of personal rewards (to oneself) may be inherently unnecessary for this particular behavior (Geschwind et al., 2011; Kabat-Zinn, 1990; Kristeller, 2007). Reinforcement management processes are about getting external reinforcement to support a positive behavior, but perhaps with mindfulness meditation practices, the motivation to perform a behavior may be more of an internalized feeling of commitment. For instance, 'Self-Determination Theory' proposes that the key to maintenance of a long-term behavior is in the extent to which an individual internalizes their willingness and motivation to perform said behavior (Deci & Ryan, 1985; 2000). However, the authors of this theory also suggested that different types of external rewards can have different effects on whether a person is intrinsically motivated to perform a task. They found that rewards such as monetary motivation made people re-evaluate their intrinsic motivation toward more extrinsic motivation, but rewards such as verbal praise worked to increase intrinsic motivation (Deci & Ryan, 1985; 2000). Perhaps a similar

situation is occurring with the practice of mindfulness meditation, since helping relationships was also seen to be very influential and important for maintainers in this study.

In addition, counter-conditioning processes may also be inherently less applicable to practicing mindfulness meditation on a regular basis once maintenance is established and continued. By the time someone is in maintenance for a period of time, they may not be needing to substitute other types of behaviors (like other stress reduction methods) in lieu of mindfulness practice. These particular results may also be indicative of certain inherent characteristics of *adoption* behaviors and maintenance, as well, since counter-conditioning and reinforcement management are often seen to be more effective for the reduction in old, unhealthy behaviors, but have seen less consistency with the adoption of new, healthy behaviors (Marcus et al., 1992; Plotnikoff et al., 2010; Prochaska, DiClemente, & Norcross, 1992; Prochaska, Redding, & Evers, 2008).

High levels of self-efficacy also increased the odds of maintaining mindfulness practice when other variables were controlled. While both decisional balance and self-efficacy were significantly higher for maintainers versus non-maintainers, only self-efficacy was a significant correlate of maintenance. This finding follows from previous studies of the TTM theory indicating the importance of self-efficacy for progression in later stages of change, in particular, as the behavior begins and continues to be performed (DiClemente, Fairhurst, & Piotrowski, 1995; Rothman, 2000). Thus, the hypothesis regarding decisional balance and self-efficacy was partially supported.

The study also examined if there was a significant relationship between maintaining mindfulness meditation practice and mental health and well-being. Overall,

the results strongly support a significant association between being in the maintenance stage of readiness to maintain an ongoing, regular routine of mindfulness meditation practice and one's level of mental health. As the literature has suggested, maintenance of mindfulness practices was significantly associated with higher levels of flourishing and lower levels of languishing than were other stages (Brown & Ryan, 2003; Geschwind et al., 2011). Maintainers were significantly more likely to have flourishing mental health compared to non-maintainers, who were significantly more likely to have moderate or languishing mental health. However, while an association was confirmed by the results of this study, these findings cannot establish actual causation inferences. These findings cannot directly answer whether maintenance of mindfulness meditation practices promotes better mental health overall, or whether better mental health significantly influences one's ability to maintain an ongoing, regular practice of mindfulness meditation. Thus, this hypothesis was ultimately supported.

In conclusion, this research has made useful contributions by emphasizing some of the factors that may be important in the maintenance of mindfulness meditation practice. These findings also provide initial, but important, support for the applicability of the TTM to the study of mindfulness meditation practices, and for the applicability of processes of change and self-efficacy to the readiness to maintain an ongoing, regular practice of mindfulness meditation.

*Strengths and Limitations:*

As in any research design, this study has both strengths and limitations. First, the study was limited to participants who have had some formal training in mindfulness-based techniques (specifically former MBSR training). This is both a strength and a

limitation. One strength of examining only those with MBSR training is that this particular form of mindfulness meditation training has developed very strong support in the literature (Carlson et al., 2007; Fang et al., 2010; Kabat-Zinn, Massion, & Kristeller, 1992; Kabat-Zinn et al., 1998; Miller, Fletcher, & Kabat-Zinn, 1995). Furthermore, by limiting participants to only those with MBSR training, the implications of any findings from this research can be applied to an area of mindfulness research that has already established some recognition and credibility in the medical community. Another strength of limiting eligibility to only those with formal MBSR training is that the study's participants had consistency in the mindfulness training they received. This eliminated potential confounding that might arise from differences in various mindfulness meditation training programs.

On the other hand, a limitation of the decision to limit eligibility requirements to participants who have had MBSR training is that of selection bias (i.e., are they non-representative). Because of this criterion, the findings of this research are generalizable only to those who have received previous formal MBSR training. Another limitation is that, while MBSR programs across the nation may, in general, be very similar to one another, there may still be differences. For instance, the motivation behind participating in and staying in the MBSR training program at the Center for Mindfulness and Medicine, Health Care, and Society in particular, may differ from the motivation behind participating at some other licensed MBSR training facility across the country. Limiting the sample to one or two MBSR programs may strengthen future studies by controlling for differences between MBSR programs such as criteria for qualification to participate in



the program, location of training facility, environmental setting of training sessions, and individual teaching styles of the MBSR practitioners within various programs.

There are also strengths and limitations specifically surrounding the use of a cross-sectional survey design. The major strength in utilizing a one-time questionnaire is for simplicity of data collection. This method presents a very feasible and manageable way to obtain information regarding current and ongoing practice of mindfulness meditation from a large number of participants. However, on a one-time survey all variables are measured at the same time, an inherent flaw in this research design. Thus, one cannot conclude cause and effect from cross-sectional information, only association.

Another limitation of this study was the limited sample size of participants. Originally the desired sample size was determined to be 170 for adequate power, but only 132 participants provided sufficient data for analysis. Even with the size limitations, significant results were still found for most of the analyses. However, future studies with larger sample sizes may find additional significant results.

Additionally with regards to participants, another limitation was the inability to determine an accurate response rate for the sample. While the recruitment methods allowed for complete anonymity of participants, there was no way to determine the number or source of participants. Consequently, there is no way to determine if the results of this study can be generalized to other samples or the larger population of those who have previously completed formal MBSR training. Perhaps the individuals who responded to the survey were more likely to do so for some common reason, like a close relationship with their teacher.

Another potential limitation was using a dichotomy between those in maintenance and those not in maintenance (those in pre-contemplation or contemplation and those in preparation or action). Using all five stages would have enabled further understanding of how the processes of change are related to each stage of change, specifically. This is a direction for future research. However, the primary objective of this particular research proposal—namely, to examine factors related to the *long-term, ongoing practice* of mindfulness meditation behavior—made the dichotomy between maintenance and other stages appropriate.

Regarding the measures used in this research study, the researchers believe the operationalizations of the ten distinct processes of change that are essential to the TTM represent a definite strength of this study. The items used to measure each process of change represented these intended theoretical constructs and demonstrated adequate reliability (DiClemente, & Prochaska, 1985; Prochaska, & Veliver, 1997). Another strength of the study is that the other concepts that are essential to TTM, i.e., self-efficacy and decisional balance, were also represented (Prochaska, Redding, & Evers, 2002).

Since this was primarily a theory-driven research study, the findings obtained from conducting this research can directly advance our understanding of the TTM with regards to the behavior of mindfulness meditation practice. While application of the TTM has been well established within research addressing numerous behaviors (Prochaska, Redding, & Evers, 2002; Rothman, 2000), it has not been applied to the behavior of practicing mindfulness. Furthermore, with regards to exploring behavior change and particularly behavioral maintenance (for which TTM is ideal), this is the first

study to apply the TTM for examining maintenance of ongoing, mindfulness-based practice

*Implications for Future Research:*

This study provided an initial, but important, starting point for further research on understanding influential factors related not only to the performance of mindfulness-based practices, but more importantly to the long-term maintenance of regular mindfulness-based practices. One of the purposes of this study was to better understand *why* individuals with previous formal MBSR training do or do not utilize their mindfulness meditation instruction and maintain an ongoing, regular routine of mindfulness practice in their daily lives. According to researchers such as Kristeller (2007) and Kuyken et al. (2010), a significant reason for not continuing regular mindfulness practice may be related to varying factors such as access and availability, perceived importance of continued practice, form of training and time since last training session, and even individual level of satisfaction with the mindfulness meditation training experience. Future researchers should continue work to identify exactly *why* some individuals respond more positively to formal MBSR training than others.

Future research should also continue the investigation into how the TTM stages, as well as other TTM constructs and processes of change, may relate to and actually *influence* the promotion of overall positive mental health. Likewise, while the TTM stages construct was successfully utilized in this study to explore how those in maintenance differ from those in other stages, future research should expand upon the TTM stage construct and begin to explore inter-stage differences across *all* stages of readiness to maintain an ongoing practice of mindfulness meditation.

Although several key constructs have been highlighted from this study (e.g., helping relationships and stimulus control), others important constructs may still remain. Among these may be constructs such as environmental constraints, personal goals, or even personal abilities, which are in theory different than just recognition of one's own ability or self-efficacy. There may be other variables of interest that were not examined for this research study that could play a major role in mindfulness maintenance. In addition, we need clearer theoretical accounts of how these variables, including the processes and other potential factors that may be particularly important in mindfulness meditation maintenance, interact together to produce maintenance of a health behavior.

*Implications for Intervention:*

Regarding implications for intervening upon the desired outcome of encouraging mindfulness maintenance, as we are better able to understand why some individuals maintain their mindfulness practice and others do not, we may eventually be able to modify training protocols and improve the likelihood of more individuals *maintaining* regular mindfulness meditation practices after formal MBSR training in the future. Through applying the TTM to mindfulness practice, the fundamental importance of this research lies in finding that strategies and activities to promote behavior change may differ across varying stages of behavior change (DiClemente, & Prochaska, 1985; Prochaska, & Veliver, 1997). Individuals in different stages utilize different processes of change and decision-making. As a result, different factors may be important in the decisions to first initiate and begin to practice a behavior, as compared to the decisions about actual long-term maintenance of a behavior over time (Conner, 2008; Prochaska, & Veliver, 1997). Findings from this research study suggested that the behavioral processes

of change might be more important and directly related to the successful development of long-term maintenance of mindfulness meditation practice, especially the processes of stimulus control and helping relationships. Principles of self-efficacy may also be important in guiding one's decisions to maintain an ongoing behavior of regular mindfulness meditation practice.

By understanding what constructs individuals most utilize to continue practicing mindfulness maintenance long after completing a formal MBSR training, researchers can better design mindfulness meditation training programs. In the future, programs can be more appropriately targeted towards promoting mindfulness *maintenance* behaviors. In other words, greater understanding of why some maintain ongoing practice of mindfulness meditation, while others do not, can provide a basis for planning a future re-organization and expansion of MBSR programs to better address, and support the students for continuing, *long-term* practice. Emphasizing techniques of helping relationships (such as a buddy system for practice) or of stimulus control for mindfulness meditation practice (such as having a mindfulness alarm that goes off periodically throughout the day) may be especially useful for future MBSR practitioners who want to achieve long-term maintenance.

Additionally, as noted by Rosen (2000), many mindfulness-based intervention programs currently operating are predominantly *action-oriented* in nature and targeted towards promoting those in the preparation or action stages of change. If we can redirect these intervention programs to also be *maintenance-oriented*, as well, many more individuals may develop *routine and long-term* mindfulness meditation practices (which may also gain them long-term mental health benefits). Although many more

longitudinal, in-depth, and larger-scale studies are still needed, this research study puts us one step closer to being able to design more effective formal mindfulness-based training programs in the future.

Assessing the long-term maintenance of mindfulness meditation practices as a tool for achieving positive mental health and well-being was the overarching motivation for this study. Guided by the TTM, this research has demonstrated that readiness to maintain a mindfulness practice is related to overall mental health. The study established that a significant and positive *association* does exist between ongoing mindfulness meditation practice and overall mental health. Based on these initial findings, mindfulness-based practices, particularly a regular routine of mindfulness practice, can be supported as a potential means to attain and maintain an overall state of positive mental health and wellness.

In conclusion, the findings of this study will hopefully inspire new and unique ideas for exploring new ways to investigate, promote, and ultimately increase long-term maintenance of routine mindfulness-based mediation techniques. Hopefully, this will increase overall mental health in our community as a result.

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## Appendix A: Recruitment Email Invitation

(To Be Forwarded To Potential Study Participants)

Subject: Mindfulness Online Study Seeks Participants

### What's Up?

Researchers at Emory University Rollins School of Public Health Department of Behavioral Science and Health Education are recruiting subjects for a sociobehavioral research study investigating significant factors (and theoretical constructs) associated with long-term practice of mindfulness meditation.

The purpose of this study is to understand why individuals who previously participated in formal MBSR training did or did not utilize the mindfulness meditation instruction offered and maintain an ongoing routine of mindfulness meditation practice. The aim is to examine factors associated with the initiation, practice and long-term maintenance of mindfulness meditation. In addition, this study also seeks to examine potential positive mental health benefits that may be associated with one's readiness to maintain an ongoing, regular routine of mindfulness meditation practice.

The procedure for this study involves evaluating mindfulness meditation through a one-time assessment and self-evaluation of mindfulness practices.

### Who Can Join?

If you have formerly participated in/completed a formal MBSR Program (8-week training session and day-long retreat) and are a legal adult (18 years or older), you may qualify for this study.

### What Can I Expect?

Those who are eligible are asked to volunteer to answer questions by complete a single online survey questionnaire (taking approximately 15-20 minutes to complete). There is a \$50 gift-card drawing incentive upon completion of the online survey. At the end of the survey if you so choose, you will be entered into a drawing for one of several \$50 gift-cards for your time and effort in completing the survey.

Interested? Click on the link provided below to access the online survey. Remember, your information will always remain completely anonymous.  
~survey monkey link~

### How Can I Get More Information?

See the official MBSR Program website for UMass Center for Mindfulness:  
Call or email Elisa B. Storyk: 864-354-5844 (estoryk@emory.edu) or Nancy J. Thompson: 404-727-3074 (nthomps@emory.edu)

PI: Elisa B. Storyk, MPH Candidate 2013

Department of Behavioral Sciences and Health Education  
Rollins School of Public Health, Emory University

Co-I: Nancy J Thompson, MPH, PhD (thesis committee chair), and Heather Zesiger, MPH, MCHES (thesis committee member)

eIRB# \_\_\_\_\_

Version 3; 10/22/2012

## Appendix B: Participant Informed Consent

### **Emory University Consent to be a Research Subject**

**Title:** Applying Constructs from the Transtheoretical Model of Behavior Change to Examine Initiation, Performance and Long-Term Maintenance of Mindfulness-Based Meditation Practices—Exploring Potential Benefits of Mental Health and Well-Being Associated with Ongoing Regular Practice of Mindfulness Meditation

**Principal Investigator:** Elisa Storyk, MPH candidate 2013, Rollins School of Public Health  
Department: Behavioral Sciences and Health Education  
Co-Investigators: Nancy J. Thompson, MPH, PhD (committee chair),  
Heather Zesiger, MPH, MCHES (member)

#### **Introduction**

You are being asked to participate in a research study because you have had previous training in Mindfulness-Based Stress Reduction (MBSR). This form is designed to tell you everything you need to think about before you decide to consent (agree) to be in the study or not to be in the study. Feel free to take your time thinking about whether you would like to participate. **It is entirely your choice. If you decide to take part, you can change your mind later on and withdraw from the research study. You can skip any questions that you do not wish to answer.** You may print a copy of this consent form to keep for your own records. By selecting “I agree” to this consent form you will not give up any legal rights.

#### **Study Overview**

The purpose of this research is to understand why individuals who previously participated in formal MBSR training did or did not utilize the mindfulness meditation instruction offered and maintain an ongoing routine of mindfulness meditation practice. The aim is to examine factors associated with the initiation, practice and long-term maintenance of mindfulness meditation. In addition, this research also seeks to explore links between mental health and mindfulness meditation practice. One hundred and seventy (or more) participants will be in the study. This research is being conducted as part of a Master’s Thesis.

#### **Procedures**

If you agree, you will be asked to fill out a one-time survey assessment, presented as a single online questionnaire that should take approximately 15-20 minutes to complete. You will be asked to provide single-answer responses, as well as additional comments and opinions about mindfulness meditation practice based on your thoughts, feelings and experiences. Your responses will be combined with those of others for analysis.

#### **Risks and Discomforts**

There are no reasonably foreseeable risks or discomforts to you as a participant in this study.

### **Benefits**

You are not likely to get any direct benefit from this study. This study is designed to learn more about the influential factors associated with ongoing maintenance of mindfulness meditation practices, as well as the long-term benefits of practicing mindfulness meditation on a regular basis. We hope to increase knowledge and understanding about MBSR trainees' practice and perceptions of mindfulness meditation, and the study results may be used to benefit others in the future.

### **Compensation**

At the end of the survey you will be entered into a drawing to receive \$50 compensation (downloadable gift-card) for your time and effort.

### **Confidentiality**

All information about you will be kept as private as possible. A study number rather than your name will be used on study records wherever possible. Your name and other facts that might point to you will not appear when we present this study or publish its results. Certain offices and people other than the researchers doing the study may look at the study records. Government agencies and Emory Departments or employees that make rules and policies about how research is done have a rights to review the study records. These offices include the Emory Institutional Review Board, the Emory Office of Research Compliance, The Emory Office of Information Technology and the Department of Behavioral Sciences and Health Education. Also, records can be opened by court order or subpoena. Emory will keep any research records we create private to the extent we are required to do so by law.

### **Voluntary Participation and Withdrawal from the Study**

Your participation is completely voluntary. You have the right to end your participation at any time without penalty. If you withdraw before completion of the survey, your research info will not be used. You may refuse to answer any questions that you do not wish to answer.

### **Contact Information**

Contact the Principle Investigator, Elisa B. Storyk at 864-354-5844 ([estoryk@emory.edu](mailto:estoryk@emory.edu)) or the Co-Investigator, Nancy J. Thompson at \_\_\_\_\_:

- if you have any questions about this study or your part in it, or
- if you have questions, concerns or complaints about the research

Contact the Emory Institutional Review Board (the group that oversees studies involving human subjects) at 404-712-0720 or toll free at 1-877-503-9797 or email [irb@emory.edu](mailto:irb@emory.edu):

- if you have questions about your rights as a research participant.
- if you have questions, concerns or complaints about the research.
- You may also let the IRB know about your experience as a research participant through our Research Participant Survey at <http://www.surveymonkey.com/s/6ZDMW75>.

### **Consent**

Please select the "I agree" button below if you agree to be in this study. By agreeing to this consent form, you will not give up any of your legal rights. You may print and keep this information sheet for your records.

\_\_\_\_\_ I agree                      \_\_\_\_\_ I do not agree                      Date                      Time

Appendix C: Draft Questionnaire Instrument

Questionnaire for Examination of Long-Term Mindfulness Behaviors and Related Effects  
for MBSR Trainees

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Basic Demographics:

1. ID #: \_\_\_\_\_ (assigned)
2. Gender:
  - a) Male
  - b) Female
3. Age:
  - a) 18 to 24
  - b) 25 to 34
  - c) 34 to 44
  - d) 45 to 54
  - e) 55 to 64
  - f) 65 to 74
  - g) 75 to 84
  - h) 85 or older
4. Ethnicity:
  - a) American Indian or Alaskan Native
  - b) Asian
  - c) Black or African-American
  - d) Hispanic
  - e) Native Hawaiian or other Pacific Islander
  - f) White/Caucasian
  - g) Other
5. Marital Status:
  - a) Single
  - b) In a casual relationship
  - c) In a committed relationship
  - d) In a long-term partnership
  - e) Engaged
  - f) Married
  - g) Widowed
  - h) Divorced
  - i) Separated
6. Highest Level of Education:
  - a) Did not graduate high school (less than high school degree)

- b) High school graduate or equivalent (e.g., GED)
- c) Some college but no degree
- d) Associate degree
- e) Bachelor degree
- f) Graduate or higher degree

7. Yearly household income:

- a) \$0-\$24,999
- b) \$25,000-\$49,999
- c) \$50,000-\$74,999
- d) \$75,000-\$99,999
- e) \$100,000-\$124,999
- f) \$125,000-\$149,999
- g) \$150,000-\$174,999
- h) \$175,000-\$199,999
- f) \$200,000 and up

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Past Mindfulness Meditation Training:

1. Have you ever participated in formal Mindfulness-Based Stress Reduction (MBSR) training at least once sometime in the past?

Yes No (exit the survey and thank them for their time)

2. If yes, did you complete:

- a. The 8-week MBSR Program, originally founded by Dr. Jon Kabat-Zinn in 1979 and officially sponsored by The Center for Mindfulness in Medicine, Health Care, and Society at the University of Massachusetts Medical School (UMass Center for Mindfulness)?
- b. Another MBSR program with classes taught by a formally trained MBSR practitioner recognized and listed in the UMass Center for Mindfulness directory?
- c. Both of the above
- d. Neither of the above (exit the survey and thank them for their time)

3. When was your **very first** MBSR training completed?

- a) 0-5 months ago (exit the survey and thank them for their time)
- b) 6-9 months ago
- c) 10-12 months ago
- d) 1-2 years ago
- e) More than 2 years but less than 5 years ago
- f) 5-10 years ago
- g) More than 10 years ago

4. How many different MBSR programs have you participated in?

- a) 1 (skip to question 6)
- b) 2



c) 3 or more

5. When was your **most recent** MBSR training completed?

- a) 0-5 months ago
- b) 6-9 months ago
- c) 10-12 months ago
- d) 1-2 years ago
- e) More than 2 years but less than 5 years ago
- f) 5-10 years ago
- g) More than 10 years ago

6. In what state(s) were the MBSR training classes you took part in? \_\_\_\_\_ (list all that apply)

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More Open-Ended Questions Concerning Previous MBSR Training:

- 1. Did your previous MBSR training meet your expectations? Why or why not?
  - 2. What do you feel were the greatest *strengths* of your previous MBSR training?
  - 3. What do you feel were the greatest *weaknesses* of your previous MBSR training?
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Current Mindfulness Meditation Practices:

[Frequency of mindfulness-based techniques]

1. On average, how often do you currently practice mindfulness meditation?

- a) Never (skip to next section)
- b) Monthly
- c) Weekly
- d) About every other day
- e) Daily
- f) Multiple times a day

2. In the last 7 days, on how many days did you practice some form of mindfulness-based technique?

- a) None
- b) 1 day
- c) 2 days
- d) 3 days
- e) 4 days
- f) 5 days
- g) 6 days
- h) 7 days

[Duration of mindfulness-based techniques]

3. On an average day when you do practice mindfulness meditation, for about how long do you practice?

- a) Less than 5 minutes
- b) 5 to 10 minutes
- c) 11 to 20 minutes
- d) 21 to 30 minutes
- e) 31 to 44 minutes
- f) 45 to 59 minutes
- g) 60 to 75 minutes
- h) More than 75 minutes

[Type of mindfulness-based technique]

4. On a typical day, what form(s) of meditation practice do you use?

- a) Sitting only
- b) Lying down only
- c) Walking only
- e) Sitting and lying down
- f) Sitting and walking
- g) Lying down and walking
- h) Sitting, lying down and walking

5. On a typical day, what is the object of your mindfulness practice? (choose all that apply)

- a) Sights
- b) Sounds
- c) Breath
- d) Thoughts
- d) Objects (Touch)
- e) Body (Body Scan)
- f) Eating

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More Open-Ended Questions Concerning Mindfulness Meditation:

1. What do you like *the most* about practicing mindfulness meditation?
  2. What do you like *the least* about practicing mindfulness meditation?
  3. What are your thoughts on the potential advantages and/or benefits of engaging in a routine practice of mindfulness meditation?
  4. What are your thoughts on the possible disadvantages and/or obstacles against practicing regular mindfulness meditation?
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\*Stage of Readiness:

1. Would you say you CURRENTLY MAINTAIN some ongoing, REGULAR ROUTINE of mindfulness meditation practice in your daily living? (for example, practicing mindfulness meditation for at least 5-10 minutes, at least 2-3 times per week on average?)

Yes No

If yes,

2.1 How long would you say you have been doing this?

Less than 6 months More than 6 months

If no,

2.2 Are you thinking about starting?

Yes No (continue on to next section)

If yes,

2.2.a Do you plan to start in the next month?

Yes No

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\*\*Processes of Change:

For each statement below, please indicate your level of agreement/disagreement:

- [select one]
- 1) Strongly disagree
  - 2) Disagree
  - 3) Somewhat disagree
  - 4) Neither disagree nor agree
  - 5) Somewhat agree
  - 6) Agree
  - 7) Strongly agree

[CR: Consciousness-Raising (increasing awareness)]

1. I recall information people have personally given me on how to regularly practice mindfulness meditation.
2. I think (have thought) about information I have seen about how to start practicing mindfulness meditation regularly.
3. I recall articles dealing with the issue of practicing mindfulness meditation.
4. I recall information people have personally given me on the benefits of ongoing mindfulness meditation.

[DR: Dramatic Relief (emotional arousal)]

1. Stories and shows about people who regularly practice mindful meditation move me emotionally.
2. Dramatic portrayals and personal testimonials about the beneficial effects of mindful meditation affect me emotionally.
3. The idea of practicing mindfulness meditation stimulates strong feelings for me.
4. I react emotionally to warnings about not being more mindful.

[ER: Environmental Re-evaluation (social reappraisal)]

1. I think it is possible that, if people maintain a more mindful state of being, they will help make the world a better place.
2. I stop to think that my lack of mindfulness affects the people around me.
3. I consider the view that not being more mindful can hurt the people around me I care about.
4. I am considering the idea that the world around me might be a better place if I were more mindful.

[SocL: Social Liberation (environmental opportunities)]

1. I find society changing in ways that make it easier for those who want to practice being more mindful.
2. I notice signs and advertisements about MBSR and/or mindfulness meditation.
3. I notice that workplaces are doing more to address the promotion of mental health and stimulate mindfulness-based techniques.
4. I notice that people who do regularly practice mindfulness are speaking out.

[SR: Self Re-evaluation (self-reappraisal)]

1. My potential for not practicing mindfulness meditation makes me feel disappointed in myself.
2. When I don't practice being mindful, I feel disappointed in myself.
3. I find, more and more, that being content with myself includes changing my mindfulness meditation behavior.
4. I constantly struggle with the issue that not practicing mindfulness contradicts my view of myself as a healthy person.

[SelfL: Self Liberation (committing)]

1. I make commitments to continually practice mindful meditation (to be more mindful in my everyday living).
2. I tell myself I can choose to be more mindful or not.
3. I tell myself I am able to start and maintain mindfulness meditation practice if I want to.
4. I tell myself that, if I try hard enough, I can keep a regular practice of mindfulness meditation.

[CC: Counter-Conditioning (substituting; contingency management)]

1. When I am tempted not to practice mindful meditation, I have begun to identify things I can do to help me go ahead and practice.
2. Instead of failing to practice mindful meditation, I do something else to help me be mindful.
3. I find that beginning with simple relaxation is a good substitute for my initial avoidance of practicing mindful meditation.
4. I find that practicing mindfulness meditation whenever I can find some downtime in my busy day is a good substitute for otherwise being too busy to schedule a more regular practice time.

[RM: Reinforcement Management (rewarding)]

1. I can expect to be rewarded (encouraged) by others if I practice mindful meditation.
2. I have people in my life who will reward me if I practice mindful meditation.
3. I can ask others to compliment me when I practice mindfulness meditation.
4. I reward myself when I practice mindful meditation.

[HR: Helping Relationships (supporting)]

1. I can be open with at least one special person about my experience with mindfulness meditation.
2. I have someone who listens when I need to talk about maintaining an ongoing practice of mindfulness meditation.
3. I have someone I can count on when I'm having problems with not practicing mindful meditation.
4. I have someone I can count on when I'm having problems with not being more mindful in general.

[SC: Stimulus Control (re-engineering)]

1. I purposely place things in my home and/or workplace that remind/encourage/aid me to be more mindful.
  2. I avoid activities and situations that make me not want to be mindful.
  3. I seek out places where I am more likely to practice mindfulness meditation.
  4. I actively participate in formal training, classes, or other group sessions that encourage my continued practice of mindfulness meditation.
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\*\*\*Other Important TTM Constructs:

For each statement below, please indicate your level of agreement/disagreement:

- [select one]
- 1) Strongly disagree
  - 2) Disagree
  - 3) Somewhat disagree
  - 4) Neither disagree nor agree
  - 5) Somewhat agree
  - 6) Agree
  - 7) Strongly agree

[DB: Decisional Balance (balancing the pros and cons)]

1. I perceive I gain personal benefits from the continuing practice of mindfulness meditation.
2. I feel that the practice of mindfulness meditation has potential health benefits.
3. I like myself better when I practice mindfulness meditation.
4. Mindfulness meditation helps me concentrate and do better work.
5. Mindfulness meditation relieves tension.
6. I'm embarrassed that I have to practice mindfulness meditation.
7. I feel the ongoing practice of mindfulness meditation is not necessary to my personal well-being.
8. I feel the ongoing practice of mindfulness meditation is not worth my time.
9. Regular mindfulness meditation would take too much of my time.

[SelfE: Self-Efficacy (confidence and temptation)]

1. I feel able to continue regular mindfulness meditation practice.
2. I believe that if I tried hard enough, I could keep up a regular practice of mindfulness meditation.
3. I perceive myself as capable when it comes to my ability to practice mindful meditation techniques under a number of different circumstances.

4. I feel I can engage in mindful behavior across tough situations.
  5. I feel I can remain mindful and use mindfulness techniques in responding to tough situations.
  6. I have a strong level of confidence in my ability to practice mindfulness meditation at least 3 days/week.
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\*\*\*\*Mental Health Continuum-Short Form (MHC-SF) for adults

During the past month, how often did you feel...

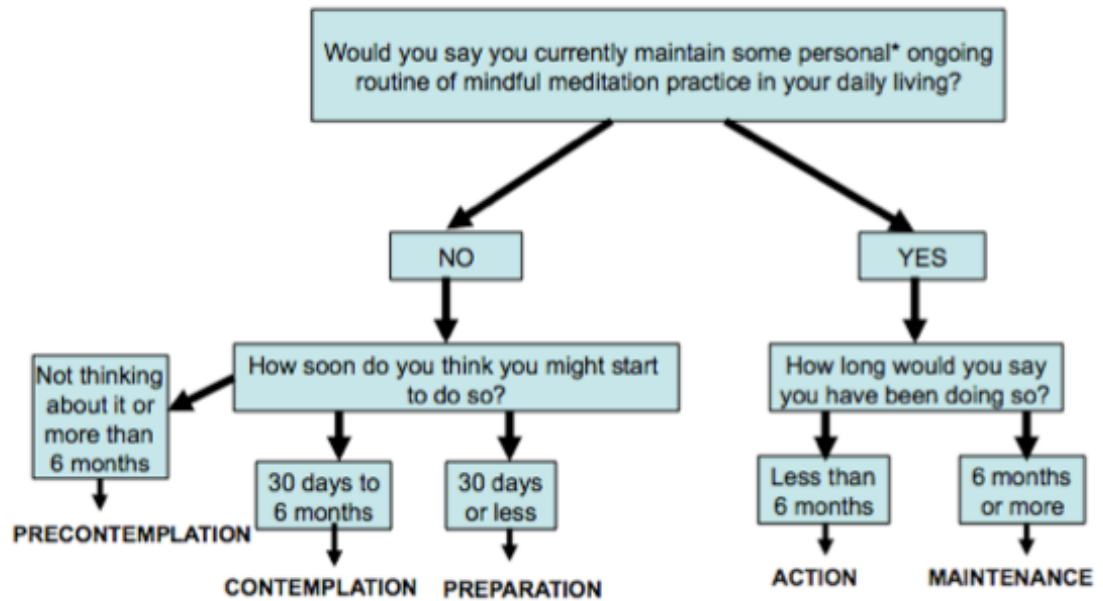
- [select one]
- 1) Never
  - 2) Once or twice
  - 3) About 2 or 3 times a week
  - 4) Almost every day
  - 5) Every day

1. happy
  2. interested in life
  3. satisfied
  4. that you had something important to contribute to society
  5. that you belonged to a community (like a social group, or your neighborhood)
  6. that our society is becoming a better place for people like you
  7. that people are basically good
  8. that the way our society works makes sense to you
  9. that you liked most parts of your personality
  10. good at managing the responsibilities of your daily life
  11. that you had warm and trusting relationships with others
  12. that you have experiences that challenge you to grow and become a better person
  13. confident to think or express your own ideas and opinions
  14. that your life has a sense of direction and meaning to it
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End of Questionnaire

Appendix D: TTM Algorithm Diagram - assessing an individual's stage of readiness to uphold ongoing personal\* practice of mindfulness meditation

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\*Personal practice is determined by individual standards for each participant.

Appendix E: Mental Health Continuum-Short Form (MHC-SF) for Adults (ages 18 & up)

Adult MHC-SF (ages 18 or older)

Please answer the following questions are about how you have been feeling during the past month. Place a check mark in the box that best represents how often you have experienced or felt the following:

During the past month, how often did you feel ...	NEVER	ONCE OR TWICE	ABOUT ONCE A WEEK	ABOUT 2 OR 3 TIMES A WEEK	ALMOST EVERY DAY	EVERY DAY
1. happy						
2. interested in life						
3. satisfied with life						
4. that you had something important to contribute to society						
5. that you belonged to a community (like a social group, or your neighborhood)						
<b>SEE BELOW 6. that our society is a good place, or is becoming a better place, for all people</b>						
7. that people are basically good						
8. that the way our society works makes sense to you						
9. that you liked most parts of your personality						
10. good at managing the responsibilities of your daily life						
11. that you had warm and trusting relationships with others						
12. that you had experiences that challenged you to grow and become a better person						
13. confident to think or express your own ideas and opinions						
14. that your life has a sense of direction or meaning to it						

**Note:** The original wording for item 6 was “that our society is becoming a better place for people like you.” This item does not work in all cultural contexts. However, when validating the MHC-SF, test both versions of item 6 to see which one works best in your context.

Citation: Keyes, C. L. M. (2009). Atlanta: Brief description of the mental health continuum short form (MHC-SF). Available: <http://www.sociology.emory.edu/ckeyes/>.



Appendix F: Descriptive Statistics of Participants' Previous MSBR Trainings

<u>Training Type, n(%)</u>	
N	132(100)
Kabat-Zinn 8-week MBSR	40(30.3)
Other official program	80(60.6)
Both Kabat-Zinn and other official program	7(5.3)
Other unofficial program	3(2.3)
None of the above	2(1.5)
<u>Number of MBSR Trainings Completed, n(%)</u>	
N	132(100)
1	98(74.2)
2	18(13.6)
3 or more	16(12.1)
<u>Time of First MBSR Training, n(%)</u>	
N	132(100)
0-5 months ago	11(8.3)
6-9 months ago	16(12.1)
10-12 months ago	14(10.6)
1-2 years ago	42(31.8)
Between 2 and 5 years ago	28(21.2)
5 to 10 years ago	10(7.6)
More than 10 years ago	11(8.3)
<u>Most Recent MBSR Training, n(%)</u>	
N	132(100)
0-5 months ago	21(15.9)
6-9 months ago	21(15.9)
10-12 months ago	16(12.1)
1-2 years ago	42(31.8)
Between 2 and 5 years ago	22(16.7)
5 to 10 years ago	7(5.3)
More than 10 years ago	3(2.3)

Appendix G: Descriptive Statistics of Participants' Current Mindfulness Practices

<u>Average Practice Frequency, n(%)</u>	
N	132(100)
Never	9(6.8)
Monthly	18(13.6)
Weekly	24(18.2)
Every other day	30(22.7)
Daily	34(25.8)
Multiple times daily	17(12.9)

<u>Practice in Prior Week, n(%)</u>	
N	132(100)
None	12(9.1)
1 day	11(8.3)
2 days	10(7.6)
3 days	13(9.8)
4 days	15(11.4)
5 days	13(9.8)
6 days	11(8.3)
7 days	47(35.6)

<u>Average Duration of Practice, n(%)</u>	
N	130(100)
Less than 5 minutes	10(7.7)
5-10 minutes	25(19.2)
11-20 minutes	32(24.6)
21-30 minutes	28(21.5)
31-45 minutes	23(17.7)
46-60 minutes	8(6.2)
61-75 minutes	2(1.5)
More than 75 minutes	2(1.5)