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# Effect of Mindfulness on Gratitude and Psychological Wellbeing

David Schultz

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EFFECT OF MINDFULNESS ON GRATITUDE  
AND PSYCHOLOGICAL WELLBEING

by

David Schultz

A Dissertation  
Submitted to the Graduate School,  
the College of Education and Human Sciences  
and the School of Psychology  
at The University of Southern Mississippi  
in Partial Fulfillment of the Requirements  
for the Degree of Doctor of Philosophy

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## ABSTRACT

Gratitude is a unique emotion characterized by the propensity to be thankful and appreciative for the positive aspects of one's life as it stands in the present moment. It has been associated with higher levels of perceived belongingness and perceived social support, as well as psychological wellbeing. Similarly, mindfulness refers to nonjudgmental awareness and acceptance of the reality of the present moment. Mindfulness has also been shown to increase one's connectivity and sense of cohesion with others. The present study examined whether increasing mindfulness in individuals yielded increased gratitude as well as the mediating effect of gratitude on the relation between mindfulness and wellbeing. A within-subjects design was used in which participants underwent brief, at-home mindfulness training over a ten day period using the empirically-supported smartphone application, Headspace. The Philadelphia Mindfulness Scale was used to measure trait mindfulness across all participants, while the Gratitude Resentment and Appreciation Test measured dispositional gratitude. Ryff's Psychological Wellbeing Scales measured psychological wellbeing and the Acceptance and Action Questionnaire measured psychological flexibility. A MANOVA was used to evaluate main effects of time (pre-intervention, post-intervention, two-week follow-up) on gratitude, psychological wellbeing, and psychological flexibility. Mediation analysis examined relations between mindfulness, gratitude, psychological flexibility and psychological wellbeing. Results indicated that ten days of training increased gratitude, psychological flexibility, and wellbeing. The relation between mindfulness and psychological wellbeing was fully mediated by gratitude and psychological flexibility, both before and after participants underwent training. Results suggest that mindfulness

training can increase individuals' quality of life and psychological flexibility, in part by increasing their ability to appreciate positive aspects of their lives.

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## CHAPTER I - BACKGROUND

### Effect of Mindfulness on Gratitude, Psychological Flexibility, and Psychological Wellbeing

Interest in mindfulness as both a psychological construct and means of regulating emotion has drastically expanded in the last few decades (Brown, Ryan, & Creswell, 2007), particularly in clinical psychology and related fields. Much of the recent research focuses in particular on the association between mindfulness and healthy mental functioning. Specifically, the majority of oft-cited research pertaining to mindfulness has investigated the potential for mindfulness to improve mental health, both in normal and mentally ill populations. Indeed, recent studies have investigated mindfulness as a mechanism of intervention in the treatment of such myriad mental health problems as depression, anxiety, sexual and eating disorders, substance use, attention-deficit hyperactivity disorder, pain management (Chambers, Gullone, & Allen, 2009), and stress reduction (Grossman, Niemann, Schmidt, & Walach, 2004). However, there exists a deficit of studies in the current literature examining the specific mechanisms through which mindfulness improves quality of life. Likewise, a lack of studies exist assessing the extent to which mindfulness training, a universal component of mindfulness-based interventions, improves positive traits beyond and in addition to mindfulness. The current study sought to address these questions.

Many mindfulness practices have conceptualized nonjudgmental orientations toward the moment to moment aspects of one's personal experience as part of the awareness that makes up mindfulness (Brown, Ryan, & Crewswell, 2007). A considerable body of research has indicated that intentionally practicing this focus on the

present moment yields substantial improvement in both working memory and attentional processing. For example, a recent study by Jha, Krompinger, and Baime (2007) found that intensive mindfulness training enhanced several components of attentional processing and led to an overall increase in attentional capacity and ability to concentrate on a particular object of focus. Likewise, Kozhevnikov, Louchakova, Josipovic, & Motes, (2009) found that highly experienced meditators (e.g., practicing more than ten years, spending a cumulative total of at least one year at meditation retreats) experienced improvements in capacity to access heightened visuospatial processing resources, as opposed to merely improving visuospatial imagery capabilities in general. Lutz et al. (2009) found that intensive mindfulness training improved sustained attention and increased response time when discerning between two differing audio tones. Likewise, Slagter, Lutz, Greischar, Nieuwenhuis, and Davidson (2009) found that similar intensive mindfulness training produced increased sustained attention capabilities as measured by an attentional blink task wherein participants were required to rapidly identify the second of two target stimuli presented in rapid succession. Research by van Leeuwen et al. (2009) found that regular mindfulness practice extending beyond one year in length can yield improved executive functioning in older adults that exceed even those of younger peers. Finally, Mrazek, Franklin, Phillips, Baird, and Schooler (2013) found that a brief mindfulness training course improved working memory capacity and reading comprehension scores on the Graduate Record Examinations (GRE). This mindfulness training simultaneously decreased the occurrence of distracting thoughts during completion of both the GRE and a measure of working memory.

Mindfulness does not refer to suppression of thoughts or emotions, but rather, the goal of mindfulness is to alter the individual's relation to their own thoughts, emotions, and feelings. Individuals experienced in mindfulness practice often experience these internal phenomena in a manner similar to that by which one experiences the various sights, sounds, and scents of their outside environment. In this way, mindful individuals are thought to be able to examine their own thoughts, emotions, and feelings, regardless of their negative or positive content, in a relatively detached manner, and are therefore able to respond in a more measured way (Brown et al., 2007). In other words, mindfulness allows one to process difficult thoughts and feelings with a greater degree of objectivity and regulation. By examining such phenomena mindfully, individuals find themselves more capable of analyzing difficult thoughts and feelings without a considerable degree of emotional disruption coloring their view of the situations.

### Psychological Flexibility

Psychological flexibility, as defined by Steven Hayes, has been conceptualized as one's ability to be aware of present thoughts and feelings without defense, as well as the ability to persist in or change behavior as necessary to pursue goals (Kashdan & Rottenberg, 2010). It has been called a fundamental aspect of mental health and has been implicated as a unique contributor social functioning, openness to experience, mindfulness, and maintaining balance across multiple life domains (Kashdan & Rottenburg, 2010). Per the name of the construct, willingness to experience difficult internal experiences indicates that the individual possesses a greater sense of flexibility in terms of the range of sensations and experiences they are willing to feel, thereby providing the individual with a greater sense of choice and autonomy as they are able to

engage in fulfilling and rewarding behaviors in spite of negative internal experiences. This heightened flexibility and range of experience is, in turn, associated with better quality of life (Hayes, Strosahl, Wislon, & Bissett, 2004)

Many of the outcomes resultant from long-term mindfulness practice are similar to those associated with psychological flexibility and have been linked to increased psychological wellbeing and decreased symptoms of distress (Hayes et al, 2004). It is possible, given the overlap between psychological flexibility and mindfulness, that psychological flexibility may mediate the relation between mindfulness and psychological wellbeing, which Dodge, Daly, Huyton, and Sanders (2012) define as the sense that one possesses the psychological, social, and physical resources necessary to meet a particular challenge.

Likewise, the capacity to intentionally shift focus away from distressing or distracting stimuli so as to see the “bigger picture” of one’s surroundings, internal experiences, and the broader context in which these variables all exist, may provide one with a greater sense of than would be possible with a less mindful state of consciousness. One may also become more aware of positive life aspects that would have otherwise gone unnoticed, while managing to maintain a relatively grounded and well-regulated attitude toward more challenging or negative life aspects. The potential for this phenomenon to occur in individuals who regularly adopt mindful states of consciousness is particularly interesting when considering the effects that such an orientation toward one’s self and surroundings may have on gratitude.

## Gratitude

The construct of gratitude has been conceptualized both as an emotion and as a trait or disposition. From the emotion perspective, researchers have conceptualized gratitude as an emotion directly related to receiving support from others (McCullough, Kilpatrick, Emmons, & Larson, 2001). In this context, gratitude is an adaptive motivator of prosocial and altruistic behavior stemming from receiving assistance or support from others. Although this conceptualization may account for some of gratitude's qualities and functions, it appears to limit gratitude to a social context and does not fully account for all possible sources of gratitude. Wood, Froh, & Geraghty (2010) note that such a conceptualization excludes elicitors of gratitude which involve no obvious benefactor. For example, one may experience gratitude upon witnessing a particularly beautiful sunset, but such an emotion obviously does not stem from interaction with others.

Furthermore, such a conceptualization of gratitude does not fully account for the demonstrated relation between gratitude and personal wellbeing. Abramson, Seligman, and Teasdale (1978) postulate, per learned helplessness theory, that much of human wellbeing is attributed to cognitive interpretations of events. They note that individuals who attribute positive aspects of their lives to transient, uncontrollable, and external forces tend to experience lower wellbeing and are more prone to clinically pathological patterns of cognition and affect (e.g., depression, anxiety). Under McCullough and colleagues' interpretation of gratitude as a response stemming exclusively from receiving assistance and support from others, an individual may often experience gratitude while simultaneously experiencing a sense of helplessness and diminished wellbeing. Such a strict interpretation is not supported by the emerging gratitude literature, which indicates



a positive relation between gratitude and wellbeing (Wood et al., 2010). A robust conceptualization of gratitude must therefore account for instances in which gratitude appears to manifest as a more generalized sense of thankfulness for various aspects of life, rather than interpret gratitude as a strictly social emotion.

The propensity to be thankful and appreciative for positive aspects of life is referred to as trait gratitude or dispositional gratitude. Wood et al., (2010) note that gratitude is distinct from other positive emotions such as hope and optimism despite their shared orientation toward positive aspects of life. These other positive emotions are characterized by positive expectations for the future and the capacity to recognize pathways through which these positive outcomes may be achieved (Carver, Scheier, & Segerstrom, 2010; Tong, Fredrickson, Chan, & Lim, 2010). By contrast, gratitude does not involve expectation or other future-oriented cognitions. Rather, gratitude appears to be primarily characterized by appreciation of the positive aspects of life in the present moment. Such appreciation may or may not involve thankfulness for support from others. Appreciation for one's own assets—for example, basic necessities or good health—appreciation of beauty in everyday objects, or a general sense of thankfulness for the simple experience of living may all be regarded as manifestations of gratitude.

It is understandable that gratitude would be correlated with wellbeing. Indeed, gratitude has been characterized as among the most fundamentally positive emotions because of its inherent orientation toward appreciation and recognition of positive aspects of experience. This may be thought of as the opposite of a depressive outlook, which inherently involves minimized recognition of positive experience while emphasizing

negative evaluation of one's self and surrounding environment, and future (Beck, 1979; Wood, Maltby, Gillet, Linley, & Joseph, 2008).

Such a conceptualization of gratitude seems to be supported by the extant empirical literature. Wood, Joseph, and Maltby (2008) examined gratitude's relation to various facets of psychological wellbeing. In their study, gratitude was found to have medium to large positive correlations with multiple elements of psychological wellbeing, including environmental mastery, personal growth, positive relationships, purpose in life, and self-acceptance. It is interesting to note that these correlations cover a vast array of life domains that are not restricted to purely social interaction, indicating once again that gratitude may be best conceptualized as a dispositional personality trait rather than as a passing emotional response to interpersonal support. It is also worth noting that, in the same study, gratitude explained a significant amount of variance relating to psychological wellbeing, even after controlling for the 30 facets of the Big Five. This lends further evidence that gratitude makes a unique contribution to overall psychological wellbeing beyond that which is contributed by the Big Five traits (Wood et al, 2008).

Evidence indicates that gratitude contributes to life satisfaction on a eudemonic, rather than hedonic, level. Lambert, Fincham, Stillman, and Dean (2009) conducted a series of experimental manipulations and found that the empirical relation between gratitude and materialism is mediated by life satisfaction. Additionally, gratitude and materialism were found to be inversely related: Participants undergoing a manipulation designed to increase state gratitude indicated higher life satisfaction and lower levels of materialism, while participants in undergoing a manipulation to increase envy yielded lower life satisfaction and a greater degree of materialism. Such results are unsurprising

given that gratitude, by definition, invokes an experience of deep appreciation and thankfulness for the assets one already has. To be hedonically materialistic and perpetually in pursuit of new material pleasures would undoubtedly represent the inverse of a life orientation influenced by gratitude.

Given the body of evidence suggesting that gratitude contributes directly and uniquely to life satisfaction, it is understandable that researchers and clinicians would take interest in developing empirically supported methods to cultivate and increase gratitude. Wood et al. (2010) compiled and rated a variety of established gratitude interventions based upon a review of twelve peer-reviewed studies. Three primary categories of gratitude intervention were noted: gratitude listing or journaling (Emmons & McCullough, 2003; Seligman, Steen, Park & Peterson, 2005), grateful contemplation (Koo, Algoe, Wilson, & Gilbert, 2008; Wood et al., 2010; Watkins, Woodward, Stone, & Kolts, 2003), and behavioral expressions of gratitude. It is worth noting that these interventions seek to increase gratitude specifically and are designed accordingly. It is worth considering whether alternative interventions, including those already designed with other goals in mind, may consequently yield increases in gratitude as an additive effect.

### Psychological Wellbeing

A model of the construct of psychological wellbeing was proposed by Ryff and Keyes (1995). According to this seminal model, six factors compose mental wellbeing: Autonomy, self-acceptance, environmental mastery, positive relations with others, personal growth, and purpose in life. Ryff and Keyes note that many of these factors—in particular, those requiring the evaluation and pursuit of one's own goals—require a

considerable amount of discipline and self-sacrifice that is likely opposed to short-term happiness. Such a conceptualization of psychological wellbeing is therefore more in line with the hypothesis that cultivation of eudemonic happiness, rather than hedonic happiness, yields greater long-term satisfaction with life.

It is also noteworthy that gratitude may contribute to life happiness at a largely eudemonic level and may, in fact, be at odds with a purely hedonic approach to happiness. Whereas hedonic happiness defines psychological wellbeing in terms of the attainment of pleasure and the avoidance of negative experience (Ryan & Deci, 2001), gratitude and the pursuit of material assets appear to be inversely correlated (Lambert et al., 2009). By way of contrast, eudemonic happiness focuses primarily on self-realization, establishing meaning and purpose in one's own life, and defines wellbeing in terms of how effectively an individual is functioning given a set of circumstances, rather than how positively one is feeling at a given time (Ryan & Deci, 2001).

A noteworthy observation to be drawn from this distinction is that, while happiness and wellbeing are often used synonymously, the two terms often refer to separate constructs in the psychological literature. While happiness generally refers to a construct which has been empirically defined through quantitative investigation, wellbeing appears to refer to a broader construct which varies in definition by theoretical perspective and may take several different variables into account, one of which may be happiness (Delle Fave et al., 2011).

Other conceptualizations of wellbeing, in addition to the subjective and psychological wellbeing dichotomy, include the Broaden-and-Build theory of positive emotions (Fredrickson, 2001). This theory proposes that experienced positive emotions

briefly increase thought-action repertoires, thereby broadening the creative array of possible actions an individual may think of or in which they might choose to participate (Fredrickson, 1998). For example, the experience of romantic love calls forth the desire to explore and enjoy new and meaningful experiences with one's romantic partner (Fredrickson, 2001). Likewise, experiencing psychological flow stemming from interested engagement in a given activity increases psychological openness toward experimentation, playfulness, and creativity when engaging in such enjoyable activities. By way of contrast, threatening or extremely unenjoyable stimuli narrow thought-action repertoires to promote immediate decision-making related to whether one will confront or escape from the unpleasant stimuli.

The Broaden-and-Build theory posits that an increased urge to engage in new and meaningful activities that results from positive emotion yields, over time, an increase in personal resources as one learns new skills, obtains new life experiences, learns new information, and obtains a greater degree of resilience against future negative emotions. This increase in personal resources further facilitates future proactive engagement in activities that yield positive emotion, creating a positive feedback loop in which one continually orients themselves toward experiencing enjoyment as a result of increasing one's own functioning. This loop is referred to as an "upward spiral" (Fredrickson, 2001) and conceptualizes one route by which the repeated experience of meaningful positive emotions may lead to increased autonomy and, ultimately, flourishing in life. In this regard, the Broaden-and-Build model may suggest a mechanism by which hedonic happiness (i.e., immediately fulfilling and rewarding pleasure) may, over time, facilitate

increased engagement in proactive behavior which facilitates and builds toward eudemonic wellbeing.

Notably, Fredrickson (2001) posits that contentment, despite its seemingly passive nature, broadens thought-action repertoires by creating the urge to enjoy and engage with one's current life circumstances, using and integrating these experiences into newer and increasingly positive views of oneself and the world they inhabit. This line of thought is of particular relevance to the present study, given the considerable connection between satisfaction with life and gratitude (Lambert et al., 2009; Park et al., 2004; Wood et al., 2009; Wood et al., 2010).

#### Mindfulness and Gratitude

O'Leary and Dockray (2015) note that mindfulness and gratitude both are positively correlated with wellbeing in a variety of populations. While mindfulness has been utilized to positive effect in a myriad of clinical settings and populations, a considerable body of research indicates that mindfulness has positive benefits for otherwise healthy individuals as well. Howell, Digdon, and Buro (2010) found that mindfulness was both directly and indirectly related to sleep regulation and wellbeing in a large sample of undergraduates, indicating that mindfulness may facilitate healthy self-regulatory habits that buffer against stress and other risk factors for the development of psychological disorders. Brown and Ryan (2003) provided further evidence for this assertion when they found mindfulness to be positively associated with overall happiness and life satisfaction, as well as negatively associated with depression and anxiety. Shapiro, Astin, Bishop, and Cordova (2005) found an eight-week mindfulness-based stress reduction program to be effective in reducing stress as well as increasing quality of

life and self-compassion in healthcare professionals, further indicating the efficacy of mindfulness in improving quality of life and buffering against stress and other mental illness risk factors in individuals who may be at higher risk of burnout or stress-related illness. Numerous studies have documented the benefits of mindfulness (Brown, Creswell, & Ryan, 2015; Chambers et al, 2009; Grossman et al, 2004; Hayes, Follette, & Linehan, 2004).

Conversely, gratitude has not been as widely used in mental health-related interventions as mindfulness (O’Leary & Dockray, 2015). Interestingly, however, there is an increasingly large body of evidence supporting many of the same associations between gratitude and a number of mental health-related outcomes as mindfulness. For example, Kendler et al. (2003) found thankfulness—a term often used synonymously with gratitude—to predict lower levels of both internalizing and externalizing disorders, including depression, anxiety, and substance use disorders. Wood et al. (2007) found gratitude to be closely associated with lower levels of stress and depression as well as higher levels of life satisfaction, health-promoting behaviors, and overall positive affect, noting that these associations yield noteworthy implications for gratitude’s efficacy when used in the context of a clinical intervention.

A growing body of evidence exists suggesting that mindfulness and gratitude, though separate constructs, appear to reciprocally yield similar benefits. For example, both gratitude and trait mindfulness were found to both buffer against risk factors implicated in problem gambling in a large sample of Taiwanese Chinese students and community members (Loo, Tsai, Raylu, & Oei, 2014). In particular, gratitude was associated with lower instances of problem gambling, gambling-related cognitions, and

gambling-related urges. Likewise, higher levels of mindfulness predicted lower levels of involvement in problem gambling behaviors among males. It is unclear whether these buffering effects were due to effects specific to mindfulness (e.g., greater emotional and behavioral regulation) versus gratitude, effects overlapping across mindfulness and gratitude (e.g., broader perspective of one's life, increased appreciation for one's existing possessions), or a combination of the two. Nonetheless, both were found beneficial in protecting against problem behaviors.

In an experimental comparison of an at-home mindfulness-based intervention versus a gratitude intervention, both mindfulness and gratitude significantly decreased stress and depression while increasing happiness relative to a control group over a five-week duration (O'Leary & Dockray, 2015). Interestingly, the gratitude intervention was most effective at reducing stress, while the mindfulness intervention most effectively increased happiness and reduced levels of depression. It is therefore possible, based upon the above research, that mindfulness and gratitude may both yield similar benefits through similar pathways. It is yet unclear what drives this association between mindfulness and gratitude. Two possibilities include that the two variables are associated due to a synergistic effect or that both variables have reciprocal effects on each other.

As noted by Brown et al. (2007), higher levels of mindfulness yield an increased capacity to intentionally shift the focus of one's attention away from individual and immediate stressors and toward the larger context of one's life experience, often resulting in a heightened sense of cohesion and connectivity with other people, as well as one's own immediate and larger environment. In addition to this heightened sense of connectivity, intentionally shifting one's awareness away from immediately perceived



stressors may promote mental states in which one becomes more aware of positive aspects of their life that would otherwise have gone unnoticed. Therefore, it is reasonable to predict increasing mindfulness may yield greater awareness of the positive aspects present in one's life, which in turn generates increased life satisfaction and overall levels of positive affect. This would suggest gratitude as a possible mechanism through which mindfulness relates to wellbeing.

### Proposed Study and Hypotheses

In sum, the present body of research on both mindfulness and gratitude indicates that both qualities yield similar, but perhaps some distinct, benefits, including increased life satisfaction and positive affect, as well as lower levels of negative affect and a decreased risk of anxiety and depression. Based upon the theoretical underpinnings of mindfulness, psychological flexibility, and gratitude, it is possible that the two constructs share a considerable degree of qualitative overlap, particularly insofar as they both involve a greater capacity to engage in non-reactive, non-judgmental awareness of stressors. This ability to reorient attentional focus allows one to avoid preoccupation or rumination about such stressors, ultimately allowing one to pay equal or greater attention to positive life elements, such as appreciation for aspects of life one may not have noticed if not in a mindful or gracious frame of mind. Because of the degree to which mindfulness appears to activate many of the cognitive mechanisms associated with gratitude, it is possible that implementing a mindfulness intervention may consequently increase gratitude, and that one or both variables may, in turn, increase overall satisfaction with life and perceptions of social support and connectedness. As yet, however, no research has attempted to directly investigate such an effect. Thus, the

purpose of the present study was to evaluate gratitude and psychological flexibility as possible mediators of the positive outcomes of a mindfulness intervention.

O’Leary and Dockray (2015) note that mindfulness interventions generally involve a considerable time commitment, with most standard mindfulness-based stress reduction interventions taking at least eight weeks to complete. This, unfortunately, limits the utility of many mindfulness-based interventions for those with relatively little free time or incentive to participate in interventions involving a large time commitment. Relative to time-intensive mindfulness interventions lasting up to multiple months, few studies to date have assessed the efficacy of brief, at-home mindfulness interventions, despite the growing popularity of such practices among the general public (Brown et al., 2007; Joiner, 2017). Further investigation into the degree to which these practices garner positive benefits, relative to more expensive and time-intensive interventions (e.g., ten-day mindfulness retreats, weekly mindfulness-based stress reduction groups lasting eight or more weeks) are necessary to assess the degree to which brief, at-home mindfulness interventions can significantly improve wellbeing in both an accessible and cost-effective manner.

The present study proposed three hypotheses: First, it was hypothesized that a brief mindfulness intervention designed to be completed at home, on a daily basis, over the span of ten days, would lead to an increase in trait gratitude (Hypothesis A). Second, it was hypothesized that completion of the mindfulness intervention would lead to increased satisfaction with life (Hypothesis B). Third, it was hypothesized that changes in gratitude and psychological flexibility occurring secondary to the mindfulness

intervention would partially mediate the relation between mindfulness and psychological wellbeing (Hypothesis C).

## CHAPTER II – METHOD

### Participants

To be eligible for participation in the study, participants were required to be 18 years or older and must have reported no prior history of formal training in mindfulness or meditation techniques. Formal training was defined, for the purpose of this study, as ever having attended formal meditation training (e.g., meditation sitting groups, retreats, or seminars) for more than a month, having ever attended a meditation retreat lasting ten or more days, or having ever engaged in an at-home meditation practice for more than a month at a time. These eligibility criteria were adapted from Arch & Craske (2006) who induced mindfulness in inexperienced participants in a laboratory setting. Participants were also required to own a smartphone capable of downloading and installing applications from online app stores or to have consistent access to the internet via a personal computer.

A total of 158 participants chose to participate in the study. Of these participants, 29 dropped out after the first round of data collection, with an additional 41 dropping out after the second round of data collection. In total, 88 participants completed mindfulness training. Of these participants, 77 completed follow-up measures, thus completing the entire study. Participants were recruited from the community after responding to advertisements posted in a university-wide mailing list, as well as through advertisements posted on social media webpages and at local yoga studios and massage therapy centers. The final sample was 81% female (n = 128) and 82.3% White (n = 130), 8.2% African-American (n = 13), 2.5% Native American (n = 4), 2.5% Asian or Asian-American (n = 4), 1.3% Pacific Islander (n = 2), and 3.2% Other (n = 5). Participant ages ranged from 18

to 68, with a mean age of 34.76 ( $SD = 14.39$ ). 44.9% of participants reported having been treated for psychological adjustment difficulties (e.g., anxiety, depression) with therapy or medication in the last two years.

## Materials

### *Philadelphia Mindfulness Scale*

Trait mindfulness was assessed using the Philadelphia Mindfulness Scale (PHLMS; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008). The PHLMS is a bidimensional measure developed to assess two key components of mindfulness via two independent subscales: present-moment awareness and acceptance (Cardaciotto et al., 2008). The scale consists of two ten-item subscales measuring awareness and acceptance, respectively. Each item is rated on a 5-point Likert-type scale (1 = never, 5 = very often) according to the frequency with which they experienced the described item over the past week (Cardaciotto et al., 2008). Both the awareness subscale and acceptance subscale demonstrated very good internal consistency in a sample of 204 nonclinical undergraduates, with Cronbach's alpha coefficient of .81 and .85 respectively. The scale has demonstrated convergent, discriminant, concurrent, and predictive validity across both clinical and normal undergraduate populations (Quaglia, Brown, Lindsay, Creswell, & Goodman, 2015). To obtain the score for each subscale, all appropriate items are totaled and reverse scored where indicated. Higher scores reflect higher levels of awareness and acceptance (Cardaciotto et al., 2008).

This particular measure was used because of its demonstrated reliability and validity with non-clinical undergraduate populations. Furthermore, the PHLMS is the only published mindfulness scale to contain separate subscales for both awareness and

acceptance. Interestingly, these subscales, while both reliable and valid, do not share a significant correlation, indicating that awareness and acceptance may be two different constructs making up the broader concept of mindfulness. Coefficient alpha for the PHLMS at baseline was .81.

*Gratitude Resentment and Appreciation Test (GRAT)*

To measure dispositional gratitude, the GRAT (Watkins, Woodward, Stone, & Kolts, 2003) was administered. The GRAT is a multidimensional measure consisting of 44 items answered on a 9-point Likert scale. The GRAT measures three factors, including the degree to which the participant experiences a sense of personal abundance, appreciation for simple life pleasures, and appreciation of others' contributions to one's own life. While there is not a subscale on the GRAT which measures resentment as a discrete construct, a number of items on the GRAT are reverse scored, indicating the degree to which individuals feel a sense of enviousness or resentment which lies opposite to gratitude on the dimensional scale ranging from resentfulness to gratefulness. This dimension is defined as the range between a "sense of deprivation" to a "sense of abundance" when scoring the measure. Consistent with the most common conceptualization of gratitude existing today, the GRAT has been derived from a conceptualization of gratitude as a characterological orientation toward thankfulness and recognition of meaningfully positive aspects of one's life, rather than as a transient emotional response to environmental events or social interaction. The full measure has been deemed to have good internal consistency, with a coefficient alpha of .92 in a sample of 237 undergraduate college students (Watkins et al., 2003). Likewise, each factor of the GRAT has been determined to have adequate internal consistency as

measured by coefficient alphas ranging from .76 to .90. The GRAT has been normed using over 1,100 participants across six differing student populations. Coefficient alpha for the GRAT at baseline was .94.

#### *Gratitude Adjective Checklist (GAC)*

The GAC is a brief scale used to measure dispositional gratitude (McCullough, et al., 2002; McCullough, Tsang, & Emmons, 2004). Participants are asked to rate how accurately three gratitude-related adjectives (grateful, thankful, and appreciative) describe them on a nine-point Likert scale. The measure has demonstrated a strong internal consistency reliability of .87 in a sample of 1,228 adult volunteers (M age = 44.6, SD = 12.0, Range = 18-75) (McCullough et al., 2002). The measure was adapted for the current study to measure state, rather than dispositional, gratitude. Rather than asking participants to report on how strongly they felt each of the three emotions on a broad, day-to-day basis, participants were asked to report how intensely they felt each of the three emotions at the moment they were taking the questionnaire. Coefficient alpha for the GAC at baseline was .98.

#### *Ryff's Psychological Wellbeing Scales (RPWS) – 42-Item Version*

The RPWS has been used extensively in a variety of settings and samples, both normative and clinical, since its first publication as a means of measuring psychological wellbeing. The current and most commonly used version of the scales measures six theoretically related constructs of psychological wellbeing: autonomy, environmental mastery, personal growth, positive relationships with others, purpose in life, and self-acceptance (Abbott et al., 2006). The 42-item version of the measure has been recommended for use by the author of the scales and has been found to have strong

predictive validity in measuring mental health outcomes a year after administration, with the items loading onto the environmental mastery factor having a particularly high degree of impact on its external validity (Abbott, et al., 2006). Various subscales of the measure have been shown to significantly predict positive outcomes on other measures. For instance, the self-acceptance subscale of the RPWS has been found to predict satisfaction with life ( $r = .71$ ; Ryff, 1989), while the environmental mastery subscale has been found to predict life satisfaction ( $r = .61$ ) and affect balance ( $r = .62$ ; Ryff, 1989). The validity of the measure has been replicated in multiple studies (Ryff & Keyes, 1995; Abbott et al., 2006) and the original item pool has been shown to have high internal consistency, with coefficient alphas of the six factors ranging from .86 to .93. Test-retest reliability has also been determined to be adequate, with coefficient alphas of the six factors ranging from .81 to .88 (Ryff, 1989). Coefficient alpha at baseline for the RPWS was .92.

#### *Satisfaction with Life Scale (SWLS)*

The SWLS is a brief, five-item self-report questionnaire assessing psychological wellbeing and overall satisfaction with life. Each item is rated on a 7-point Likert scale. It has been found to have a high internal consistency, with an alpha of .87, alongside high test-retest reliability ( $r = .82$ ) (Diener, Emmons, Larsen, & Griffin, 1985). A body of evidence exists suggesting that the measure exhibits good construct and concurrent validity, with scores on the SWLS correlating moderately to highly with at least ten other measures of subjective wellbeing and affect (Pavot, Diener, Colvin, & Sandvik, 1991). Research has also indicated that individuals tend to respond in a relatively forthright manner to the items on the SWLS, and that the measure does not appear to evoke a social desirability response set (Pavot et al., 1991). The SWLS has also been shown to



negatively correlate with personality characteristics associated with low satisfaction with life, such as neuroticism and emotionality, while positively correlating with personality characteristics associated with higher satisfaction with life, such as sociability (Pavot et al., 1991). This measure was used as a supplemental measure of psychological wellbeing alongside the RPWS and AAQ (described below). Coefficient alpha at baseline for the SWLS was .90.

#### *Acceptance and Action Questionnaire (AAQ)*

The AAQ is a 9-item measure of psychological flexibility (Hayes et al., 2004). Notably, lower scores on the AAQ indicate higher levels of psychological flexibility. As such, all items on the AAQ were reverse-keyed during analysis such that results would be more intuitive to the reader, with higher scores on the AAQ instead indicating greater psychological flexibility for the current study. The AAQ is presently used as a measure of this construct and has been shown to correlate moderately to highly with the both the Beck Depression Inventory (.36 to .72) and Beck Anxiety Inventory (.35 to .58). In a sample of 290 undergraduate students, test-retest reliability was found to be .64 four months after initial administration of the measure (Hayes et al., 2004). Likewise, significant correlations have been found between the AAQ and multiple measures of psychological wellbeing and overall health, such as the General Health Questionnaire—12, Quality of Life Inventory, Brief Symptom Inventory, and the Job Induced Tension Scale. As such, the AAQ was used both as a measure of psychological flexibility and as a supplemental measure of psychological wellbeing due to its measured construct's close association with psychological wellbeing. Coefficient alpha at baseline for the AAQ was .76.

### *Depression, Anxiety, and Stress Scales (DASS-21)*

The DASS-21 (Lovibond & Lovibond, 1995) is a brief clinical assessment instrument that measures the three related constructs of depression, anxiety, and stress. It consists of 21 items and takes approximately three minutes to complete. The measure is considered a valid and reliable indicator of these three constructs and each subscale can be interpreted independently of the other two. The depression scale has a .74 reported correlation with the Beck Depression Inventory, while the anxiety scale has a reported correlation of .81 with the Beck Anxiety Inventory (Lovibond & Lovibond, 1995). The measure was used to supplement measures of positive affect and wellbeing and to measure whether the intervention produced reductions in negative affective states. Coefficient alphas at baseline for the Depression, Anxiety, and Stress scales were .90, .81, and .85, respectively. Baseline scores on the DASS-21 indicated that the average participant experienced severe to extremely severe symptoms of depression, anxiety, and stress, compared to norm groups.

### Headspace

Headspace is a widely available digital application that provides mindfulness and meditation training and has been downloaded over 11 million times as of January 2017 (Headspace, 2017). Training is provided via recorded guided meditations. While the majority of the application's content requires a paid subscription, the first ten lessons, intended for beginners to use daily over a ten-day period, are available free of charge. Completion of this ten lesson package, which takes approximately ten minutes per day to complete was found to significantly improve wellbeing, increase positive affect, as well as decrease depression in a sample of 121 predominately White (90.1%) adults ( $M$  age =

40.7,  $SD = 10.6$ ) (Howells, Ivtzan, & Eiroa-Orosa, 2016). Other research utilizing the Headspace application has found that it can increase compassionate responding (Lim, Condon, & DeSteno, 2015), and one review of mindfulness-based phone applications found Headspace to have the highest quality and usability out of 23 mindfulness training applications for smartphone (Mani, Kavanagh, Hides, & Stoyanov, 2015).

### Procedure

The study and all included procedures were approved by the Institutional Review Board at The University of Southern Mississippi (see Appendix F) After responding to a link contained in advertisements for the study, interested individuals were directed to a webpage containing a summary of the study and were given the option to provide their email addresses so a link to the first survey used in the study could be emailed to them. Participants were sent a link to the Qualtrics web-based survey system, where the informed consent, screening questions, and the PHLMS, GRAT, RPWS, SWLS, AAQ, and DASS-21 were administered. No face-to-face contact with the principal investigator was necessary, as all experimental manipulations and measures were administered either online or via smartphone application.

Each participant's involvement in the experiment lasted approximately 31 days. The study used a within-subjects longitudinal design, and therefore a double-baseline was incorporated to evaluate and control for the potential effect of time on the outcome measures (Christ, 2007). After completing the first survey via Qualtrics, participants were instructed to wait seven days, after which time the same survey was sent to them to complete a second time.

After completing the second survey, participants were instructed to download and immediately begin using the Headspace app. Instructions were delivered to participants which included screenshot images to explain relevant application features and guide participants through the process of downloading and utilizing the included exercises. Participants were encouraged to begin utilizing the application, beginning with the first of the ten meditations, immediately, and to engage in using each of the ten exercises, once per day, over the next ten days. They were notified that an email would be sent in ten days containing follow-up measures. On the eleventh day, participants were emailed a message informing them that it had been ten days since they were given instructions on how to use Headspace. The email contained a link to a third survey where the PHLMS, GRAT, RPWS, SWLS, AAQ, and DASS-21 were administered a third time, in the event that participants have already completed ten days of Headspace use as requested. Participants were notified that, if they had not yet completed their ten days of use, to continue using the app for all ten days before completing post-training measures.

Fourteen days after completing the third survey a final email was sent to participants containing a link to follow-up measures, consisting of the measures previously administered. Eligible participants were given the option at this time to provide contact information in the event that they wish to be entered into the drawing for gift cards ranging from \$20-50. Eleven of the 77 eligible participants won the drawing. Participants had the opportunity to email the researcher with questions about the study at any time.

## CHAPTER III - RESULTS

### Statistical Analysis

All outcome data were examined for skewness and kurtosis at each time point. Depression and anxiety were non-normally distributed, with skewness ranging from 1.12 to 1.83 between time points two and four. Likewise, anxiety at times three and four indicated high kurtosis values of 3.92 and 3.25, respectively. Distributions of all other outcome data were within relatively normal ranges, with skewness ranging between -1 and 1 and kurtosis ranging between -3 and 3.

Response validity and missing data were also assessed. Data from participants who took less than fifteen minutes to complete the first survey would not be used in the final analyses. No participants took under fifteen minutes to complete any surveys. Therefore, no adjustments for response validity were necessary. For the purposes of conducting an intention-to-treat analysis, the last observed case for any given participant was carried forward such that the last observed case was treated as their final outcome for all subsequent time points. When conducting analyses with only individuals who completed all parts of the study, missing data were removed casewise, given the size of the dataset and the low incidence of missing data (i.e., individuals who did not withdraw from the study partway through completing a survey produced complete surveys in nearly all cases). In both the intention-to-treat analysis and analysis with only those who completed the full study, data from participants who partially completed the first survey and then withdrew participation before reaching the end of the survey were deleted listwise such that none of their data were used in final analyses.

Statistical analysis then proceeded with a series of correlations between trait mindfulness and all outcome variables (i.e., gratitude, wellbeing, and DASS-21 scores) to assess for potential covariates to be used in subsequent analyses. If trait mindfulness at time 1 correlated with any outcome variables, it was to be entered as a covariate in subsequent MANOVA and ANOVA analyses of that variable. An independent samples t-test was used to assess whether White and African-American respondents, as well as male versus female respondents, differed significantly in their responses to any outcome measures. Likewise, correlations were examined between age and all outcome variables. Age was entered as a covariate in all ANCOVA analyses which used outcomes variables that correlated significantly with age as the independent variable.

To provide a precise and unbiased estimate of mean differences during subsequent analyses, change scores were calculated for the differences between Times two minus one (Time 2-1), three minus two (Time 3-2), and four minus two (Time 4-2). These change scores were used in a one-way repeated measures MANCOVA to assess for effects of the mindfulness intervention on each of the outcome variables. Because trait mindfulness did not show any statistically significant interactions with time in the MANCOVA, the analysis was re-run as a MANOVA, without trait mindfulness used as a covariate. A series of follow-up ANOVA's and ANCOVAs were then used to examine each isolated time point identified as significant in the MANOVA. These analyses were first conducted only with individuals who completed the full study. They were then repeated using an intention-to-treat analysis, in which the last data values provided by participant drop-outs were carried forward into subsequent time points, such that the last observed scores of drop-outs were treated as their final outcome for all subsequent time

points. As a result, change scores for these drop-out participants equaled zero for time points following their point of withdrawal from the study. Change score means and standard deviations for individuals who completed the full study are found in Table 1, while means and standard deviations for individuals included in the intent-to-treat analysis are found in Table 2.

A mediational analysis was conducted to assess the mediating effects of changes in gratitude and psychological flexibility on the relation between changes in trait mindfulness and psychological wellbeing. The analysis was conducted using change scores calculated as the difference between Times two and three to assess whether the mindfulness intervention altered the mediating effect. PHLMS scores served as an indicator of trait mindfulness, while the six subscales of Ryff's Psychological Scales of Wellbeing comprised a latent variable, Wellbeing. The mediators of these two variables were defined as GRAT scores, indicating trait gratitude, and AAQ scores, indicating psychological flexibility.

#### Correlations of Trait Mindfulness with Dependent Variables

Table 3 presents the correlations were used to examine the relation between trait mindfulness, as measured by the PHLMS, and all outcome variables (GRAT, Ryff's Scales of Psychological Wellbeing, AAQ, SWLS, GAC, DASS-21 subscales) at Time 1.

As seen in Table 3, positive correlations were found between trait mindfulness and trait gratitude  $r(151) = .382, p < .01$ ; psychological wellbeing,  $r(150) = .422, p < .01$ ; psychological flexibility,  $r(150) = .487, p < .001$ ; and satisfaction with life,  $r(151) = .321, p < .001$ . Likewise, negative correlations were found between trait mindfulness and depression,  $r(146) = -.292, p < .001$ ; anxiety,  $r(146) = -.315$ ; and stress,  $r(146) = -.451$ ,

Table 1 *Means and Standard Deviations of Change Scores for Completers*

Variable	Time 2 - 1		Time 3 - 2		Time 4 - 2	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Trait Mindfulness (PHLMS)	0.94	5.756	7.33	7.533	8.64	8.646
Trait Gratitude (GRAT)	2.11	18.174	14.59	22.454	11.20	22.768
Psychological Wellbeing (RPWS)	1.30	12.586	7.68	15.001	9.12	15.310
Psychological Flexibility (AAQ)	0.45	4.670	2.29	5.614	2.62	5.481
Satisfaction with Life (SWLS)	0.31	3.509	1.78	4.007	1.84	4.469
Gratitude Adjective Checklist (GAC)	-0.09	2.147	0.34	1.780	0.55	1.814
Depression (DASS-21)	-0.46	8.888	-2.93	7.488	-2.29	8.439
Anxiety (DASS-21)	-0.46	7.679	-1.93	7.165	-0.61	8.824
Stress (DASS-21)	-0.57	8.905	-4.30	8.958	-2.66	7.627



Table 2 Means and Standard Deviations of Change Scores for Intention-to-Treat Analysis

Variable	Time 2 - 1		Time 3 - 2		Time 4 - 2	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Trait Mindfulness (PHLMS)	0.75	5.166	4.11	6.706	4.24	7.428
Trait Gratitude (GRAT)	1.67	16.161	8.18	18.274	5.42	16.755
Psychological Wellbeing (RPWS)	1.02	11.143	4.25	11.778	4.36	11.492
Psychological Flexibility (AAQ)	0.32	3.927	1.20	4.205	1.18	3.897
Satisfaction with Life (SWLS)	0.24	3.106	1.00	3.121	0.89	3.234
Gratitude Adjective Checklist (GAC)	-0.07	1.892	0.19	1.340	0.27	0.103
Depression (DASS-21)	-0.36	7.830	-1.61	5.717	-1.11	5.963
Anxiety (DASS-21)	-0.36	6.765	-1.06	5.376	-0.29	6.126
Stress (DASS-21)	-0.45	7.847	-2.36	6.952	-1.29	5.454

Table 3 Means, Standard Deviations, and Intercorrelations for Trait Mindfulness and Eight Dependent Variables at Baseline

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Trait Mindfulness (PHLMS)	68.82	10.32	-								
2. Trait Gratitude (GRAT)	309.67	47.64	.382**	-							
3. Psychological Wellbeing (RPWS)	184.97	26.26	.422**	.650**	-						
4. Psychological Flexibility (AAQ)	33.36	8.09	.487**	.535**	.602**	-					
5. Satisfaction with Life (SWLS)	23.40	6.99	.321**	.656**	.686**	.600**	-				
6. Gratitude Adjective Checklist (GAC)	14.59	2.14	.020	.191*	.174*	.024	.104	-			
7. Depression (DASS-21)	25.20	9.40	-.292**	-.458**	-.593**	-.492**	-.528**	-.016	-		
8. Anxiety (DASS-21)	23.17	9.23	-.315**	-.323**	-.434**	-.498**	-.412**	.107	.581**	-	
9. Stress (DASS-21)	30.72	10.10	-.451**	-.358**	-.510**	-.521**	-.445**	-.062	.639**	.712**	-

Note: \*  $p < .05$ , \*\*  $p < .01$

$p < .001$ . There was no correlation between trait mindfulness and state gratitude measured by the GAC.

Because there was a significant correlation between mindfulness and all but one outcome variables, PHLMS scores were entered as a covariate during the initial MANCOVA analysis. Correlations between trait mindfulness and all other outcome variables at Times 2, 3, and 4 can be found in Tables 4, 5 and 6 respectively.

#### Demographic Differences Across Dependent Variables

Demographic differences (ethnicity, age, gender) were examined to assess whether specific demographic groups scored significantly different than others on any given outcome variables. An independent samples t-test assessed whether White and African-American respondents, as well as male versus female respondents, differed significantly in their responses to any outcome measures. Significant differences were found between men ( $M = 169.75$ ,  $SD = 26.82$ ) and women ( $M = 182.29$ ,  $SD = 26.50$ ) on baseline scores for psychological wellbeing,  $t(150) = -2.26$ ,  $p = .03$ . Likewise, men ( $M = 284.28$ ,  $SD = 36.35$ ) differed significantly from women ( $M = 306.52$ ,  $SD = 46.51$ ) on scores for gratitude,  $t(151) = -2.41$ ,  $p = .02$ . As a result, gender was entered as a covariate in subsequent ANCOVA analyses of psychological wellbeing and gratitude. There were no significant differences between White and African-American participants.

Likewise, correlations were examined between age and all outcome variables. Significant correlations were found between age and anxiety,  $r(146) = -.345$ ,  $p < .001$ ; depression,  $r(146) = -.251$ ,  $p = .002$ ; stress,  $r(146) = -.217$ ,  $p = .008$ ; psychological flexibility,  $r(150) = .309$ ,  $p < .001$ ; psychological wellbeing  $r(150) = .219$ ,  $p = .007$ ; and

Table 4 Means, Standard Deviations, and Intercorrelations for Trait Mindfulness and Eight Dependent Variables at Time 2

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Trait Mindfulness (PHLMS)	64.29	12.47	-								
2. Trait Gratitude (GRAT)	313.79	51.22	.387**	-							
3. Psychological Wellbeing (RPWS)	186.49	26.95	.501**	.670**	-						
4. Psychological Flexibility (AAQ)	32.29	8.29	.600**	.666**	.758**	-					
5. Satisfaction with Life (SWLS)	24.11	6.97	.375**	.690**	.669**	.681**	-				
6. Gratitude Adjective Checklist (GAC)	14.33	2.10	.084	.268**	.160*	.082	.148	-			
7. Depression (DASS-21)	24.67	10.26	-.371**	-.499**	-.616**	-.549**	-.534**	-.184*	-		
8. Anxiety (DASS-21)	22.77	9.43	-.215**	-.308**	-.416**	-.518**	-.292**	.032	.546**	-	
9. Stress (DASS-21)	30.43	10.26	-.398**	-.393**	-.466**	-.591**	-.406**	-.113	.690**	.679**	-

Note: \*  $p < .05$ , \*\*  $p < .01$

Table 5 Means, Standard Deviations, and Intercorrelations for Trait Mindfulness and Eight Dependent Variables at Time 3

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Trait Mindfulness (PHLMS)	72.00	10.92	-								
2. Trait Gratitude (GRAT)	327.45	46.58	.511**	-							
3. Psychological Wellbeing (RPWS)	193.61	28.21	.576**	.758**	-						
4. Psychological Flexibility (AAQ)	30.45	8.38	.691**	.652**	.782**	-					
5. Satisfaction with Life (SWLS)	25.80	6.25	.386**	.603**	.665**	.650**	-				
6. Gratitude Adjective Checklist (GAC)	14.67	2.04	.018	.328**	.284**	.116	.196	-			
7. Depression (DASS-21)	21.63	8.31	-.504**	-.598**	-.667**	-.659**	-.429**	-.166	-		
8. Anxiety (DASS-21)	20.77	6.32	-.376**	-.577**	-.556**	-.534**	-.431**	.034	.625**	-	
9. Stress (DASS-21)	25.65	8.27	-.581**	-.540**	-.589**	-.641**	-.477**	-.137	.692**	.665**	-

Note: \*  $p < .05$ , \*\*  $p < .01$

Table 6 Means, Standard Deviations, and Intercorrelations for Trait Mindfulness and Eight Dependent Variables at Time 4

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Trait Mindfulness (PHLMS)	72.99	11.23	-								
2. Trait Gratitude (GRAT)	324.99	49.16	.517**	-							
3. Psychological Wellbeing (RPWS)	195.66	28.37	.592**	.730**	-						
4. Psychological Flexibility (AAQ)	29.88	7.96	.689**	.648**	.789**	-					
5. Satisfaction with Life (SWLS)	25.95	6.73	.427**	.642**	.739**	.685**	-				
6. Gratitude Adjective Checklist (GAC)	14.88	2.22	.044	.338**	.284**	.133	.180	-			
7. Depression (DASS-21)	22.24	9.25	-.501**	-.600**	.196	-.589**	-.487**	-.210	-		
8. Anxiety (DASS-21)	22.19	9.10	-.422**	-.567**	-.503**	-.587**	-.395**	-.198	.669**	-	
9. Stress (DASS-21)	27.71	10.23	-.577**	-.515**	-.626**	-.653**	-.520**	-.131	.732**	.742**	-

Note: \*  $p < .05$ , \*\*  $p < .01$

gratitude,  $r(151) = .253, p = .002$ . As a result, age was entered as a covariate in subsequent ANCOVA analyses of the above variables.

#### Drop-Out Analysis

Given the approximately 51% rate of attrition from the study, predictors of participant drop-out were analyzed. A chi-square test was conducted on data from the second, third, and fourth rounds of data collection to examine whether prior treatment for psychological difficulties, gender, or ethnicity predicted dropout. An independent samples t-test was conducted at the same time points to examine whether age predicted dropout. None of these demographic variables were found to be significant predictors of attrition.

#### Omnibus Test of Mindfulness Intervention Effects

To assess the effect of the mindfulness intervention on the eight dependent variables, a one-way repeated measures MANCOVA was conducted using the three change scores previously calculated for each outcome variable, with trait mindfulness (PHLMS) entered as a covariate. A Greenhouse-Geisser correction was used to account for violation of the assumption of sphericity on the MANCOVA and all subsequent analyses. There was no statistically significant within subjects interaction between trait mindfulness and time (Wilks'  $\lambda = .749, F(16, 47) = .982, p = .491, \text{partial } \eta^2 = .251$ ). To adjust for this finding, the analysis was re-run as a MANOVA without trait mindfulness as a covariate. A significant multivariate effect was observed (Wilks'  $\lambda = .657, F(16, 48) = 1.563, p = .117, \text{partial } \eta^2 = .343$ ). The results of the MANOVA and follow-up ANOVAs are presented in Table 7.

Table 7 Means, Standard Deviations, and Analyses of Variance for the Effects of Mindfulness Intervention on Eight Dependent Variables

Variable	Time 1		Time 2		Time 3		Time 4		F	p	Partial eta <sup>2</sup>
	M	SD	M	SD	M	SD	M	SD			
Trait Mindfulness (PHLMS)	63.89	10.33	64.51	12.49	71.96	10.99	73.13	11.22	28.029	<.001	.272
Trait Gratitude (GRAT)	310.16	47.52	314.55	51.31	327.45	46.58	325.75	49.28	0.281	.664	.004
Psychological Wellbeing (RPWS)	184.37	26.35	186.56	26.77	193.36	28.10	195.42	28.08	0.188	.770	.003
Psychological Flexibility (AAQ)	33.29	8.06	32.20	8.28	30.45	8.38	29.66	8.14	2.031	.150	.031
Satisfaction with Life (SWLS)	23.47	6.98	24.17	6.95	25.80	6.25	26.01	6.71	1.723	.190	.023
Gratitude Adjective Checklist (GAC)	14.62	2.14	14.37	2.10	14.67	2.04	14.92	2.24	3.188	.059	.041
Depression (DASS-21)	25.37	9.45	24.55	10.24	21.63	8.31	22.26	9.19	5.445	.013	.069
Anxiety (DASS-21)	23.32	9.25	22.68	9.40	20.77	6.32	22.08	9.08	2.253	.126	.030
Stress (DASS-21)	30.74	10.03	30.21	10.37	25.65	8.27	27.55	10.25	5.686	.010	.072



Univariate ANOVAs were used as a follow-up analysis, examining the effect of the intervention on all eight outcome variables separately.

#### Effect of Mindfulness Intervention on Trait Mindfulness Change Scores

A follow-up ANOVA was conducted to examine the effect of the mindfulness intervention on PHLMS scores. A significant effect was found,  $F(1.420, 106.496) = 28.029, p < .001, \text{partial } \eta^2 = .272$ . Pairwise comparisons between PHLMS change scores revealed an increase in trait mindfulness between baseline ( $M = .47, SD = 6.279$ ) and post-intervention ( $M = 7.71, SD = 7.617$ ) change scores, with a statistically significant mean difference of 7.237 ( $p < .001$ ). Comparison of baseline and two-week follow-up change scores ( $M = 8.70, SD = 8.687$ ) indicated that these changes persisted out to two weeks post-termination of the intervention, with a mean difference of 8.224 ( $p < .001$ ). No statistically significant differences in change scores were found between post-intervention and follow-up. The observed effect size indicates that the intervention had a small to medium positive effect on the trait mindfulness scores of those who completed all four time points of the study.

#### Effect of Mindfulness Intervention on Gratitude Scores

A follow-up ANCOVA was conducted to examine the effect of the mindfulness intervention on GRAT change scores, with gender and age added as covariates. No significant effect was found,  $F(1.330, 95.733) = .281, p = .664, \text{partial } \eta^2 = .004$ .

#### Effect of Mindfulness Intervention on Gratitude Adjective Checklist Change Scores

A follow-up ANOVA was conducted to examine the effect of the mindfulness intervention on GAC change scores. No significant effect was found,  $F(1.508, 111.617) = 3.188, p = .059, \text{partial } \eta^2 = .041$ .

### Effect of Mindfulness Intervention on Ryff's Tests of Psychological Wellbeing

A follow-up ANCOVA was conducted to examine the effect of the mindfulness intervention on change scores for Ryff's Tests of Psychological Wellbeing, with gender and age added as covariates. No significant effect was found,  $F(1.530, 108.616) = .188$ ,  $p = .770$ , partial  $\eta^2 = .003$ .

### Effect of Mindfulness Intervention on Acceptance and Action Questionnaire Change Scores

A follow-up ANCOVA was conducted to examine the effect of the mindfulness intervention on change scores on the Acceptance and Action Questionnaire, with age added as a covariate. No significant effect was found,  $F(1.443, 99.002) = 2.031$ ,  $p = .150$ , partial  $\eta^2 = .031$ .

### Effect of Mindfulness Intervention on Satisfaction with Life Change Scores

A follow-up ANOVA was conducted to examine the effect of the mindfulness intervention on change scores on the Satisfaction with Life Questionnaire. No significant effect was found,  $F(1.496, 110.731) = 1.723$ ,  $p = .190$ , partial  $\eta^2 = .023$ .

### Effect of Mindfulness Intervention on DASS-21 Depression Change Scores

A follow-up ANCOVA was conducted to examine the effect of the mindfulness intervention on change scores on the DASS-21 Depression subscale, with age entered as a covariate. A significant effect was found,  $F(1.359, 99.191) = 5.445$ ,  $p = .013$ , partial  $\eta^2 = .069$ . Pairwise comparisons between DASS-21 Depression change scores revealed a decrease in depression between baseline ( $M = -.53$ ,  $SD = 7.442$ ) and post-intervention ( $M = -3.04$ ,  $SD = 7.493$ ) change scores, with a statistically significant mean difference of  $-2.507$  ( $p = .021$ ). Comparison of baseline and two-week follow-up change scores ( $M = -$

2.43,  $SD = 8.410$ ) indicated that these changes did not persist out to two weeks post-termination of the intervention, with a mean difference of  $-1.893$  ( $p = .542$ ). No statistically significant differences in change scores were found between post-intervention and follow-up. The observed effect size indicates that the intervention had a very small mitigating effect on the depression scores of those who completed all four time points of the study, with mean depression scores remaining in a clinically elevated range.

#### Effect of Mindfulness Intervention on DASS-21 Anxiety Change Scores

A follow-up ANCOVA was conducted to examine the effect of the mindfulness intervention on change scores on the DASS-21 Anxiety subscale, with age entered as a covariate. No significant effect was found,  $F(1.427, 104.179) = 2.253$ ,  $p = .190$ , partial  $\eta^2 = .126$ .

#### Effect of Mindfulness Intervention on DASS-21 Stress Change Scores

A follow-up ANCOVA was conducted to examine the effect of the mindfulness intervention on change scores on the DASS-21 Stress subscale, with age entered as a covariate. A significant effect was found,  $F(1.416, 103.375) = 5.686$ ,  $p = .010$ , partial  $\eta^2 = .072$ . Pairwise comparisons between DASS-21 Stress change scores revealed a decrease in stress between baseline ( $M = -.29$ ,  $SD = 7.765$ ) and post-intervention ( $M = -4.77$ ,  $SD = 9.380$ ) change scores, with a statistically significant mean difference of  $-4.480$  ( $p = .021$ ). Comparison of baseline and two-week follow-up change scores ( $M = -2.72$ ,  $SD = 7.659$ ) indicated that these changes did not persist out to two weeks post-termination of the intervention, with a mean difference of  $2.427$  ( $p = .236$ ). No statistically significant differences in change scores were found between post-

intervention and follow-up. The observed effect size indicates that the intervention had a very small mitigating effect on the stress scores of those who completed all four time points of the study, with mean stress scores remaining in a clinically elevated range.

#### Intention-to-treat Analysis

To assess the effect of the intervention on all participants collectively, rather than only those who completed the entire study, the above statistical analyses were conducted a second time, using an intention-to-treat analysis. In these analyses, all participants who were not eliminated from analyses per the listwise deletion criteria listed above were included. Participants who completed at least one time point and then withdrew from the study had their last observed cases carried forward into subsequent time points, such that their last observed case was treated as their final observed outcome.

As in the previous analyses, a one-way repeated measures MANCOVA was conducted using the three change scores previously calculated for each outcome variable, with trait mindfulness (PHLMS) entered as a covariate. A Greenhouse-Geisser correction was used to account for violation of the assumption of sphericity on the MANCOVA and all subsequent analyses. There was no statistically significant within-subjects interactions between trait mindfulness and time (Wilks'  $\lambda = .848$ ,  $F(16, 140) = 1.571$ ,  $p = .084$ , partial  $\eta^2 = .152$ ). To adjust for this finding, the analysis was re-run as a MANOVA without trait mindfulness as a covariate. A significant multivariate effect was observed (Wilks'  $\lambda = .826$ ,  $F(16, 141) = 1.856$ ,  $p = .030$ , partial  $\eta^2 = .174$ ).

Follow-up ANOVAs and ANCOVAs were conducted as above. As in previous analyses, a significant effect was found for trait mindfulness,  $F(1.391, 217.035) = 16.693$ ,  $p < .001$ , partial  $\eta^2 = .097$ . Pairwise comparisons between PHLMS change scores

revealed an increase in trait mindfulness between baseline ( $M = .75$ ,  $SD = 5.166$ ) and post-intervention ( $M = 4.11$ ,  $SD = 6.706$ ) change scores, with a statistically significant mean difference of 3.357 ( $p < .001$ ). Comparison of baseline and two-week follow-up change scores ( $M = 4.24$ ,  $SD = 7.428$ ) indicated that these changes persisted out to two weeks post-termination of the intervention, with a mean difference of 3.484 ( $p < .001$ ). No statistically significant differences in change scores were found between post-intervention and follow-up. The observed effect size indicates that the intervention had a small positive effect, particularly in comparison to the effect size observed for those who completed all four surveys, on the trait mindfulness scores of those who completed all four time points of the study.

No other significant results were found. The results of the MANOVA and follow-up ANOVAs are presented in Table 8.

#### Mediational Analysis of Gratitude and Psychological Flexibility

To assess whether changes in gratitude and/or psychological flexibility mediated the relation between increases in trait mindfulness and psychological wellbeing, a path analysis using bootstrapping procedures was conducted using MPlus statistical modeling software. Observed PHLMS change scores were used to model Pre- to post-intervention change scores (Time 3 minus Time 2) were used to model changes in trait mindfulness (PHLMS), gratitude (GRAT), and psychological flexibility (AAQ). Pre- to post-intervention change in psychological wellbeing was modeled as a latent variable, indicated by change scores for the six subscales of Ryff's Scales of Psychological Wellbeing. A total of 1,000 bootstraps was utilized.

Table 8 Means, Standard Deviations, and Intent-to-Treat Analyses of Variance for the Effects of Mindfulness Intervention on Eight Dependent Variables

Variable	Time 1		Time 2		Time 3		Time 4		F	p	Partial eta <sup>2</sup>
	M	SD	M	SD	M	SD	M	SD			
Trait Mindfulness (PHLMS)	68.82	10.32	64.29	12.47	72.00	10.92	72.99	11.23	16.693	<.001	.097
Trait Gratitude (GRAT)	309.67	47.64	313.79	51.22	327.45	46.58	324.99	49.16	0.258	.701	.002
Psychological Wellbeing (RPWS)	184.97	26.26	186.49	26.95	193.61	28.21	195.66	28.37	0.224	.748	.001
Psychological Flexibility (AAQ)	33.36	8.09	32.29	8.29	30.45	8.38	29.88	7.96	2.802	.074	.018
Satisfaction with Life (SWLS)	23.40	6.99	24.11	6.97	25.80	6.25	25.95	6.73	2.749	.081	.017
Gratitude Adjective Checklist (GAC)	14.59	2.14	14.33	2.10	14.67	2.04	14.88	2.22	1.928	.160	.012
Depression (DASS-21)	25.20	9.40	24.67	10.26	21.63	8.31	22.24	9.25	1.883	.169	.012
Anxiety (DASS-21)	23.17	9.23	22.77	9.43	20.77	6.32	22.19	9.10	0.577	.492	.004
Stress (DASS-21)	30.72	10.10	30.43	10.26	25.65	8.27	27.71	10.23	2.809	.084	.018

## Results of Mediational Analysis

The results of the mediational model are presented in Figure 1. A significant total effect of increases in mindfulness on increases in wellbeing was observed before the addition of mediating variables ( $B = .56$ , 95% CI = .38-.73). The results indicated no significant indirect effect of trait mindfulness on wellbeing through gratitude ( $B = .06$ , 95% CI = -0.32-.14). Conversely, the indirect effect of changes in trait mindfulness on changes in wellbeing through psychological flexibility was significant ( $B = .21$ , 95% CI = .09-.33). The total effect of the relation between increases in mindfulness and psychological wellbeing was significant,  $B = .56$ ,  $p < .001$ , as was the total indirect effect,  $B = .27$ ,  $p < .001$ . Therefore, the model indicates that approximately 48% of the total effect of the degree to which change in mindfulness predicts change in wellbeing was mediated by the indirect effect of changes in gratitude and psychological flexibility.

The relation between change in mindfulness and gratitude was significant,  $B = .41$ ,  $p < .001$ . However, the relation observed between gratitude and psychological being was not,  $B = .14$ ,  $p = .19$ . The relation between mindfulness and psychological flexibility was significant,  $B = .40$ ,  $p < .001$ , as was the relation between psychological flexibility and psychological wellbeing,  $B = .53$ ,  $p < .001$ . The direct effect of mindfulness on psychological wellbeing remained significant,  $B = .29$ ,  $p = .01$ .

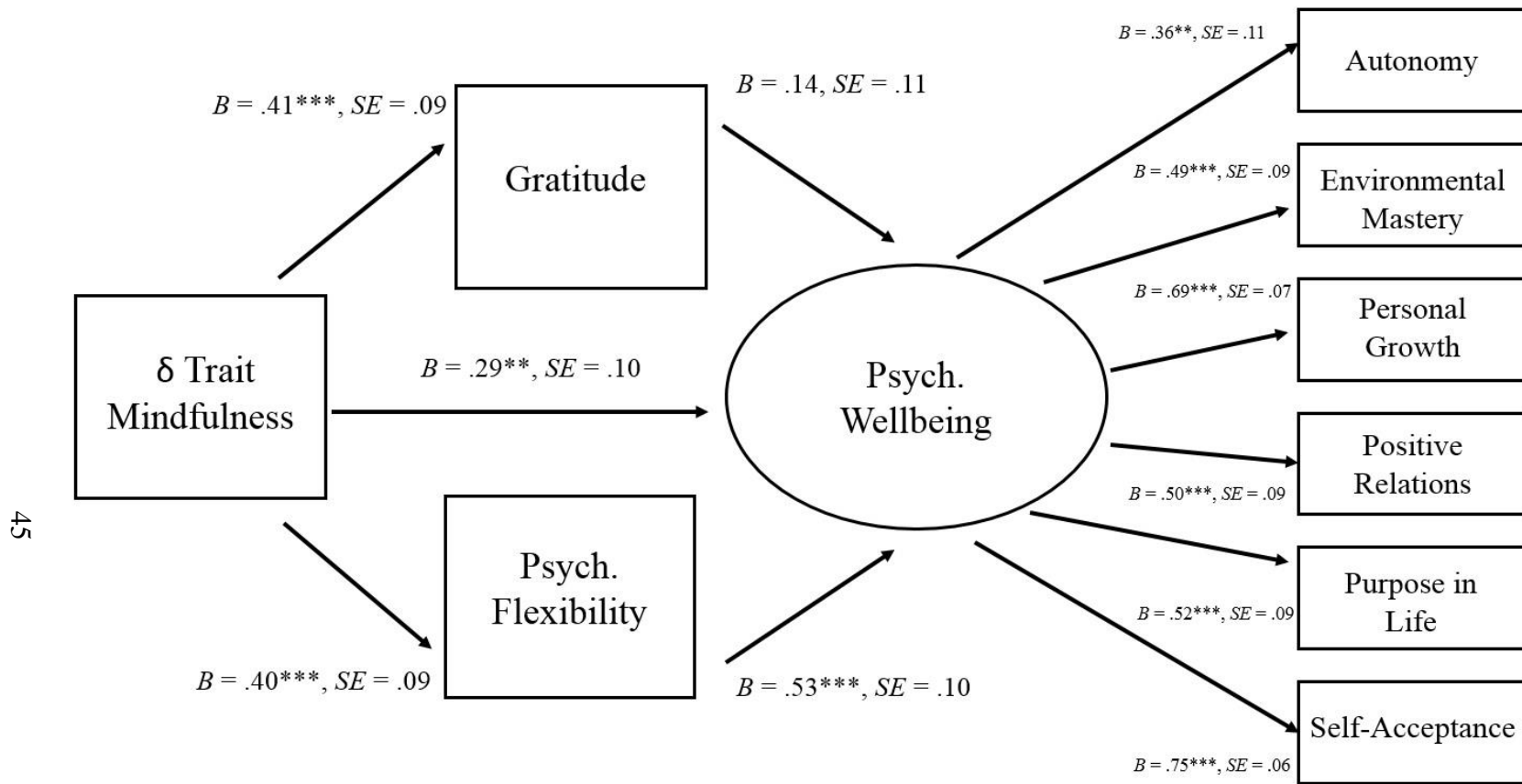


Figure 1. Mediating effect of post-intervention change in gratitude and psychological flexibility.

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$



## CHAPTER IV – DISCUSSION

The present study sought to investigate whether individuals who engaged in a brief mindfulness training—comprised of ten days of brief, ten-minute mindfulness meditation exercises completed at home—would experience lasting increases in gratitude and life satisfaction. The first variable, gratitude, was hypothesized to increase in part as a result of individuals adopting a state of mind characterized by open, nonjudgmental awareness to their surroundings (Hypothesis A). Such a state of mind would provide the cognitive freedom to decrease fixation on future-oriented and possibly negative content and instead adopt a mental frame of reference marked by appreciation of the present moment.

The second variable, satisfaction with life, was also hypothesized to increase in response to brief mindfulness training (Hypothesis B). Given the extensive literature base indicating a positive relation between mindfulness and both positive affect and psychological wellbeing (Kashdan & Rottenburg, 2010), as well as a negative relation between mindfulness and negative affect (Chambers et al., 2009; Grossman et al., 2004; O’Leary & Dockray, 2015), it is appropriate to hypothesize that increases in mindfulness will also yield increases in life satisfaction.

No support was found for Hypothesis A, which stated that individuals would experience lasting increases in dispositional gratitude as a result of undergoing the ten day mindfulness intervention, as there were no significant differences in gratitude change scores across baseline, post-intervention, or follow-up timepoints. As such, results do not indicate that mindfulness training yields increases in gratitude. These null findings contrast studies which found increases in self-compassion (Wylde, Mahrer, Meyer, &

Gold, 2017) and compassion (Lim, Condon, & DeSteno, 2015) with the Headspace app, though the timespans of Headspace use in these studies ranged from 10-21 days.

Likewise, no support was found for Hypothesis B, which stated that individuals would experience increases in satisfaction with life as a result of the mindfulness intervention. As was the case in Hypothesis A, change scores on the relevant outcome measure (SWLS) did not change across the duration of the study. This indicates that no substantive changes in satisfaction with life occurred as a result of the mindfulness intervention. Again, such findings contrast with prior research using the Headspace app, which found that the same ten-day training program used in the current study increased positivity and wellbeing (Howells et al,2016)

The pathways through which mindfulness is hypothesized to yield increases in psychological wellbeing and related constructs were investigated in the third hypothesis (Hypothesis C). Partial support was found for Hypothesis C, which stated that gratitude and psychological flexibility would partially mediate the relation between trait mindfulness and psychological wellbeing. The path analysis model used to investigate this hypothesis was estimated using Time 3 minus Time 2 change scores from data collected immediately following the intervention at Time 3. Results indicated that a significant mediating effect of psychological flexibility was observed marked by significant relations between mindfulness and psychological flexibility, which in turn was related to psychological wellbeing. However, gratitude was not a significant mediator. Specifically, while the observed relation between mindfulness and gratitude was significant, no significant relation existed between gratitude and psychological wellbeing in the mediation model. The direct effect of trait mindfulness on psychological wellbeing

remained significant after accounting for the mediated indirect effects, indicating a partial mediating effect of psychological flexibility. While a relation between mindfulness and psychological flexibility has already been well documented in prior research, as has the relation between psychological flexibility and psychological wellbeing (Kashdan & Rottenberg, 2010), it is noteworthy that psychological flexibility was determined to not only relate discretely to each variable, but to mediate the relation between the two as well. It would be beneficial for future studies to examine the potential causal effect of mindfulness on gratitude and psychological wellbeing. For example, future studies may examine whether individuals experiencing high levels of state mindfulness may be more likely to derive benefit from gratitude interventions than those with low levels of state mindfulness, which in turn may lead to greater increases in quality of life as a result of such interventions.

While a vast array of interventions and day-to-day activities can certainly increase psychological wellbeing (Fredrickson, 2000; Fredrickson, 2001) and gratitude (Emmons & McCullough, 2003; Koo et al., 2008; Seligman et al., 2005; Watkins et al., 2003; Wood et al., 2010), the current study failed to find that simple mindfulness meditation exercises over a ten day period are sufficient to produce substantive change in variables other than trait mindfulness, depression, and stress.

Additionally, the findings which found that the mindfulness exercises significantly reduced depression and stress in individuals who completed the entire study must be interpreted with a number of limitations in mind. The effect sizes for these variables were small, relative to those found for improvements in trait mindfulness, indicating that the effect the exercises had on these variables, while significant, may have

had relatively little practical impact on the subjective experience of depression and stress in participants. Such an interpretation is supported by an examination of mean depression and stress scores post-intervention and at follow-up, which remained in the clinically elevated range.

Given the high levels of reported depression and stress reported by participants, it is also possible that some amount of the observed decrease in these variables was the result of simple regression toward the mean, rather than the impact of mindfulness training alone. These limitations are especially prominent when looking at depression and stress scores in the intention-to-treat analysis, wherein no effect was observed on these variables throughout the study. The fact that depression and stress scores were minimally affected in analyses of study completers, and unaffected in the intent-to-treat analysis, indicates that insufficient evidence was found to suggest that brief mindfulness training alone may be able to generate meaningful improvement in mood or stress levels among individuals reporting high levels of depressive and stress-related symptoms.

It is worth noting that, while psychological flexibility and psychological wellbeing did not increase as a result of the mindfulness intervention, the mediation model found a significant pathway through which post-intervention changes in psychological flexibility mediated the relation between changes in trait mindfulness and changes in psychological wellbeing. In interpreting this finding, it is worth noting that mindfulness and psychological flexibility are closely linked dispositional traits, and it is highly likely that increases in one are likely to yield increases in the other (Hayes et al., 1996; Hayes et al., 2004). Likewise, the theoretical model of psychological wellbeing underlying Ryff's Scales of Psychological Wellbeing defines self-acceptance as a

fundamental and necessary component for psychological wellbeing and flourishing. The mindfulness intervention, the scale measuring trait mindfulness in the current study (Cardaciotto et al., 2008), and mindfulness as a broader construct, delineate the ability to engage in nonjudgmental awareness and acceptance of all stimuli experienced in the immediate and present moment as a critical component of effective mindfulness practice.

It is reasonable, then, to conclude that in the relation between psychological wellbeing, as measured by the Ryff scales, and trait mindfulness may be driven in part by one's ability to be aware of present thoughts and feelings without defense—a fundamental component of psychological flexibility. Given that gratitude was not a significant mediator of mindfulness and psychological wellbeing, it appears that mindfulness and gratitude may be best described as independent components which make unique contributions to psychological wellbeing. As such, it is possible that separate mindfulness and gratitude interventions may yield the greatest increase in these respective traits

Additionally, the results of the current study provide further evidence in favor of the extant wealth of empirical literature indicating that mindfulness can be a useful component in various interventions designed to reduce negative affect and build positive skills for proactive and adaptive stress management (Chambers et al., 2009; Grossman et al., 2004). It is possible that increases in trait mindfulness yielded by the intervention used in this study may have made direct contributions to the decreases in both depression and stress observed by individuals who successfully completed the mindfulness intervention, although the previously mentioned limitations of such assumptions of our findings must be kept in mind. However, such an interpretation would be consistent with

prior findings which supported the effectiveness of the Headspace app in reducing stress levels following ten days of use (Economides, Martman, Bell, & Sanderson, 2018).

It remains unclear as to why the mindfulness intervention utilized in the current study failed to generate significant decreases in anxiety levels across participants. In addition to the intervention simply failing to affect mindfulness levels significantly enough to generate decreases in anxiety, it is also possible that the relative inexperience of the participants may have limited the benefits they could obtain from the intervention. Likewise, it is possible that the relatively short length of time participants engaged in practice, both in terms of duration (ten minutes at a time) and overall length of regular practice (ten days in total) may have additionally limited the potential benefits obtained from the intervention.

It is also unclear as to why participants experienced no significant changes in trait gratitude after completing the intervention. It is possible that increases in trait mindfulness do not necessarily translate to increases in the frequency of gratitude-related emotions, despite the hypothesized connection between trait mindfulness and the ability to experience present-focused emotions such as gratitude. Such a hypothesis as to why no significant effects were found can also be extended to changes were noted in state gratitude, as measured by the GAC. In addition to the above hypothesis, it stands to reason that state gratitude, like any emotional state, is likely to increase and decrease throughout the course of a day—perhaps even as rapidly as hour-by-hour. As a result, it may be that the state gratitude of participants in the current study was simply too variable to detect using the current study design, in which state gratitude was measured at a very small number of discrete time points. Future studies which attempt to measure the impact

of mindfulness training on state, rather than trait, gratitude may yield more robust results by employing momentary experience sampling, wherein participants are pulled at random times, several times a day, for an extended period of time so that average levels of state gratitude could be evaluated.

Additionally, it is possible that effects on dispositional gratitude were not captured because possible changes in gratitude possessed a more emotional, as opposed to rational, quality that was not measured by the GRAT. Many of the items on the GRAT do not refer to the frequency or intensity of gratitude-related emotions, instead referring, for example, to the extent to which individuals believe that they are fundamentally pleased with their lives, have experienced sufficient good fortune relative to others, and recognize the role that others have played in helping to generate their successes and accomplishments. These are, of course, crucial components of gratitude, but do not necessarily invoke intense emotions unless they are reflected upon deliberately, as is the goal in many gratitude interventions (Emmons & McCullough, 2003; Koo et al., 2008; Seligman et al., 2005; Watkins et al., 2003; Wood et al., 2010). In light of this, it would be interesting to examine whether meditation exercises which focus more intentionally on invoking intense feelings of compassion and appreciation for others, such as loving-kindness meditation, would be more effective in generating increases in trait—and, consequently, state—gratitude over time.

With this in mind, it is notable that only two-thirds of cases in which a trait was significantly affected by the mindfulness intervention yielded changes which persisted out to the final two-week follow-up time point. While changes trait mindfulness and stress were enduring, changes in depression were not. This indicates that the long-term

impact of the mindfulness intervention was mixed, insofar as there was an observed tapering off of positive effects which occurred within two weeks following cessation of mindfulness training. While it is likely that individuals who choose to engage in formal meditation practice must do so regularly for an extended amount of time—many years, among highly experienced practitioners—the results of the current study are encouraging in that they indicate that even inexperienced individuals may be able to experience significant and enduring positive effects after as little as ten minutes a day for ten days.

It is worth noting that, of all the constructs measured during investigation of the first two hypotheses, trait mindfulness exhibited the greatest increase as a result of the intervention. This is intuitively sensible, as the intervention was specifically intended to increase mindfulness. It is nonetheless worth drawing explicit attention to this result, however, as this indicates that the intervention was successful in increasing the targeted construct of trait mindfulness, despite the brevity of the intervention. Additionally, all increases in other traits relating to positive affect (i.e., gratitude, satisfaction with life, psychological wellbeing, psychological flexibility), as well as decreases in negative affect (i.e., DASS-21 depression and stress scores), were commensurate with corresponding increases in mindfulness which occurred as a result of the intervention.

It is nonetheless important to note that a conclusion cannot be drawn that these non-mindfulness traits changed as a direct result of increases in mindfulness specifically, as opposed to an indirect effect of the mindfulness intervention which occurred irrespective of increases in mindfulness. Given the high degree of skew observed in depression scores, simple regression to the mean cannot be ruled out as a reason for observed decreases. In addition, given that the study did not utilize a control group, it is



also possible that other variables that were not considered or measured may have made contributions to observed changes.

It should also be noted that trait mindfulness was the only trait found to be significantly affected during the intention-to-treat analysis, though its effect size was reduced considerably. While it is noteworthy that significant increases in trait mindfulness were observed despite a 51% attrition rate from the study, the fact that trait mindfulness was the only significant variable is not altogether surprising, given that increases in trait mindfulness would be the minimal expected result of a mindfulness meditation intervention.

As is often the case in studies involving self-administered interventions, it is important that the motivation of all participants to persist throughout the ten-day training period be considered. The participants in the present study were all novice practitioners, many of whom were introduced to mindfulness exercises for the first time as a result of their participation in the present study. Consequently, it is possible that the benefits they were able to ascertain from ten days of mindfulness practice were limited as a result of their inexperience.

Conversely, it is possible that individuals with an affinity for mindfulness practice may derive the most significant benefits immediately after beginning practice, after which time the benefits of practice may begin to taper off or deaccelerate. While the current study indicated that the vast majority of benefits observed in participants persisted two weeks after completing the training, it is unclear whether additional benefits would have been observed were the participants instructed to continue engaging in mindfulness practice for a longer period of time (e.g., thirty days, rather than ten), or for longer

periods of time (e.g., thirty minutes, rather than ten). It is noteworthy that, despite their novice status as meditators, all participants in the study had some intrinsic motivation to participate and persist in the study, given that they volunteered for a month-long longitudinal study with no assuredness of compensation. This intrinsic motivation may further have bolstered positive effects elicited by the mindfulness training.

Additionally, while it is possible that different effects would have been observed if the present study included individuals with substantive meditation experience, the noteworthy results obtained by the present study are promising insofar as they indicate that considerable and lasting increases in a multiple facets of psychological health (e.g., psychological wellbeing and flexibility, satisfaction with life, gratitude), as well as commensurate decreases in risk factors for psychological illness (e.g., depression, stress), can be obtained with as little as ten days of dedicated practice. However, it is possible that individuals with extensive meditation experience may have—by consequence of their preexisting practice, which would likely yield increases in wellbeing and decreases in depression and stress—relatively little room for improvement on the outcome variables measured in this study, compared with less experienced individuals such as those who participated in the current study. Likewise, while these results were obtained with a community sample reporting high levels of depressive, anxious, and stress-related symptoms, it is possible that similar effects may be yielded with generally healthy community samples. Conversely, it is possible that a floor effect may be encountered in healthier samples, such that decreases in depression and stress would be less likely than in the sample used in the current study.

## Limitations

Results obtained by the present study must be considered within the context of a number of limitations. First, as a consequence of the study's primary intervention occurring at home, as opposed to in a lab setting, it was impossible to confirm complete fidelity to all instructions presented throughout the course of the study. It is possible that some degree of error may have been introduced into the final collection of data as a result of misinterpretation of instructions presented before, during, or after the meditation training. While participants were reminded throughout the course of participation to email the principal investigator with any questions or concerns, it is impossible to assure that all instructions were completed with total accuracy by all participants. Specifically, it is impossible to ascertain whether participants completed fewer than ten meditation exercises, exactly ten meditation exercises, or more than ten meditation exercises. This is important to note, as these potential issues arising from the uncontrolled setting would be expected to decrease effects of the intervention, rather than strengthen the effect. This is a noteworthy limitation to point out, given the small to medium effect sizes observed throughout both the completers-only and intention-to-treat analyses.

Secondly, the questionnaire completed at the two-week follow-up did not ask participants whether they had continued to meditate following completion of the meditation training. It is possible that some participants, having experienced observable positive impact as a result of the meditation training, had continued to meditate regularly following completion of the training. If this is the case, it is possible that some of the sustained positive effects measured at the final time point were partially a consequence of certain individuals continuing to meditate after the ten day training period, rather than a

result the ten day training period yielding effects that persisted out to two weeks. Of course, this would nonetheless indicate that mindfulness medication yields positive effects for these individuals, but would suggest that the effect of only ten days of meditation training may be smaller than that represented by the results of the current study.

Additionally, the results of the present study must be interpreted with the understanding that the study used a non-probability sampling method, with all participants self-selecting into participation. It is likely that a significant number of these individuals had a pre-existing interest in meditation or related topics or activities (e.g., mindfulness, yoga). Since a probability sampling method (e.g., simple random or stratified sampling) was not used, the extent to which the results of the present study can be applied to the general public—the majority of whom are unlikely to have to same degree of motivation or interest in meditation as the participants in the current study—is limited. As such, it is possible that the results of the current study are best interpreted as applying specifically to individuals with a sustained interest or openness toward meditation practice, rather than the general population. However, the need to experience motivation to engage in a given behavior for a prolonged practice period before being able to experience benefits resulting from said behavior is a phenomenon that is far from unique to mindfulness practice. It cannot be understated that, as with any skill, one must possess a genuine desire to develop the skill, leading to active engagement in prolonged practice, before they are able to experience sustained benefit.

The present study only examined the effects of the mindfulness intervention out to two weeks following termination of the intervention. These results unfortunately cannot

be used to predict the length of benefit individuals are likely to experience following meditation training before such benefits begin to taper off or revert to baseline. As such, the results of the current study cannot be generalized beyond two weeks following cessation of the mindfulness meditation. Future studies may benefit by examining longer periods of time to assess how long effects of mindfulness training last.

Furthermore, it is notable that the current study utilized a community sample reporting high levels of depression, anxiety, and stress. As a result, the degree to which the findings of this study are applicable to the general population is limited. It is likely that a variety of factors important to completing and obtaining benefit from the mindfulness training (e.g., motivation to participate consistently, ability to concentrate and focus, willingness to experience emotional discomfort which can result from meditation) will vary significantly in clinically elevated samples as compared to healthy community samples, and may additionally vary further across diagnoses. Specifically, the severity of experienced symptoms in clinical samples may moderate the extent to which individuals in such populations may be able to benefit from meditation training. For example, intense severity of symptoms may decrease the effect of brief mindfulness meditation, given that the individual may be so impaired by symptom distress that they are unable to appropriately focus or engage in the meditation. Conversely, individuals with mild to moderate symptoms of psychopathology may actually stand to benefit even more than the sample in the current study because they have more room for improvement in their levels of wellbeing.

Finally, it is worth noting the limitations inherent in the study's experimental design. As a consequence of the study using a within-subjects design, no control group

was utilized. This limitation poses interpretive difficulties when analyzing the results of the mindfulness intervention, as it becomes more difficult to definitively attribute any observed effect to the mindfulness intervention. Along the same lines, it is possible that a wide array of third variables that were not examined or measured may have impacted the observed findings.

#### Future Directions

The above limitations inherently limit the generalizability of the results garnered by the study. A number of fruitful areas of future research to further elucidate and expand the findings of the present study are provided below.

Firstly, it is worth investigating whether individuals introduced to mindfulness practice by means of participating in a study involving brief mindfulness training continue to practice following termination of the intervention. While the current study's results are promising in terms of the impact that a brief mindfulness intervention may have on trait mindfulness scores, the practical usefulness of these results is inherently limited if individuals do not continue to engage in mindfulness practice following termination of the intervention. As a result, future studies would benefit by examining the extent to which individuals perceive mindfulness practice useful enough that they continue to incorporate it into their day-to-day lives, even after cessation of formal training or participation in a mindfulness study. Such studies may reassess relevant dispositional traits alongside the frequency of meditation on a monthly basis. Regardless of whether individuals continued meditating or eventually stopped, useful data concerning the positive results (or decrement thereof) of meditation resulting from

continued or discontinued practice could be garnered from such long-term data collection.

Additionally, an aforementioned limitation of the current study is that follow-up data was not collected for a sufficient length of time to determine the point at which the beneficial effects of mindfulness training began to taper off and decline. This observation poses a number of interesting areas of future investigation. For example, it would be a worthwhile endeavor to measure the extent to which mindfulness practice can generate long-lasting benefits, even after the cessation of regular mindfulness practice. Likewise, it would be beneficial to note whether mindfulness practice, whether brief or extensive, can generate long-lasting changes to personality or personal disposition, even after cessation of practice, or whether all changes in mood, gratitude, trait mindfulness, and wellbeing, eventually revert back to baseline levels after the end of training.

Furthermore, it would be worthwhile to investigate whether different methods of mindfulness training yield differing results. The current study exclusively used an at-home method of mindfulness training, using pre-recorded audio guidance. Future studies may compare and contrast the effectiveness of such an approach with alternative means of learning meditation, such as direct instruction by a skilled practitioner. While it stands to reason that direct instruction with live feedback would yield superior effects when compared with pre-recorded audio instructions, no such investigation that is analogous to the current study has yet been conducted with a community sample.

Finally, given the lack of substantive change in gratitude in the current study, it would be interesting to examine the degree to which gratitude was affected by alternative methods of meditation which make focused attempts to induce states of mind marked by

compassion, gratitude, and acceptance of others. The meditation intervention used in the current study utilized traditional mindfulness techniques commonly utilized as fundamentals of various Eastern meditation practices (e.g., Vipassana, zazen). Alternative meditation techniques such as loving-kindness meditation may yield stronger effects on gratitude than the techniques utilized in the current study, and may be a useful adjunct to more commonly used meditation techniques.

### Conclusions

The results of the current study indicate that a brief, ten-day mindfulness training course is capable of providing significant and sustained benefits by increasing trait mindfulness. Significant improvements in depression and stress levels were also noted, but the effect sizes associated with these changes were small, and no such improvements were observed in subsequent intention-to-treat analyses. Perhaps most notably, changes in psychological flexibility immediately following the mindfulness training course partially mediated the relation between trait mindfulness and psychological wellbeing. No mediating effect of gratitude was observed. These findings indicate that, while increases in mindfulness are related to increases in other positive variables associated with quality of life, the manifestation of these facets of psychological wellbeing appear to occur in part as a result of increases in trait psychological flexibility resulting from mindfulness training. Given that gratitude was not a significant mediator of mindfulness and psychological wellbeing, it appears that mindfulness and gratitude may be best described as independent components which make unique contributions to psychological wellbeing. As such, it is possible that separate mindfulness and gratitude interventions may yield the greatest increase in these respective traits.



Future studies may expand upon these findings in a number of productive ways. Firstly, further research must still be conducted to assess the exact causal mechanisms by which gratitude mediates the relation between mindfulness and wellbeing. Additionally, further research might assess the extent to which continued mindfulness practice yields additional benefits, or whether discontinuation of mindfulness practice yields decrements in benefit. Finally, assessing whether different modes of meditation instruction (e.g., direct instruction) or alternative forms of meditation (e.g., loving-kindness) yield greater effects on the variables measured in this study may be useful in evaluating the relative effectiveness of various mindfulness and meditation interventions.

## APPENDIX A – Philadelphia Mindfulness Scale

Instructions: Please circle how often you experienced each of the following statements *within the past week*.

1. I am aware of what thoughts are passing through my mind.
2. I try to distract myself when I feel unpleasant emotions.
3. When talking with other people, I am aware of their facial and body expressions.
4. There are aspects of myself I don't want to think about.
5. When I shower, I am aware of how the water is running over my body.
6. I try to stay busy to keep thoughts or feelings from coming to mind.
7. When I am startled, I notice what is going on inside my body.
8. I wish I could control my emotions more easily.
9. When I walk outside, I am aware of smells or how the air feels against my face.
10. I tell myself that I shouldn't have certain thoughts.
11. When someone asks how I am feeling, I can identify my emotions easily.
12. There are things I try not to think about.
13. I am aware of thoughts I'm having when my mood changes.
14. I tell myself that I shouldn't feel sad.
15. I notice changes inside my body, like my heart beating faster or my muscles getting tense.
16. If there is something I don't want to think about, I'll try many things to get it out of my mind.
17. Whenever my emotions change, I am conscious of them immediately.
18. I try to put my problems out of mind.

19. When talking with other people, I am aware of the emotions I am experiencing.
20. When I have a bad memory, I try to distract myself to make it go away.

## APPENDIX B – (GRAT) Opinion Questionnaire – R

Please provide your honest feelings and beliefs about the following statements which relate to you. There are no right or wrong answers to these statements. We would like to know how much you feel these statements are true or not true of you. Please try to indicate your true feelings and beliefs, as opposed to what you would like to believe. Respond to the following statements by filling in the number that best represents your real feelings in the blank provided next to each statement. Please use the scale provided below, and please choose one number for each statement (i.e. don't circle the space between two numbers).

1 (I strongly disagree)

2

3 (I disagree somewhat)

4

5 (I feel neutral about the statement)

6

7 (I mostly agree with the statement)

8

9 (I strongly agree with the statement)

1. \_\_\_ I couldn't have gotten where I am today without the help of many people.
2. \_\_\_ I think that life has been unfair to me.
3. \_\_\_ It sure seems like others get a lot more benefits in life than I do.
4. \_\_\_ I never seem to get the breaks or chances that other people do.
5. \_\_\_ Often I'm just amazed at how beautiful the sunsets are.

6. \_\_\_ Life has been good to me.
7. \_\_\_ There never seems to be enough to go around and I never seem to get my share.
8. \_\_\_ Often I think, "What a privilege it is to be alive."
9. \_\_\_ Oftentimes I have been overwhelmed at the beauty of nature.
10. \_\_\_ I feel grateful for the education I have received.
11. \_\_\_ Many people have given me valuable wisdom throughout my life that has been important to my success.
12. \_\_\_ It seems like people have frequently tried to impede my progress.
13. \_\_\_ Although I think it's important to feel good about your accomplishments, I think that it's also important to remember how others have contributed to my success.
14. \_\_\_ I really don't think that I've gotten all the good things that I deserve in life.
15. \_\_\_ Every Fall I really enjoy watching the leaves change colors.
16. \_\_\_ Although I'm basically in control of my life, I can't help but think about all those who have supported me and helped me along the way.
17. \_\_\_ Part of really enjoying something good is being thankful for that thing.
18. \_\_\_ Sometimes I find myself overwhelmed by the beauty of a musical piece.
19. \_\_\_ I'm basically very thankful for the parenting that was provided to me.
20. \_\_\_ I've gotten where I am today because of my own hard work, despite the lack of any help or support.
21. \_\_\_ Over the December holidays, the presents I get aren't as good or as many as others seem to get.
22. \_\_\_ Sometimes I think, "Why am I so fortunate so as to be born into the family and culture I was born into?"

23. \_\_\_ One of my favorite times of the year is Thanksgiving.
24. \_\_\_ I believe that I am a very fortunate person.
25. \_\_\_ I think that it's important to "Stop and smell the roses."
26. \_\_\_ More bad things have happened to me in my life than I deserve.
27. \_\_\_ I really enjoy the changing seasons.
28. \_\_\_ Because of what I've gone through in my life, I really feel like the world owes me something.
29. \_\_\_ I believe that the things in life that are really enjoyable are just as available to me as they are to the very rich.
30. \_\_\_ I love to sit and watch the snow fall.
31. \_\_\_ I believe that I've had more than my share of bad things come my way.
32. \_\_\_ Although I think that I'm morally better than most, I haven't gotten my just reward in life.
33. \_\_\_ After eating I often pause and think, "What a wonderful meal."
34. \_\_\_ Every spring, I really enjoy seeing the flowers bloom.
35. \_\_\_ I think that it's important to pause often to "count my blessings."
36. \_\_\_ I think it's important to enjoy the simple things in life.
37. \_\_\_ I basically feel like life has ripped me off.
38. \_\_\_ I feel deeply appreciative for the things others have done for me in my life.
39. \_\_\_ I feel that God, or fate, or destiny, doesn't like me very well.
40. \_\_\_ The simple pleasures of life are the best pleasures of life.
41. \_\_\_ I love the green of spring.
42. \_\_\_ For some reason I never seem to get the advantages that others get.

43. \_\_\_ I think it's important to appreciate each day that you are alive.

44. \_\_\_ I'm really thankful for friends and family.

APPENDIX C – Ryff’s Psychological Wellbeing Scales (PWB), 42 Item Version

Please indicate your degree of agreement (using a score ranging from 1-6) to the following sentences.

1. I am not afraid to voice my opinions, even when they are in opposition to the opinions of most people. 1 2 3 4 5 6
2. In general, I feel I am in charge of the situation in which I live. 1 2 3 4 5 6
3. I am not interested in activities that will expand my horizons. 1 2 3 4 5 6
4. Most people see me as loving and affectionate. 1 2 3 4 5 6
5. I live life one day at a time and don't really think about the future. 1 2 3 4 5 6
6. When I look at the story of my life, I am pleased with how things have turned out. 1 2 3 4 5 6
7. My decisions are not usually influenced by what everyone else is doing. 1 2 3 4 5 6
8. The demands of everyday life often get me down. 1 2 3 4 5 6
9. I think it is important to have new experiences that challenge how you think about yourself and the world. 1 2 3 4 5 6
10. Maintaining close relationships has been difficult and frustrating for me. 1 2 3 4 5 6
11. I have a sense of direction and purpose in life. 1 2 3 4 5 6
12. In general, I feel confident and positive about myself. 1 2 3 4 5 6
13. I tend to worry about what other people think of me. 1 2 3 4 5 6
14. I do not fit very well with the people and the community around me. 1 2 3 4 5 6
15. When I think about it, I haven't really improved much as a person over the years. 1 2 3 4 5 6



16. I often feel lonely because I have few close friends with whom to share my concerns.  
1 2 3 4 5 6
17. My daily activities often seem trivial and unimportant to me. 1 2 3 4 5 6
18. I feel like many of the people I know have gotten more out of life than I have. 1 2 3 4  
5 6
19. I tend to be influenced by people with strong opinions. 1 2 3 4 5 6
20. I am quite good at managing the many responsibilities of my daily life. 1 2 3 4 5 6
21. I have the sense that I have developed a lot as a person over time. 1 2 3 4 5 6
22. I enjoy personal and mutual conversations with family members or friends. 1 2 3 4 5  
6
23. I don't have a good sense of what it is I'm trying to accomplish in life. 1 2 3 4 5 6
24. I like most aspects of my personality. 1 2 3 4 5 6
25. I have confidence in my opinions, even if they are contrary to the general consensus.  
1 2 3 4 5 6
26. I often feel overwhelmed by my responsibilities 1 2 3 4 5 6
27. I do not enjoy being in new situations that require me to change my old familiar ways  
of doing things. 1 2 3 4 5 6
28. People would describe me as a giving person, willing to share my time with others. 1  
2 3 4 5 6
29. I enjoy making plans for the future and working to make them a reality. 1 2 3 4 5 6
30. In many ways, I feel disappointed about my achievements in life. 1 2 3 4 5 6
31. It's difficult for me to voice my own opinions on controversial matters. 1 2 3 4 5 6
32. I have difficulty arranging my life in a way that is satisfying to me. 1 2 3 4 5 6

33. For me, life has been a continuous process of learning, changing, and growth. 1 2 3 4  
5 6
34. I have not experienced many warm and trusting relationships with others. 1 2 3 4 5 6
35. Some people wander aimlessly through life, but I am not one of them 1 2 3 4 5 6
36. My attitude about myself is probably not as positive as most people feel about  
themselves. 1 2 3 4 5 6
37. I judge myself by what I think is important, not by the values of what others think is  
important. 1 2 3 4 5 6
38. I have been able to build a home and a lifestyle for myself that is much to my liking.  
1 2 3 4 5 6
39. I gave up trying to make big improvements or changes in my life a long time ago. 1 2  
3 4 5 6
40. I know that I can trust my friends, and they know they can trust me. 1 2 3 4 5 6
41. I sometimes feel as if I've done all there is to do in life. 1 2 3 4 5 6
42. When I compare myself to friends and acquaintances, it makes me feel good about  
who I am. 1 2 3 4 5 6

## APPENDIX D – The Acceptance and Action Questionnaire (AAQ)

Below you will find a list of statements. Please rate the truth of each statement as it applies to you. Use the following scale to make your choice

1 (never true)

2 (rarely true)

3 (seldom true)

4 (sometimes true)

5 (frequently true)

6 (almost always true)

7 (always true)

1. I am able to take action on a problem even when I am uncertain what is the right thing to do.
2. I often catch myself daydreaming about things I've done and what I would do differently next time.
3. When I feel depressed or anxious, I am unable to take care of my responsibilities.
4. I rarely worry about getting my anxieties, worries, and feelings under control.
5. I'm not afraid of my feelings.
6. When I evaluate something negatively, I usually recognize that this is just a reaction, not an objective fact.
7. When I compare myself to other people, it seems that most of them are handling their lives better than I do.
8. Anxiety is bad.

9. If I could magically remove all of the painful experiences I have had in my life, I would do so.

## APPENDIX E – Satisfaction with Life Scale

Below are five statements that you may agree or disagree with. Using the 1 - 7 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

7 - Strongly agree

6 - Agree

5 - Slightly agree

4 - Neither agree nor disagree

3 - Slightly disagree

2 - Disagree

1 - Strongly disagree

\_\_\_\_ In most ways my life is close to my ideal.

\_\_\_\_ The conditions of my life are excellent.

\_\_\_\_ I am satisfied with my life.

\_\_\_\_ So far I have gotten the important things I want in life.

\_\_\_\_ If I could live my life over, I would change almost nothing.

31 - 35 Extremely satisfied

26 - 30 Satisfied

21 - 25 Slightly satisfied

20 Neutral

15 - 19 Slightly dissatisfied

10 - 14 Dissatisfied

5 - 9 Extremely dissatisfied

## APPENDIX F – IRB Approval Letter



### INSTITUTIONAL REVIEW BOARD

118 College Drive #5147 | Hattiesburg, MS 39406-0001

Phone: 601.266.5997 | Fax: 601.266.4377 | [www.usm.edu/research/institutional.review.board](http://www.usm.edu/research/institutional.review.board)

### NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.  
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 17091304

PROJECT TITLE: Effects of Mindfulness on Gratitude

PROJECT TYPE: New Project

RESEARCHER(S): David Schultz

COLLEGE/DIVISION: College of Education and Psychology

DEPARTMENT: Psychology

FUNDING AGENCY/SPONSOR: N/A

IRB COMMITTEE ACTION: Expedited Review Approval

PERIOD OF APPROVAL: 09/15/2017 to 09/14/2018

**Lawrence A. Hosman, Ph.D.**

**Institutional Review Board**

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