Dispositional Mindfulness and Positive Psychological Processes in Older Adults: Executive Functioning, Positive Reappraisal and Meaning in Life.

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Dispositional Mindfulness and Positive Psychological Processes in Older Adults:
Executive Functioning, Positive Reappraisal and Meaning in Life.

by

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ABSTRACT

Although dispositional mindfulness has been associated with positive outcomes in the broader mental health literature, less is known about dispositional mindfulness in older adults as it relates to factors important in successful aging, such as meaning in life. This study investigated the relationship between dispositional mindfulness and meaning in life, while taking into consideration older adults’ available cognitive resources and use positive reappraisal. The primary purpose of this study was to determine if the relationship between dispositional mindfulness and meaning in life was mediated by executive function and positive reappraisal. Additionally, this study examined the moderation effect of perceived level of stress.

To investigate processes within a proposed theoretical framework, a sample of older adults (N=47) were assessed across various measures, including dispositional mindfulness, meaning in life, perceived stress, positive reappraisal as well as a number of executive functions (i.e., working memory, cognitive flexibility and inhibition). Dispositional mindfulness significantly predicted use of positive reappraisal strategies, but was not found to play a significant role in the executive functions or the presence of meaning in life. Stress did not moderate the relationship between dispositional mindfulness and executive functions.

Limitations, implications and future directions are discussed.

Keywords: Mindfulness, meaning in life, executive functioning, positive reappraisal
For my grandma
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CHAPTER ONE

Introduction

By 2030 the number of individuals 65 years of age or older is expected to approach 70 million, or 20% of the United States population (Administration on Aging, 2014). More globally, estimates predict that by 2050, the proportion of the world’s population over 60 will double, from 900 million to 2 billion (World Health Organization, 2016). This phenomenon is in part, driven by improvements in longevity, which continue to steadily increase at a rate of 3 months of life per year (National Institute on Aging, 2015). Therefore, as the population continues to age, understanding older adults’ protective factors in health and wellness will become increasingly important.

The importance of delineating older adults’ protective factors is underscored by their more frequent experience with changes in independence, chronic pain, bereavement, and socioeconomic status that threaten overall wellbeing (World Health Organization, 2016). One point of intervention to promote wellbeing is improving health factors. Interestingly, older adults with vascular risk factors such as coronary heart disease have higher rates of depression than those who are medically well. Conversely, untreated depression is associated with increased cardiovascular morbidity and mortality (Lichtman et al., 2009). That said, although improving physical health is crucially important to aging in place, factors related to psychological wellbeing should also be considered.

Meaning in Life

Meaning in life is one factor that fosters wellbeing and reduces distress in people’s lives. According to Steger (2012), meaning in life refers to “the web of connections, understandings, and interpretations that help us comprehend our experience and formulate plans directing our energies to the achievement of desired future,” implying that meaning in life refers to extent to
which we comprehend and see significance in our lives, as well as the degree to which we subscribe to an overarching goal for that life (p. 65). Theoretically, meaning in life is said to be comprised of two existential and one cognitive component (Heintzelman & King, 2014). From an existential perspective, a meaningful life is one that has a sense of purpose and significance. Cognitively, a meaningful life makes sense to the person who is living it (i.e., it is easily understood and somewhat predictable) (Baumeister & Vohs, 2002). Meaning in life is associated with a variety of positive outcomes. For example, self-reports of meaning in life are associated with higher quality of life, (Krause, 2007), self-reported subjective sense of health (Steger, Mann, Michels, & Cooper, 2009) and decreased stress (Ishida & Okada 2006). In addition, meaning in life is associated with lower rates of psychological disorders (Owens, Steger, Whitesell, & Herrera, 2009) and increased adaptive coping strategies after injury (Thompson, Coker, Krause, & Henry, 2003).

While meaning in life is important for people of all ages, this may be especially true for older adults. Sources of meaning in life are altered considerably in older adulthood, which often requires individuals to reflect and make new meaning of current life circumstances. Changes in major life roles (e.g., death of a spouse, retirement, change in mobility status, etc.) may precipitate contemplation about one’s life purpose. This contemplation can either lead to a sense of meaning and fulfillment, or a sense of regret and/or despair. (Erikson & Erikson, 1998). Specific to older adults, research has shown that meaning in life predicts slower age-related cognitive decline and decreased risk for Alzheimer disease (Boyle, Barnes, Buchman & Bennett, 2009) and decreased mortality (Krause, 2009). Therefore, as an index of psychological and physical health, meaning in life may be particularly relevant to older adults.
Positive Reappraisal

One way we may be able to increase the experience of a meaningful life is through active cognitive reframing, such as positive reappraisal. Keeping that in mind, when a stimulus that was originally appraised as threatening is reinterpreted as benign or even meaningful, it is recognized as an emotion regulation strategy called positive reappraisal. More generally, literature defines emotion regulation as an internal process that influences the intensity, duration and type of emotion experienced in accordance with one’s short and long-term goals (Gross & Thompson, 2007). There are several different kinds of emotion regulation strategies. Ochsner and Gross (2005) suggest a distinction between behavioral regulation (e.g., suppressing expressive behavior) and cognitive regulation. Cognitive regulation relies on attentional control (e.g., purposeful inattention to negative emotional stimuli, performing distracting tasks, etc.) or on cognitive change. Cognitive change strategies include the controlled regulation of an ongoing emotional response, such as positive reappraisal (i.e., modifying of how one appraises a situation so as to alter its emotional impact).

Positive reappraisal is an active coping strategy that “involves direct contemplation of the stressor and its context;” it is not a defense mechanism used to repress negative emotion or deny reality (Garland, Farb, Goldin & Fredrickson, 2015, p. 13). Therefore, unlike suppression, positive reappraisal has been shown to attenuate stress physiology, including neuroendocrine and cardiovascular factors (Bower, Low, Moskowitz, Sepah & Epel, 2008). For example, relative to a different type cognitive emotion regulation (i.e., distancing), increasing positive emotion through reappraisal results in shortened cardiac inter-beat interval paired with reduced blood pressure (Shiota & Levenson, 2012). This cardiovascular response profile has been previously associated with a “challenge” rather than a “threat” mindset (Tomaka, Blascovich, Kibler, & Ernst, 1997). Hence, positive reappraisal is an adaptive rather than avoidant strategy that works
to enhance top-down, prefrontal regulation during meaning making (Ochner & Gross, 2005). Given its “active” stance, it is not surprising that positive reappraisal has been found to reduce distress during a number of stressful life experiences, including health-related issues such as cancer and myocardial infarction, as well as more global stressors such as natural disasters (Nowlan, Wuthrich & Rapee, 2015).

**Socioemotional Selectivity Theory**

In general, older adults show improvements relative to younger adults in emotional wellbeing (Ngo, Sands, Isaacowitz, 2016). For example, older adults report greater social support and fewer daily hassles (Fiksenbaum, Greenglass & Eaton, 2006) as well as more satisfying social lives (Luong, Charles & Fingerman, 2011). Moreover, older adults demonstrate lower levels of physiological reactivity in response to negative experiences (Levenson, Carstensen, Friesen & Ekman, 1991) and have lower rates of disorders implicated in emotion dysregulation such as depression and anxiety (Kessler, Amminger, Aguilar-Gaxiola, Alonso, Lee & Ustun, 2007). Thus, current research points to the conclusion that older adults experience more social and emotional wellbeing than their younger counterparts.

The Socioemotional Selectivity Theory (SST) provides an explanation for this phenomenon, asserting that adults’ motivational goals, governed largely by the recognition that time is limited and life is finite, are responsible. Specifically, when people are young and free of major distress/mental illness, they typically view time as expansive, and therefore prioritize motivational goals related to knowledge and novelty. Conversely, older adults who view time as limited, prioritize motivational goals related to emotional wellbeing and the preservation of life’s meaningful experiences over time (Carstensen, 2006).

According to SST, greater emphasis on emotionally salient goals leads to a greater focus on, attention to, and memory for positive information (Carstensen, Mikels & Mather, 2006). This
phenomenon, is termed the “positivity effect,” and refers to the observation that older adults attend to and remember more positive and less negative stimuli compared to younger adults (Knight et al., 2007). As an example, in one study where older adults were shown positive, negative, and neutral stimuli followed by a timed delay, older adults recalled an increased amount of positive information compared to younger adults (Charles, Mather & Carstensen, 2003). Important to understand is that the observed positive effects in cognitive processing are understood as the way in which older adults accomplish their positive emotional goals; that is, it is motivational in nature (Reed & Carstensen, 2012).

**Cognitive Control.** The Cognitive Control Model (CCM) broadens the scope of SST by emphasizing the “top-down” nature of the positivity effect and asserts that the accomplishment of positive emotional goals is best achieved when one has adequate higher-order cognitive resources to direct towards them (Mather, 2012). In order to achieve positive emotional goals, older adults must engage in emotional regulation, which requires sufficient cognitive control abilities (Ochsner & Gross, 2005). The term cognitive control refers to broad set of cognitive processes that allow information processing and behavior to vary adaptively from one moment to the next, depending on current goals (Lezak, Howieson, Bigler & Tranel, 2012). Cognitive control encompasses a number of skills including, but not limited to, the ability to: (1) selectively attend to relevant information while also filtering out distractors (selective attention and interference suppression); (2) mentally manipulate information that is currently being held in one’s mind (working memory); (3) flexibly switch between tasks (set-shifting); and (4) inhibit inappropriate response tendencies (response inhibition) (Lezak et al., 2012). They are also known as executive functions.
Research has shown that older adults with intact executive functioning skills more frequently display the positivity effect when recalling emotional stimuli (Mather & Knight, 2005). For example, when manipulating one’s available resources in a divided attention task (i.e., decreasing available cognitive control resources), older adults do not display the positivity effect. With that in mind, CCM posits that older adults who are able to direct cognitive resources (i.e., working memory, set-shifting and response inhibition abilities) towards positive emotional goals are more likely to successfully orient their attention and memory towards positive stimuli (i.e., engage emotion regulation strategies), and consequently, achieve a more meaningful, emotional experience (Mather & Knight, 2005).

Stress. Although older adults typically experience less negative emotion in some situations, older adults may display increased negative emotion (Mroczek & Almeida, 2004) and arousal in emotionally stimulating situations (Uchino, Birmingham & Berg, 2010). Labouvie-Vief, Gilet and Mella (2014) state that in highly arousing, stressful situations, age related cognitive decline (i.e., diminished processing speed, working memory, executive functioning and episodic memory) may hinder the accomplishment of positive emotional goals. Specifically, increased stress may impede the accomplishment of positive emotional goals by depleting the cognitive resources (i.e., working memory, set-shifting and response inhibition abilities) needed to successfully engage in emotion regulation strategies. Therefore, uncovering factors that withstand common stressors of aging and also contribute to older adults’ cognitive control in order to increase meaning in life is an overarching goal of this study. One proposed factor is dispositional mindfulness.

Dispositional Mindfulness

Mindfulness is conceptualized and studied in a variety of contexts. Most commonly, it is examined as it naturally occurs and varies across the population as an aspect of personality (i.e.,
trait or disposition). It is also studied as a temporarily induced state (i.e., experimental manipulation) in meditators and through clinical intervention (e.g., 8 week course of MBSR) (Ostafin, Robinson & Meier, 2015). Therefore, an important distinction is made between dispositional mindfulness and the state of mindfulness, in that, the state of mindfulness is understood as a mode of awareness characterized by present centered attention to one’s current experience that is free of preoccupation, while dispositional mindfulness reflects the propensity towards exhibiting such nonjudgmental awareness naturally (Garland 2007; Quaglia, Brown, Lindsay, Creswell & Goodman, 2015).

Mindfulness is particularly salient for older adults’ wellbeing. For example, mindfulness has been shown to positively impact aspects of physical health including improved immune function, reduced blood pressure and cortisol levels (Carlson, Speca, Faris & Patel, 2007). It has also been shown to produce positive effects on psychological wellbeing (Chiesa & Serretti, 2009), enhance cognitive functioning in older adults (Jha, Krompinger & Baime, 2007), and slow cognitive impairment in Alzheimer’s disease (Quintana-Hernandez et al., 2016).

Mindfulness may also lead to increased cognitive and emotional control. For example, expert meditators perform significantly better than novices on tasks of selective and sustained attention (van den Hurk et al., 2010) and show greater cortical thickness in the frontal cortices (Lazar et al., 2005). Mindfulness has also been shown to counter normal age-related decline thereby providing support for the role of mindfulness as a buffer against the neurobiological cascades of aging (Pagnoni & Cekic, 2007). Lastly, dispositional mindfulness is associated with neural recruitment of the cortico-subcortical circuitry engaged in emotional regulation (Way, Creswell, Eisenberger & Lieberman, 2010). Taken together, evidence of mindfulness’ role in increased cognitive and emotional functioning suggests it may help older adults shift cognitive
processing and accomplish positive emotional goals, even in the face of more emotionally complex and/or arousing situations.

**Statement of the Problem**

Dispositional mindfulness has been associated with positive outcomes in the broader mental health literature. However, less is known about dispositional mindfulness in older adults and how it may be relevant to factors important to successful aging, such as meaning in life. In order to begin to answer these questions (Garland, Farb, Goldin & Fredrickson, 2015) recently advanced the Mindfulness to Meaning Theory, which attempts to explain the process by which mindfulness decreases stress and promotes meaning in life through successful emotional regulation.

**Mindfulness to Meaning Theory**

Focusing on mindfulness and meaning in life, the Mindfulness to Meaning Theory (MMT) explores specific ways in which dispositional mindfulness leads to increased meaning in life through positive emotion regulation. MMT posits that increased dispositional mindfulness leads to increases in meaning in life through a process of promoting positive reappraisal in stressful contexts (Garland et al., 2015). In brief, the MMT asserts that mindfulness allows one to decenter from stress appraisals into a metacognitive state of awareness. This state then broadens attention control to previously unnoticed (and likely more positive) information, which accommodates reappraisal (i.e., reframing) of stressful events that then reduces distress. To illustrate, a change in mobility status may be initially interpreted as terrible, but later reappraised as the catalyst for healthy lifestyle changes and a source of gratitude for one’s intact abilities. Reappraisal then motivates future behavior and promotes deeper sense of purpose over time (Garland et al., 2017). Ultimately, the more we are able to engage in this type of process, the more likely it will continue to occur, which leads to reduced stress and enhanced wellbeing.
Taken together, the proposed study hypothesized that increased dispositional mindfulness will lead to more frequent use of positive reappraisal as well as improved executive functions. This in turn, will lead to greater meaning in life. Furthermore, the relationship between dispositional mindfulness and executive functioning is hypothesized to weaken as stress increases.

**Purpose of this Study**

This study investigated the relationship between dispositional mindfulness and meaning in life, while taking into consideration older adults’ available cognitive resources and use of positive reappraisal. The primary purpose of this study was to determine if the relationship between dispositional mindfulness and meaning in life was mediated by executive function and positive reappraisal. Additionally, this study examined the moderation effect of perceived level of stress between dispositional mindfulness and executive functioning. To the researcher’s knowledge, no studies have been conducted that examine the implications of MMT related to older adults. Overall, the current study aimed to integrate what is known about normal aging with what is known about positive psychological processes related to mindfulness.

**Research Questions**

- **Question 1**: Does dispositional mindfulness predict increased meaning in life?
- **Question 2**: Is the relationship between dispositional mindfulness and meaning in life mediated by executive functioning and positive reappraisal?
- **Question 3**: Is the proposed model moderated by stress, such that higher levels of stress weaken the ability of individuals with greater dispositional mindfulness to direct cognitive resources towards positive emotional regulation, thus resulting in less meaning in life?

**Statement of Hypotheses**

- *Hypothesis 1(a)*: Dispositional mindfulness will positively correlate with presence of meaning in life.
- *Hypothesis 1(b)*: Executive functioning and positive reappraisal will positively correlate with presence of meaning in life.
• **Hypothesis 2 (a):** Dispositional mindfulness will be positively correlated with positive reappraisal.

• **Hypothesis 2 (b):** Dispositional mindfulness will be positively correlated with executive functioning.

• **Hypothesis 3 (a):** The relationship between dispositional mindfulness and presence of meaning in life will be mediated by positive reappraisal and executive functioning.

• **Hypothesis 4 (a):** The mediational effect of dispositional mindfulness and executive functioning will be moderated by perceived stress.

**Definitions of Terms & Operational Definitions**

**Dispositional Mindfulness**

While the state of mindfulness is characterized by an attentive, nonjudgmental awareness of cognition, emotion, and sensation without fixation on thoughts of past and future (Garland, 2007), dispositional mindfulness reflects one’s natural propensity towards exhibiting such nonjudgmental awareness. Simply put, dispositional mindfulness refers to the degree of day-to-day mindful attention that varies in individuals (Brown & Ryan, 2003). Therefore, dispositional mindfulness typically concerns the general quality and frequency of “open or receptive attention to and awareness of ongoing events and experience” over time (Brown & Ryan, 2003, p. 245). The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) was developed to assess naturally occurring variations in mindfulness and was used to measure dispositional mindfulness along one factor: awareness/attention.

**Executive Function**

Executive function processes include a broad class of mental operations that help us organize incoming information for tasks such as decision making or problem solving, and includes neurocognitive skills such as working memory, set shifting and response inhibition (Lezak et al., 2012). Working memory is understood as a system that works to register, recall and
mentally manipulate information within short-term memory (Baddeley, 1995). Digit span tests are commonly used with the digits forward component used to assess basic auditory attention and the backward and sequencing components used to assess working memory. Working memory was assessed through participants’ performance on Digit Span, a subtest of the Wechsler Adult Intelligence Scale, Fourth Edition (WAIS-IV; Wechsler, 2008). Set shifting is defined as our ability to flexibly switching between tasks. Set-shifting was assessed through participants’ performance on Trial Making Test (Parts A & B) (Reitan, 1958). Lastly, response inhibition is the ability to inhibit inappropriate response tendencies (Lezak et al., 2012) and was assessed using the Stroop Color and Word Test (Golden, 1978).

**Positive Reappraisal**

When confronted with threat, the brain activates a physiological response involving autonomic, neuroendocrine, metabolic, and immunologic changes that are intended to facilitate adaptation to one’s environment (Lupien, McEwen, Gunnar & Heim, 2009). Engaging in cognitive reappraisal allows one to modify the consequences of the stress response through reshaping the meaning of the stressor and subsequently, the behavioral responses to it. Specific to this study, positive reappraisal therefore, is understood an adaptive process by which stressful events are redefined as benign, valuable or beneficial (Garland, Gaylord & Park, 2009). It was measured with the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski et al., 2001).

**Meaning in Life**

The current literature base on the topic of meaning in life has produced a variety of definitions. The current study takes the position that meaning in life is best understood as the presence of (Presence of Meaning in Life; PML), meaning in life. (Steger, Frazier, Oishi & Kaler, 2006). PML is defined as the extent to which individuals see significance or meaning in their lives, whereas search for meaning (Search for Presence of Meaning in Life; SML) refers to
the pursuit of a meaningful existence (Bodner, Bergman & Cohen-Fridel, 2014). Therefore, meaning in life was measured only using the PML subscale of the Meaning in Life Questionnaire, (MLQ; Steger et al., 2006).

**Perceived Stress**

Perceived stress refers to the feelings or thoughts a given person has about how much stress they are under at any given point in time (Cohen, Kamarck & Mermelstein, 1983). The construct of perceived stress incorporates the following: feelings regarding the ability to control and predict one’s life, how often one has to deal with daily hassles, the amount of unwanted change present, and one’s confidence in their own ability to overcome a stressor given the resources available. Simply put, perceived stress refers to how an individual feels about the general stressfulness of their life and their ability to handle it; it was measured using the Perceived Stress Scale (PSS; Cohen, Kamarak, & Mermelstein, 1983).
CHAPTER TWO

Age Related Decline in Cognitive Functioning

With aging comes some degree of cognitive decline (Christensen, 2001) and while some aspects of cognition remain grossly intact (e.g., procedural memory, vocabulary, storage of general knowledge; Rog & Fink, 2013), changes in brain structure and function (e.g., decreased white matter density and cortical thinning) are associated with normal age declines (Der, Allerhand, Starr, Hofer & Deary, 2009). As such, normal aging is commonly associated with decreases in aspects of cognitive efficiency (i.e., the level of difficulty an individual can perform a task with a certain amount of accuracy) through reductions in abilities such as processing speed and working memory capacity (Rog & Fink, 2013).

Slowed processing speed (i.e., the rate at which tasks of varying difficulty can be performed) is suspected to mediate cognitive efficiency by restricting the speed at which cognitive processes can be executed (Park & Reuter-Lorenz, 2009). Reduced processing speed also impacts the quality and accuracy of older adults’ performance on cognitive tasks (Finkel, Reynolds, McArdle & Pedersen, 2007). The consequences of reduced processing include decreased working memory (Finkel, Reynolds, McArdle & Pedersen, 2007). In turn, changes in working memory are related to decreased ability to suppress processing of irrelevant stimuli (i.e., inhibitory mechanisms of selective attention). This in turn, can lead to attentional impairments that account for deficits in various aspects of executive performance including set-shifting and cognitive flexibility (Park & Reuter-Lorenz, 2009).

Taken together, aging is associated with declines in executive functioning. Executive functions are carried out by the coordinated activation of multiple brain areas within the “cognitive control network.” This network includes the dorsolateral prefrontal cortex, medial prefrontal cortex (including the anterior cingulate cortex), parietal cortex, and cerebellum.
(Bellebaum & Daum, 2007; D’Esposito, 2007). Important to note, the Prefrontal Cortex (PFC) supports executive functioning by actively “maintaining rules online” in order to evaluate incoming information, as well as internal states to guide response selection toward a current goal (Miller & Cohen, 2001).

**Age Related Increase in Wellbeing**

Despite the fact that aging is associated with declines in executive functioning, older adults seem to experience higher levels of emotional wellbeing as they age (Ngo, Sands, Isaacowitz, 2016). For example, older adults report higher levels of satisfaction with family (Charles & Piazza, 2009), fewer stressors (Aldwin, Jeong, Igarashi & Spiro, 2014) less negative emotion (Charles, Reynolds & Gatz, 2001) as well as more satisfying interpersonal relationships (Luong, Charles, & Fingerman, 2010) compared to younger adults. As discussed in the first chapter, increased emotional wellbeing may be related to older adults’ tendency to attend more readily to positive over negative information relative to younger adults (Carstensen, Mikels, & Matger, 2006). For example, studies using eye-tracking technology to examine visual attention have found age-related positivity effects, in that older adults tend to look away from angry or sad faces and direct their attention toward happy faces. In contrast, younger adults focus more on fearful faces (Isaacowitz, Waldinger, Goren, & Wilson, 2006). Thus, older adults tend to disengage more readily from negative stimuli within their environments compared to younger adults. Again, this phenomenon, termed the “positivity effect,” refers to the observation that older adults attend to and remember more positive and less negative stimuli compared to younger adults (Carstensen & Mikels, 2005).

**Improvement in Emotion Regulation**

The positivity effect appears to assist older adults in regulating their emotions during unavoidable interactions with negative stimuli. For example, in an experimental study in which
older and younger adults watched disgusting videos of surgical operations, younger adults showed no difference between the control condition (i.e., just viewing with no instructions termed “natural viewing”) and the increasing emotional reaction condition. Conversely, older adults showed no difference between the control condition and the decreasing emotion reaction condition. The authors concluded that older adults tend to focus away from negative content, whereas younger adults tend to amplify their negative emotions during natural viewing (Kunzmann, Kupperbusch, & Levenson, 2005). This study suggested that older adults more readily disengage from negative content as a form of emotion regulation. Similarly, in a study where participants were asked to remark on negative comments directed toward them, younger adults were more likely to retaliate with disparaging remarks, whereas older adults made fewer and less negative remarks. Moreover, the younger adults were more likely to dwell on negative information than older adults (Charles & Carstensen, 2008). Taken together, not only do older adults disengage from negative content, they tend to naturally diminish negative affect once induced.

**The Paradox of Aging**

Many of the same executive functioning processes used to regulate attention, memory and thoughts in non-emotional contexts are also used in the regulation of emotion (Ochner & Gross, 2008). For example, prefrontal systems responsible for emotion regulation including the dorsal and lateral regions of the PFC, have also been linked to selective attention and working memory. Similarly, ventral regions of the PFC implicated in response inhibition are also implicated in the regulation of emotion (Hölzel et al., 2011). Of note, emotion regulation, and positive reappraisal in particular, is associated with increased activity in the PFC and decreased activation in the amygdala, a brain region important in emotional processing. This top down
regulation of the amygdala by the PFC is recognized as a classical neural signature of cognitive reappraisal (Banks, Eddy, Angstadt, Nath & Phan, 2007).

The paradoxical relationship between declines in cognitive functioning and improvement in emotion regulation across aging gives rise to a number of theoretical models. For instance, while lateral brain structures tend to decline with age, medial brain structures are known to remain relatively intact (Fjell et al., 2009; Lalanne, Rozenberg, Grolleau, & Piolino, 2010). According to Martins and Mather (2016) the maintenance of medial areas of the prefrontal cortex may be key to the conservation of emotion regulation despite declines in the lateral PFC.

Another perspective is provided by the Socioemotional Selectivity Theory (SST; Carstensen, Isaacowitz, & Charles, 1999), which suggests that changes in motivation explain the paradoxical relationship between cognitive and emotional functioning.

**Socioemotional Selectivity Theory**

SST postulates that there are two primary motivational goals related to human behavior and temporal perspective: those dedicated to emotional meaningfulness and hedonic experience, and those dedicated to the acquisition of knowledge and information gain. Younger adults who view time as more expansive are likely to prioritize knowledge acquisition and novelty, whereas older adults who view their time as more limited, are motivated to prioritize positive emotion-related goals (Carstensen et al., 1999). Stated differently, people change their perspective as the constraints of the finality of life become increasingly present. These changes in perspective allow older adults to navigate their environments in such a way, that they more frequently avoid negative experiences. This results in a higher ratio of meaningful experiences and greater emotional wellbeing. Since older adults prioritize emotionally salient goals, SST posits that this emphasis leads to greater attention to, and memory for, positive over negative information when compared to their younger counterparts. Greater attention to and memory for positive
information is what leads to the positivity effect described early and is best understood as the way in which older adults accomplish their positive emotional goals (Reed & Carstensen, 2012).

To compliment this perspective from a neurocognitive standpoint, we can draw from the Fronto-amygdalar Age-related Differences in Emotion Theory (FADE; Davis, Dennis, Daselaar, Fleck & Cabeza, 2008). FADE postulates that older adults’ tendency to prioritize positive emotional experiences is made possible through the PFC’s exertion of cognitive control to inhibit amygdala responses to negative stimuli (St. Jacques, Bessette-Symons & Cabeza, 2009). This is supported by observations of decreased activation within the amygdala, as well as a greater tendency to recruit more of the prefrontal cortex (Gunning-Dixton et al., 2003) when perceiving negative stimuli in older, compared to younger adults. FADE provides a unique prospective and sound explanation for the role of motivation in increased wellbeing despite age-related cognitive changes. As an example, if the amygdala were truly less responsive (due to changes in brain structure/function rather than top-down control) a difference in responses across valences and contexts would be observed. However, amygdala responses have been shown to be largely intact for older adults in response to positive stimuli (Erk, Walter, & Abler, 2008).

**The Role of Self-Referential Processing**

While lateral executive brain structures and functions associated with the prefrontal cortex tend to decline with age, medial prefrontal brain structures involved in self-referential processing remain generally intact (Gutchess, Kensinger, Yoon & Schacter, 2007). According to Martins and Mather (2016), areas of the PFC that are well maintained, namely the mPFC, may help sustain emotion regulation function in late life despite observed declines in lateral regions of the PFC. Research regarding the posterior-to-anterior shift (PASA), which describes a pattern of decreased activity in posterior brain regions such as the occipital lobe and medial temporal lobe, coupled with increased activity in anterior brain regions such as the PFC during aging, supports
this idea (Davis et al., 2008). Specifically, enhanced self-referential processing may be due to
increases in frontal activity seen in PASA.

As such, older adults engage in more self-referential processing (by recruiting the mPFC) during thinking of positive rather than negative information, and this activity is predictive of later memory for the encoded information (Gutchess, Kensinger & Schacter, 2007). Conversely, younger adults engage more readily in self-referential processing of negative stimuli and have better memory for negative self-referential information during post-tests (Martins & Mather, 2016). Thus, findings suggest that older adults tend to selectively process positive information more self-referentially, whereas younger adults tend to process negative information more self-referentially (Leshikar, Park & Gutchess, 2015). Keeping this in mind, Martins and Mather (2016) posit that by selectively increasing the self-relevance of positive, but not negative emotional situations, medial brain structures lead to increases in wellbeing. Importantly, these brain areas have been associated with the interpretation and elaboration of emotional information in a personal or meaningful way (Amodio & Frith, 2006; Qin & Northoff, 2011). Both changes in motivation as well as the maintenance of medial areas of the prefrontal cortex are likely contributory and may even complement one another in a reciprocal manner. Regardless, it appears that older adults likely attend to more positive stimuli and more readily engage in positive meaning making.

Cognitive Control Model (CCM)

Regardless of the mechanisms behind the observed paradox in aging, research has established that emotional regulation requires intact cognitive resources (Mather, 2012). As such, recent discussions of increased wellbeing in older adults have begun to incorporate the role of cognitive functioning and its influence on the positivity effect. Emphasizing the top-down nature of the positivity effect (i.e., effortful processing of information from higher order brain regions),
CCM asserts that older adults’ positive goals are implemented with the help of executive function resources (Nashiro, Sakaki & Mather, 2012). More specifically, in order to achieve goals and engage in emotional regulation, sufficient resources are needed to successfully orient attention and memory to positive material. CCM asserts that older adults with intact executive functioning will show the greatest bias towards positive stimuli as well as the most successful emotion regulation strategies.

To highlight the role of executive functioning in emotion regulation for older adults, Knight et al. (2007) focused on selective visual attention and found that during a divided attention condition (as compared to a full attention control condition), older adults’ tendency to avoid negative stimuli seen in the control condition was reversed, in that older adults spent more time attending to negative information. As such, compared with younger adults, older adults limited resources were more likely to be drawn to negative stimuli when they were distracted (Knight et al., 2007). Therefore, executive functioning is believed to be a central resource used to shift cognitive processing and attain positive emotional goals.

**Perceived Stress**

While older adults have decreased negative responses to minimally arousing situations, high arousal, emotionally complex situations that place increased demands on one’s cognitive resources, leads to increased reactivity (Ngo, Sands, & Isaacowitz, 2016). Therefore, as executive functions become overwhelmed secondary to decline, older adults become more vulnerable to the negative effects of high levels of stress. In support of this, Hess and Ennis (2012) found that when older adults displayed higher levels of reactivity (measured by systolic blood pressure), their cognitive performance suffered in comparison to younger adults. This finding provides evidence of depleted cognitive resources as task difficulty and stress increases.
Older adults have decreased negative response to low-arousal situations but increased emotional reactivity in highly arousing contexts that place demands on cognitive resources. Consequently, whereas older adults regulate low levels of negative distress quite well, they have greater difficulty when they experience chronic distress (Wrzus et al., 2012). This pattern of decreased emotion regulation in the face of increased stress can be illustrated using positive reappraisal. For example, when confronted with a stressor in the midst of a depressive episode, the associated narrowing of attention to thoughts and other environmental stimuli that confirm one’s dysphoric outlook serve to perpetuate negative thinking (Garland et al., 2015). As attention and interpretational biases intensify with time, attempts to positively reappraise events become less and less frequent, leaving depressed individuals more depressed (Garland, Gaylord & Park, 2009). One potential factor that may buffer against the effects of stress in order to preserve available cognitive resources and promote emotion regulation is mindfulness.

**Mindfulness**

At its core, mindfulness is a mode of awareness characterized by present centered attention to one’s current experience that is free from preoccupation (Garland, Gaylord & Park, 2009). Generally, mindfulness is associated with a number of positive benefits. To start, mindfulness-based interventions have been largely efficacious in the treatment of a number of clinical disorders such as anxiety and depression that are associated with negative emotional experience (Hofmann, Sawyer, Witt, & Oh, 2010). Mindfulness has also been shown to positively influence aspects of physical health including improved immune function and reduced cortisol levels (Carlson, Speca, Faris & Patel, 2007). Lastly, it has also shown to produce positive effects on psychological wellbeing (Chiesa & Serretti, 2009) and to enhance cognitive and emotional functioning in older adults (Foulk et al., 2014; Fountain-Zaragoza & Prakash, 2017; Jha, Krompinger & Baime, 2007).
Mindfulness, Attention, and Working Memory. Mindfulness also cultivates attention regulation and improves cognition (Tang, Holzel & Posner, 2015; Zeidan, Johnson, Diamond, David, Goolkasian, 2010). Many mindfulness practices emphasize focused attention through instructions such as the following: “Focus your entire attention on your incoming and outgoing breath. Try to sustain your attention there without distraction. If you get distracted, calmly return your attention to the breath and start again” (Smith & Novak, 2003, p. 77 as cited in Hozel et al., 2011). Directions such as these highlight focus on conflict monitoring, or executive attention in mindfulness, which involves the focus of attention on an object while disregarding distractors.

Neuroimaging research shows that the anterior cingulate cortex (ACC) is associated with executive attention by assisting in the detection of conflicts during information processing (van Veen & Carter, 2002). When engaged in mindfulness meditation, activation of the ACC contributes to the maintenance of attention by alerting brain systems implementing top-down regulation to resolve internal conflict (Hozel et al., 2011). Several neuroimaging studies provide evidence of the involvement of the ACC in meditation. For example, Holzel et al. (2007) illustrated that compared with age, gender, and education-matched controls, experienced meditators showed greater activation in the rostral ACC (Holzel et al., 2007). This finding suggests an effect of meditation practice on ACC activity. A similar effect (greater rostral ACC activation in meditators compared with controls) was identified when individuals engaged in a mindfulness practice while awaiting unpleasant electric stimulation (Gard et al., 2011).

Related to attention is working memory, which refers to the ability to selectively maintain and manipulate goal-relevant information without getting distracted by irrelevant information (Lezak et al., 2012). Jha, Stanley, Kiyonaga, Wong, and Gelfand (2010) examined the effects of
mindfulness practice emphasizing open monitoring (i.e., directing attention to any object that arises without reacting, and then letting thoughts related to the object pass) on working memory capacity in a cohort of pre-deployment military personnel (U.S. Marines). Over the course of the pre-deployment period, working memory capacity, as assessed by the operation span task (OS PAN; Unsworth, Heitz, Schrock, & Engle, 2005), decreased in the control group which did not receive mindfulness training. Notably, mindfulness prevented this working memory capacity decline, which is a pattern that was observed among participants that underwent periods of high stress. Moreover, working memory capacity at the end of the pre-deployment period was predicted by the amount of mindfulness practice in which participants engaged. Taken together, mindfulness may improve cognitive function.

**Mindfulness and Emotion Regulation.** Literature also suggests that mindfulness practice leads to improvement in emotion regulation (Ochsner & Gross, 2005). For example, mindfulness leads to decreased negative mood (Jha et al., 2010) and reduced reactivity to repetitive thoughts (Feldman, Greeson, & Senville, 2010). Moreover, in a seven-week mindfulness training program, healthy adults shown a reduction in emotional interference (e.g., the delay in reaction time after being presented with affective versus neutral pictures) compared to those who followed a relaxation protocol and those in a wait-list control group (Ortner, Kilner & Zelazo, 2007).

Research has also established that the practice of mindfulness leads to the reduction, regulation and transformation of negative emotions. For example, Creswell, Way, Eisenberger, and Lieberman (2007) used fMRI to show that dispositional mindfulness predicted greater prefrontal cortical activation and reduced bilateral amygdala activation. They also demonstrated that these two regions increasingly correlated in a negative direction during affect labeling
relative to control tasks. Taken together, findings indicate that high levels of dispositional mindfulness in adults lead to more effective down regulation of limbic brain regions involved in negative emotion. Stated differently, dispositional mindfulness is linked to reduced negative arousal due to decreased activity in brain regions dedicated to emotional processing. Relatedly, mindfulness also promotes increased voluntary exposure to unfavorable negative experience. For example, Niemiec and colleagues (2010) found that higher dispositional mindfulness predicted less suppression of thoughts related to death, a greater willingness to engage in thoughts of death, and less defensiveness in response to self-relevant threat. Lastly, Hill and Updegraff (2012) found that higher dispositional mindfulness predicted lower emotional liability and dysregulation in daily life. Taken together, research demonstrates that dispositional mindfulness promotes a greater ability to withstand stressful experiences over a greater period of time, less suppression and intensity of negative affect, and more effective down-regulation of negative emotion.

While a variety of psychological disorders characterized by emotional dysregulation such as post-traumatic stress disorder (Shin et al., 2005) and generalized anxiety (Monk et al., 2008) are associated with dysfunction in the frontal-limbic network (i.e., increased amygdala activation and decreased PFC activation), mindfulness is associated with improved emotional regulation and improved prefrontal control over amygdala responses. For instance, during mindfulness meditation, experienced mindfulness meditators show greater activation in the dmPFC and ACC compared with non-meditators (Holzel et al., 2007). In a similar vein, after participants completed an 8-week mindfulness-based stress reduction course, Farb et al. (2007) found increased activity in participants’ ventrolateral PFC, which was interpreted as improved inhibitory control. Following engagement in a mindfulness-based stress reduction course, social
anxiety patients showed a quicker decrease of activation in the amygdala (Goldin & Gross, 2010). Taken together, evidence suggests that mindfulness meditation involves the activation of brain regions relevant to emotion regulation. Furthermore, research suggests that the activation of these regions may be altered through mindfulness practice.

**Mindfulness and Positive Reappraisal.** Mindfulness may specifically promote positive reappraisal. For example, in a large cross-sectional study of mindfulness and positive reappraisal, including participants across five samples (e.g., college students, alcohol dependent adults and chronic pain patients) dispositional mindfulness was correlated with positive reappraisal (r=.41) even after controlling for positive affect (Hanley & Garland, 2014). Additionally, Garland, Gaylord and Fredrickson (2011) conducted a prospective study of 339 adults in an eight-week long mindfulness-based stress and pain management program. They found that increases in dispositional mindfulness over the course of training correlated with increases in positive reappraisal and most importantly, that this relationship was partially mediated by increases in positive reappraisal. Similarly, a quasi-experimental study comparing university students participating in a mindful communication course found that mindfulness training was associated with significant increases in dispositional mindfulness, which was correlated with increases in positive reappraisal compared to a standard communications curriculum condition (Huston, Garland & Farb, 2011). Overall, research points to the conclusion that dispositional mindfulness leads to increased positive reappraisal.

Findings are replicated in brief interventions. For example, in an experimental study of brief mindfulness training, the degree of state mindfulness achieved during meditation was positively associated with increases in reappraisal. Most importantly, path analysis revealed that the indirect effect between brief mindfulness training and reappraisal was significant through
state mindfulness (Garland, Hanley, Farb & Froeliger, 2015). Another recent study found that individuals who completed a short course of mindfulness training (MBCT) evidenced significantly greater positive reappraisal abilities during an experimental negative mood induction manipulation, compared to a matched control group or group of participants that who are treated with cognitive-behavior therapy (Troy, Shallcross, Davis, & Mauss, 2013).

**Mindfulness to Meaning Theory**

Although important, exclusively focusing on the reduction of negative mental states and behaviors does not fully explain the mechanisms underlying the benefits of mindfulness. For example, studies examining the effects of mindfulness versus relaxation training have shown that while both lead to reduced distress and more positive mood states, only mindfulness practices lead to significant decreases in ruminative thoughts (Jain et al., 2007). Such findings highlight the idea that one of mindfulness’ mechanisms of action may include positive cognitive coping processes. Therefore, a comprehensive account of mindfulness should also take into consideration how the practice of mindfulness leads to enhanced wellbeing and the use of positive reappraisal to form meaning in the face of adversity.

The literature on this topic explains that in the nonjudgmental state afforded by mindfulness, a person is more likely to realize and/or learn that thoughts are automatic and not necessarily our reality (i.e., thoughts are not facts). As previously discussed, reappraisal of a stressful life event is a process that requires an effortful attentional stance in order to shift away from the stressor to its interpretive context. According to Garland, Gaylord and Park (2009) mindfulness is a key factor that can lessen the impact of stressful life events through decentering, (i.e., stepping back from thoughts, emotions and sensations) (Shapiro, Carlson, Astin & Freedman, 2006). Through decentering, mindfulness is thought to provide a buffer from automatic appraisals by clearing working memory (Teasdale & Chaskalson, 2011) and creating
some “psychological space” for greater perspective taking and cognitive set shifting. Indeed, mindfulness is associated with increased cognitive flexibility (Moore & Malinowski, 2009) and the capacity to re-orient attention (Jha, Krompinger & Baime, 2007). In sum, the nonjudgmental, metacognitive features of mindfulness are thought to disrupt negative emotional reactions and subsequently expand attention to include previously unattended information relevant to the stressor and its broader socio-environmental context.
CHAPTER THREE

Methodology

This chapter will be divided into four subsections. First, the characteristics of the participants will be described in detail. Second, procedures will be described regarding how data was collected. Third, the psychometric properties of each instrument will be outlined. In the fourth section, a description of the specific study design and analyses conducted to test the hypotheses will be provided.

Participants

This study’s aim was to determine the relationship between dispositional mindfulness, executive functioning, positive reappraisal and meaning in life among older adults. Therefore, the study was limited to adults 65 and older. No other exclusion was made based on gender, sexual orientation, race, or ethnicity. A convenience sample of self-selected participants was recruited through solicitation using flyers (placed in mailboxes) at local continuing care retirement communities (CCRCs). The Springpoint Communities are continuum of care residential centers offering a broad spectrum of specialized housing, recreational and health care services for adults. Residents range from individuals of independent living status to individuals with moderate physical/ cognitive needs who reside in the assisted living component of the facility. Participants in this study were residents from the independent living section of the Springpoint communities. Solicitation materials included an overview of the study, as well as a description of requirements of participation, time commitment required to participate, and potential benefits and risks associated with participation. Participants arranged an appointment time to participate (via telephone) and were reminded that they may withdraw at any time leading up to and/or during that appointment.
**Procedure**

Data was collected anonymously in order to protect the identity of individuals. More specifically, this study utilized numbers to code data for the participants. A master list matching codes to participants was kept by the principal investigator in a locked cabinet at Seton Hall University and only the principal investigator had access to the master list. Participants were informed that their names were not used in connection with the study and that their responses were not linked to their identity. Information and data received from the measures was stored on a password protected USB memory key, which was also kept in a locked secure location within the principal investigator’s office. In addition, informed consent was kept separate from responses to ensure anonymity. Interested parties who have questions or concerns about the study were advised to contact the principal investigator or the Seton Hall University IRB with any questions.

Participants varied in cognitive functioning between little to no impairment and mild cognitive impairment due to age-related cognitive declines. However, no residents who lacked capacity to consent participated in the study. In order to ensure this, immediately following informed consent, participants were given the Mini-Mental State Examination (MMSE) at the beginning of the assessment procedures. The MMSE is a tool that can be used to systematically and thoroughly assess mental status. It is an 11-question measure that tests five areas of cognitive function: orientation, registrations, attention and calculation, recall and language. The maximum score is 30. A score of 23 or lower is indicative of cognitive impairment. If participants obtained a score below 23, they were thanked for their participation and the study was concluded. The following statement (see Appendix C) was read aloud as a script in such instances: “Thank you for your participation in this study! I want to thank you for taking the time to volunteer today. For some people this assessment is longer, while for others it is shorter.
That being said, this concludes the end of our time together, as we have gathered all the information we need.”

If participants received a score above 23, level of social support, SES and quality of education were then assessed along with all demographic information such as age and ethnicity. Next, participants were given the neuropsychological assessments. Specifically, participants were given neuropsychological assessments in the following order: (1) Matrix Reasoning; (2) Vocabulary (3) Coding; (4) Digit Span; (5) Trail Making Test (Parts A & B); (6) Stroop Color and Word Test; and (7) Symbol Search. This specific order was chosen in order to separate the tasks involving a speeded element (i.e., with instructions stating “complete as quickly as you can”). Lastly, participants were given the self-report measures related to dispositional mindfulness, positive reappraisal, meaning in life, and perceived stress. All neuropsychological evaluations were scheduled through the primary investigator. However, a portion of the evaluations were administered by a doctoral level research assistant. All evaluations were scored and then entered into SPSS by the primary investigator.

**Measures**

The Mini-Mental State Examination (MMSE) was first used to establish capacity to consent. Basic attention and working memory were measured using the Wechsler Adult Intelligence Scale, Fourth Edition (WAIS-IV; Wechsler, 2008) subtest of Digit span (e.g., Digit Span Forward, Digit Span Backward, and Digit Span Sequencing). Inhibitory control was measured using the Stroop Color and Word Test (Golden, 1978) and set-shifting was measured using the Trailmaking Test (Parts A & B) (Reitan, 1979). Processing speed was measured by the WAIS-IV (Wechsler, 2008) subtests of Coding and Symbol Search. Abbreviated intelligence was measured using the Wechsler Abbreviated Scale of Intelligence-Second Edition-II (WASI-II; Wechsler, 2011). The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003)
was used to measure dispositional mindfulness. The Cognitive Emotion Regulation Questionnaire (CERQ: Garnefski et al., 2001) was used to measure positive reappraisal. Perceived stress was measured using the Perceived Stress Scale (PSS; Cohen, Kamarak, & Mermelstein, 1983). Lastly the meaning in life questionnaire (MIL; Steger, 2006) was used to measure meaning in life.

**Mini Mental State Examination (MMSE).** The MMSE is an 11-item psychometric screening assessment of cognitive functioning that is used to screen patients for cognitive impairment across a number of domains including orientation, attention, calculation, language and immediate and delayed memory. An extensive normative data set is available for the MMSE based on both age and education, which has been updated in the current manual (Folstein, Folstein & McHugh, 1975). The most commonly used cut-off score for the MMSE is 23, with scores lower than this suggested moderate-severe cognitive impairment. Scores between 27-30 represent “normal” cognitive functioning, whereas 21-26 typically indicates mild cognitive impairment (Folstein et al., 2001). Test re-test reliability for the MMSE has been examined in both cognitive impaired and intact adults. Results have produced stable coefficients typically ranging from .79 to .98 (Folstein, Folstein & McHugh, 1975). Validity studies examining the sensitivity and specificity of the MMSE have demonstrated adequate sensitivity in detecting dementia. In a recent study comprised of older adults, the standard MMSE cut-off score of 23 or below yielded a sensitivity of .66, specificity of .99 and an overall correct classification rate of 89% in detecting dementia.

**Weschler Abbreviated Scale of Intelligence-Second Edition (WASI-II).** The Wechsler Abbreviated Scaled of Intelligence-Second Edition (WASI-II; Wechsler, 2011), a revision of Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) is an individually
administered assessment of intelligence for participants aged 6 through 90 years old. It provides composite scores that estimate Verbal Comprehension and Perceptual Reasoning Abilities. The WASI-II was used to obtain an estimate of IQ scores quickly and effectively. Average reliability coefficients were calculated for individual subtests as well as Full Scale IQ estimates based on two and four subtests with Fisher’s z. Average reliability estimates for the adult sample for individual subtests, Block Design, Vocabulary, Matrix Reasoning and Similarities were .91, .92, .90 and .91, respectively. Average reliability estimates for the adult sample for the Verbal Comprehension and Perceptual Reasoning Composite Scores were .95 and .94 respectively.

Average reliability estimates for the adult sample for Full Scale IQ estimates based on two and four subtests were .94 and .97 respectively. Concurrent Validity was established with WASI, WISC-IV, WAIS-IV and the KBIT-2.

Vocabulary (Wechsler, 2011) is a task of verbal comprehension that is designed to measure participant’s word knowledge and verbal concept formation. Vocabulary includes 3 picture items and 28 verbal items. For picture items, participants are asked to name the objected presented. For verbal items, the participants are asked to define words that are presented both visually and orally. Matrix Reasoning (Wechsler, 2011) is a task of perceptual reasoning that is designed to measure the ability to analyze and logically reason with abstract visual stimuli. This subtest includes 23 items and involves the viewing of an incomplete matrix then selecting the response option that completes the matrix or series. Together, Vocabulary and Matrix Reasoning correlate with the full administration of Full Scale IQ using the WAIS-IV in the .90 range (Sattler, 2008).

Weschler Adult Intelligence Scale (WAIS-IV). The WAIS-IV (Wechsler, 2008) is the most recent revision of Wechsler’s intelligence tests for adults. It consists of 10 standard subtest
and 5 supplemental subtests individually administered for participants between the ages of 16 and 90. The test yields of Full Scale IQ (FSIQ) score and four Index scores: The Verbal Comprehension, Perceptual Reasoning, Working Memory and Processing Speed Indices. The normative group of the WAIS-IV included 2,200 individuals and was demographically representative of the U.S. population from the 2005 Census on the basis of age, gender, ethnicity, geographic region, and education. Internal consistency was reported at .71 to .96 for the individual subtests. Scores on each subtest can be compared with the normative sample by transforming raw scores to scaled scores with known means and standard deviations. For the purposes of this study, only the WAIS-IV Digit Span, Symbol Search and Coding subtests were used.

The WAIS-IV Digit Span (Wechsler, 2008) subtest is a task of working memory involving the use and mental manipulation of orally presented information. The specific subtest of Digit Span is comprised of three separate tasks: Digit Span Forward (DSF) Digit Span Backward (DSB) and Digit Span Sequencing (DSS) For DSF, the participant is read a sequence of numbers and is asked to repeat the numbers in the same order. For DSB, the participant is read a sequence of numbers and is asked to recall the numbers in reverse order. Lastly, for DSS, the participant is read a sequence of numbers and is required to repeat the numbers in ascending order.

The two subtests of the WAIS-IV Processing Speed Index, Coding and Symbol Search, were used to assess information processing speed. Coding (Wechsler, 2008) is a task of processing speed that involves visual perception and visual-motor coordination (Sattler, 2008). Using a key, the participant copies symbols that are paired with numbers within a specified time limit. Symbol Search (Wechsler, 2008) requires visual-motor coordination, psychomotor speed,
attention and speed of mental operations. Working within a specified time limit, the participant scans a search group and indicates whether one of the symbols in the target group matches. Reliability coefficients for all subtests were obtained utilizing the split-half method with Spearman-Brown correction and test-retest reliability were computed for speeded subtests (i.e., Coding and Symbol Search). Average coefficients across age groups ranged from .73 to .95 for all core subtests. Digit Span coefficients ranged from .86 to .92 in adults aged 55-90. Similarly, coefficients for Coding ranged from .86 to .89 and from .81 to .86 for Symbol Search.

**Trailmaking Test (TMT).** The Trailmaking Test (TMT Parts A & B; Reitan, 1979) is included in the Halsetead-Reitan Battery (HRB) and is one of the most frequently used tests in neuropsychology due to its high sensitivity to cognitive impairment (Mitrushina, Boone, Razni & Elia, 2005). The test consists of two conditions: Part A and Part B. In part A, participants are given a piece of paper with the numbers 1-25 scattered randomly across it in circles. They are then asked to draw lines connecting the numbers in order as quickly as possible. In Part B, participants are given a piece of paper with both numbers (1-13) and letters (A-L) scattered randomly across it. They are then asked to draw a line, alternating in order between the numbers and letters (e.g., 1-A-2-B, etc.) as quickly as possible. Two scores are yielded, each reflecting the completion time (in seconds) of each condition. During administration, if a participant makes an error in sequencing, they are corrected, which slows down overall performance time. Maximum completion time is 180 seconds for Part A and 300 seconds for Part B.

Previous studies have documented its usefulness as a measure of visual-motor tracking (Lezak, Howieson, Bigler & Tranel, 2012), sequencing abilities (Martin, Hoffman & Donders, 2003) as well as executive functioning (Burgess, 2010). Sanchez-Cubillo et al. (2009) suggested that Part A measures mainly visuoperceptual abilities, while Part B measures working memory.
and task-switching ability. The Trailmaking test is a well validated measure of executive functioning (Reitan & Wolfson, 1985). Specific to older adults, test-retest reliability with a one-year interval ranged from .53 to .64 for Part A and from .67 to .72 for Part B (Mitrushina & Satz, 1991).

**Stroop Color and Word Test.** The Stroop Test measures the relative speed of reading colors printed in incongruous ink (e.g., the word “blue” printed in red ink). The conflict interference the situation creates is called the Stroop Effect, which is believed to measure response inhibition. The specific version of the test used for this study, the Stroop Color-Word Test (Golden; 1978), has 100 items presented in five columns of 20 items on three pages. The version used consists of a word page (black printed words "red", "blue" and "green"), a color page ("X" letter printed in red, blue and green) and color-word page with the words presented on the first page with the colors printed on the second page, but colors and words do not match. The score derived is the number of correctly identified items per page within a 45 second time limit.

**Mindful Attention Awareness Scale.** The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) is a 15-item self-report measure in which respondents indicate their level of awareness and attention to present events and experiences. Participants rate items (e.g., “It seems I am ‘running on automatic,’ without much awareness of what I’m doing” & “I find it difficult to stay focused on what’s happening in the present”) on a 6-point Likert-type scale ranging from 1 (almost always) to 6 (almost never) (Brown & Ryan, 2003). A mean rating score is calculated with higher scores suggesting greater levels of mindfulness. The MAAS has demonstrated good internal consistency across a wide variety of samples (.80 - .87) and test-retest reliability over a 1-month time period ($r = .81$; Brown & Ryan, 2003).
The MAAS has also demonstrated negative relationships with stress symptoms (Carlson & Brown, 2005) as well as depressive symptoms, affect and rumination (Brown & Ryan, 2003). Brown and Ryan (2003) also found that individuals who do not have prior meditation experience vary considerably in their levels of mindfulness (i.e., there is natural variance in the population). Additionally, Brown and Ryan (2004) found that meditators scored higher on the MAAS than non-meditators and that there is a positive correlation between MAAS scores and length of time meditating among meditators. Therefore, the MAAS is considered to be an instrument of trait or dispositional mindfulness. Chronbach’s alpha for this study was .82.

**Positive Reappraisal.** The Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski & Kraaij, 2007) is a 36-item questionnaire consists of nine conceptually distinct subscales made up of four items that refer to what one thinks after the experience of stressful life events. The subscales include self-blame, other blame, rumination, catastrophizing, putting into perspective, positive refocusing, positive reappraisal, acceptance, and planning. While the scale in its entirety will be administered, positive reappraisal specifically, will be measured with the four-item positive reappraisal subscale of the Cognitive Emotion Regulation Questionnaire. Participants rate items on a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always). Individual subscale scores are obtained by summing the scores (ranging from 4 to 20). Previous research has shown that all subscales have good internal consistencies ranging from .68 to .86 (Garnefski & Kraaij 2002). The positive reappraisal subscale is an internally consistent subscale (alpha .85) which asks the respondent “how often they think they can become a stronger person as a result of what has happened” or “look for positive sides to the matter to cope with stressful events” (Garnefski, & Kraaij, 2002). Chronbach’s alpha for this study was .83.
Meaning in Life Questionnaire. Presence of meaning in life will be measured with the Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi & Kaler, 2006) which measures MIL on two dimensions: the presence of, and search for meaning in life. Participants rate 5 items on the two subscales purpose in life (e.g., “I have a good sense of what makes my life meaningful”), and search for meaning in life (e.g., “I am seeking a purpose or missions for my life”). Participants rate items on a scale ranging from 1 (absolutely untrue) to 7 (absolutely true). Items are summed by subscale, which some reversed scored. Only the PML subscale will be used in this study. Higher scores on the PML subscale indicate higher presence of meaning in life, or the extent to which participants feel their lives are meaningful. During initial development and validation Chronbach’s alphas were high for both PML and SML, .86 to .88. Test-retest stability coefficients were good (.70 and .73) and showed good internal consistency .88 and .93 for MLQ-P and MLQ-S, respectively. High convergent correlations (.61-.74) between the MLQ and other measures indicated good construct validity (Steger et al., 2006). Chronbach’s alpha for PML in this study was .77.

Perceived Stress Scale. Perceived stress will be measured using the Perceived Stress Scale (PSS; Cohen et al., 1983; Cohen & Williamson, 1988), which specifically measures the degree to which situations in a person’s life over the past month are appraised as unpredictable, uncontrollable and overwhelming. Participants rate items (e.g., “In the past month how often have you felt unable to control the important things in your life”) on a 5-point Likert scale ranging from 0 (never) to 4 (very often). Positively worded items are reverse scored and ratings are summed, with higher scores indicating more perceived stress. This is a widely used and well-validated scale. During development of the scale, the authors reported both internal consistency and test-retest reliability to be high, and significant convergent correlations with related
constructs were obtained. For example, Chronbach’s alphas ranged from 0.84 to 0.86 (Cohen et al., 1983). In a recent validation of the PSS in a sample of 778 older adults, the internal consistency reliability of the scale was assessed by Cronbach’s alpha, and concurrent validity was evaluated by examining the PSS relationship with gender, depression, anxiety, and PANAS. The internal consistency coefficient was reported at .82 and there was support for both divergent and concurrent validity (Cohen et al., 1983). Chronbach’s alpha for this study was .85.

**Covariates**

The following factors were included as covariates: intellectual functioning and processing speed. Processing speed is a basic cognitive function that subserves many other higher-order cognitive functions, including executive functioning. Thus, executive functioning is dependent on processing speed, and has been shown to effect performance on neuropsychological tasks of executive functioning (Lezak et al., 2012). In addition, Friedman et al. (2006) found updating tasks (i.e., working memory) to be highly correlated with intelligence as measured by Wechsler IQ tests. As such, although set-shifting and inhibition are frontally mediated and relatively unaffected by IQ (Arffa, 2007), performance on tests of working memory are affected by IQ. Therefore, in order to control for threats to validity, specifically confounding variables that influence performance on tests of executive functioning, measures of both IQ and processing are included in the battery. Although not a primary part of the research questions/hypothesis, including these variables in the evaluation is essential in order to reduce the chance that the observed effects are due to variables other than those intended. As such, the model will statistically control the effect of variables not included in the study.

**Design**

The current study employed cross-sectional research design in order to make inferences about the relationship between/among the study variables. More specifically, a cross-sectional
design was chosen to help define the existence, and delineate characteristics of, the particular phenomenon of interest. This study excluded the use of experimental manipulation of the study variables and therefore cannot be used to describe a cause-and-effect relationship. Rather, this design was used to study phenomena involving older adults and meaning in life.

**Analyses**

The hypotheses were tested using a mediation/moderation path analysis model with Structural Equation Modeling. Dispositional Mindfulness was entered as the independent (exogenous) variable, meaning in life as the dependent (endogenous) variable, perceives stress as a moderator, and executive functioning measures and positive reappraisal as mediators. Given the relatively small sample size, the data was later reanalyzed in order to explore the role of power in the overall findings. All secondary analyses were conducted using a macro called PROCESS (Hayes, 2013), a tool for path analysis-based mediation and moderation that utilizes bootstrapping for effect size estimation (Hayes, 2013).

**Research Questions**

- **Question 1:** Does dispositional mindfulness predict increased meaning in life?
- **Question 2:** Is the relationship between dispositional mindfulness and meaning in life mediated by executive functioning and positive reappraisal?
- **Question 3:** Is the proposed model moderated by stress, such that higher levels of stress weaken the relationship between dispositional mindfulness and executive functioning?

**Statement of Hypotheses**

- **Hypothesis 1(a):** Dispositional mindfulness will positively correlate with presence of meaning in life.
- **Hypothesis 1(b):** Executive functioning and positive reappraisal will positively correlate with presence of meaning in life.
- **Hypothesis 2 (a):** Dispositional mindfulness will be positively correlated with positive reappraisal.
• **Hypothesis 2 (b):** Dispositional mindfulness will be positively correlated with executive functioning.

• **Hypothesis 3 (a):** The relationship between dispositional mindfulness and presence of meaning in life will be mediated by positive reappraisal and executive functioning.

• **Hypothesis 4 (a):** The mediational effect between dispositional mindfulness and executive functioning will be moderated by perceived stress.
CHAPTER FOUR

Results

The purpose of this chapter is to present the results of the study. The chapter begins with a review of participant characteristics as well as the preliminary analyses and then proceeds to an explanation of the primary hypotheses plan by providing a description of structural equation modeling (SEM). In addition, an explanation for secondary analyses used given the small sample size is provided.

Characteristics of Participants

The final sample was comprised of 47 older adults. Participant characteristics are presented in Table 1. Ages ranged from 68 to 95 with a mean of 84 years. Approximately seventy percent of the sample was female and thirty percent was male. The majority of the participants in the current study were non-Hispanic White (87%) followed by Hispanic/Latino (9%), Black/African American (2%) and Asian (2%). Most participants had Bachelor degrees (40%), followed by Master degrees (30%), high school (13%) and Associates degrees (9%).

Table 1 Demographic characteristics of participants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>84.11 ±6.6</td>
</tr>
<tr>
<td>Female, %</td>
<td>70.2</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic White, %</td>
<td>87.2</td>
</tr>
<tr>
<td>Non-Hispanic Black, %</td>
<td>2.1</td>
</tr>
<tr>
<td>Hispanic White, %</td>
<td>2.1</td>
</tr>
<tr>
<td>Asian, %</td>
<td>2.1</td>
</tr>
<tr>
<td>Education, less Bachelors, %</td>
<td>21.3</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
</tr>
<tr>
<td>Married, %</td>
<td>31.9</td>
</tr>
<tr>
<td>Widowed, %</td>
<td>53.2</td>
</tr>
<tr>
<td>Divorced, %</td>
<td>10.6</td>
</tr>
<tr>
<td>Single, %</td>
<td>4.3</td>
</tr>
</tbody>
</table>

Note. n = 47; Continuous variables are presented as mean ± standard deviation and categorical variables are presented as percentage.
Preliminary Analyses

Data screening involved a number of steps to examine accuracy of data entry, the normality of distributions and multivariate outliers. First, frequencies were examined to assess for out-of-range values. Across all variables, except for the age of two participants, no out-of-range values were identified. Values were determined to be data entry errors and were corrected to reflect accurate ages. All relevant variables were calculated and checks for missing data were then performed. Across all variables, two participants had missing data for processing speed (WAIS-IV PSI) and one had missing data for cognitive inhibition (Stroop Interference). Missing data for PSI was related to difficulty with fine-motor task due to tremor disorders. Missing data for cognitive inhibition was related to an inability to differentiate between the colors due to color-blindness. As a result, both participants could not complete the measures. Missing data comprised a small percentage of the data (<5%) and was therefore replaced with the mean of all cases. All relevant variables were calculated again and checks for computation errors were performed.

Next, scores in the data set were converted into standardized scores (e.g., Z score) to determine whether there were outliers (z-scores ≥ 3.0). No univariate outliers were identified in the sample. To identify multivariate outliers (i.e., cases that revealed unusual patterns of scores in combination) a Mahalanobis distance statistic was used. Mahalanobis distance refers to the distance of one variable from the centroid of the remaining ones where the centroid is the point created by the means of all the variables (Field, 2013). Once the Mahalanobis distance statistic was calculated, the criterion of 18.47 was set based on the degrees of freedom (df) and the critical value of chi-square statistics. No multivariate outliers were identified. Lastly, for all continuous variables, normality of the distributions was assessed; non-normality is defined as skewness > 3.0 or kurtosis > 2.0 (Kline, 2004). All variables were within parameters.
Means and standard deviations were obtained for all major study variables (Table 2).

With regards to self-report measures, participants’ perceived level of stress was measured by the PSS (Cohen, 1983). High scores reflect higher levels of perceived stress. Presence of meaning in life was measured using a subscale of the MIL (Steger et al., 2006). High scores indicate more felt presence of meaning in life. Positive reappraisal was measured using a subscale of the CERQ (Garnefski et al., 2001). Higher scores indicate greater tendency to use positive reappraisal strategies. Dispositional mindfulness was measured using the MAAS (Brown & Ryan, 2003), with higher scores indicating more trait mindfulness (Garland, 2007). Working memory was measured using the Digit Span subtest of the WAIS-IV. Scores are presented as scaled scores with a mean of 10 and a standard deviation of 3. Average scores fall between 8 and 11. Set-shifting was measured using Trailmaking Test Part B and cognitive inhibition was measured using the interference T-score of the Stroop test. Scores are presented as T-scores with a mean of 50 and a standard deviation of 10. Average scores fall between 43 and 56.

**Table 2 Means and Standard Deviations of Major Study Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Stress</td>
<td>14.89</td>
<td>6.92</td>
</tr>
<tr>
<td>Regulatory Processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Reappraisal</td>
<td>13.27</td>
<td>3.96</td>
</tr>
<tr>
<td>Working Memory</td>
<td>11.79</td>
<td>2.44</td>
</tr>
<tr>
<td>Set-Shifting</td>
<td>46.60</td>
<td>7.95</td>
</tr>
<tr>
<td>Cognitive Inhibition</td>
<td>53.70</td>
<td>9.35</td>
</tr>
<tr>
<td>Dispositional Mindfulness</td>
<td>4.64</td>
<td>0.65</td>
</tr>
<tr>
<td>Meaning in Life</td>
<td>27.51</td>
<td>4.78</td>
</tr>
</tbody>
</table>

*Note. N=47*

Additionally, the major study variables’ mean and standard deviation were examined to ensure consistency with the standardization sample. All values were consistent with previous validation studies. Internal consistency reliabilities were also obtained and consistent with
previous research (range = .77-.85). Lastly, before testing the hypothesized relationships, potential differences because of gender, ethnicity and relationship status were tested for the major study variables, through separate Multivariate Analyses of Variance (MANOVA). Results of the analysis revealed no significant multivariate differences on the outcome measures for gender, ethnicity or relationship status.

Pearson correlation was used to evaluate potential linear relationships among the study variables. The result of the correlation analysis is summarized in Table 3. These correlations suggested significant relationships between perceived stress, positive reappraisal and meaning in life. Executive functioning and dispositional mindfulness were unrelated to other study variables. Additionally, because all significant correlations were below .85, there were likely no multicollinearity issues (Kline, 2004).

### Table 3 Correlations between Major Study Variables

<table>
<thead>
<tr>
<th></th>
<th>PSS</th>
<th>Pos-R</th>
<th>WM</th>
<th>SS</th>
<th>Cog-I</th>
<th>DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pos-R</td>
<td></td>
<td>-.403**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WM</td>
<td>-.190</td>
<td></td>
<td>-.025</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS</td>
<td>-.109</td>
<td>.043</td>
<td>.397**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cog-I</td>
<td>.153</td>
<td>-.156</td>
<td>.002</td>
<td>.328**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM</td>
<td>-.007</td>
<td>.245</td>
<td>.046</td>
<td>-.065</td>
<td>-.176</td>
<td></td>
</tr>
<tr>
<td>MIL-P</td>
<td>-.330*</td>
<td>.288*</td>
<td>.065</td>
<td>.138</td>
<td>.004</td>
<td>.097</td>
</tr>
</tbody>
</table>

*Note. *p < .05 (2-tailed), **p < .01 (2-tailed). PSS = Perceived Stress; Pos-R = Positive Reappraisal, WM = Working Memory, SS = Set-Shifting, Cog-I = Cognitive Inhibition, DM = Dispositional Mindfulness, MIL-P = Presence of Meaning in Life.

**Primary Analysis**

**Structural Equation Modeling.** In the present study, I hypothesized associations among the multiple variables (i.e., dispositional mindfulness, perceived stress, executive functioning, positive reappraisal and meaning in life). Therefore, Structural Equation Modeling (SEM) was used to test the correlational links between the variables. Specifically, hypotheses were tested using a mediational path analysis model with SEM. Dispositional mindfulness was entered as the independent variable, meaning in life as the dependent variable, and positive reappraisal and
executive functioning as the mediational variables. Perceived stress was added as a moderator of the relationship between the IV and executive functioning. Based on the $N: q$ rule, which describes the power, “... in terms of the ratio of cases ($N$) to the number of model parameters that require statistical estimates ($q$)” (Fonseca, 2013, p. 12), a subject to parameter ratio of 12:1 is required for sufficient power in the current model. There are 5 measured variables in the present model (1 independent variable, 2 mediators, 1 moderator and 1 dependent variables), along with their 5 corresponding parameter error estimates. Thus, using the $N: q$ rule, with 12 participants per each parameter (6), the minimum number of participants needed for sufficient power was 72 participants. This is consistent with sample size empirical studies with SEM (e.g., Kim, 2005; Wolf, Harrington, Clark, & Miller, 2013).

In the present study, data collection was capped at 47 participants. There are a number of reasons why this course of action was determined to be the most appropriate given the learning objectives and overall goals throughout this learning process. To start, taking into account the practical aspects of managing this project, concerns were raised about the study’s overall feasibility. This study required an intensive time commitment dedicated to training research assistants in standardized test administration, psychometric test properties and scoring. The intensity of training required was underestimated. Even so, it was an extremely rewarding experience to step into the role of teacher. Furthermore, it allowed for a fuller appreciation of the comprehensive knowledge base and complexity of skill required for neuropsychological evaluation. Additionally, this study strived to collect comprehensive neuropsychological data through assessment of various covariates, a number of executive functions as well as the self-report questionnaires. As a result, each evaluation required 2.5 hours of time for administration and scoring. Again, time spent in data collection was underestimated; however, insight into the
requirements of rigorous, quality research was gained. Keeping this in mind, the intensive time commitment and knowledge gained were weighted against the overall goal of project completion and scientific production.

Given the relatively small sample size, it was decided that the data would be later reanalyzed in order to explore the role of power in the overall findings. All secondary analyses were conducted using a macro called PROCESS (Hayes, 2013) in SPSS statistical software (Version 24). PROCESS is a tool for path analysis-based mediation and moderation that utilizes bootstrapping for effect size estimation (Hayes, 2013). Bootstrapping allows for resampling by repeatedly taking subsamples from the original data collected and computing the effect size within each subsample. This process is repeated thousands of times to estimate the shape of the sampling distribution for the desired effect size. There are two key strengths to using the PROCESS bootstrapping approach. First, it does not require a normal sampling distribution, which allows for testing of effects in the presence of non-normality (Hayes & Preacher, 2014; Hayes & Scharkow, 2013; Preacher & Hayes, 2004). Second, it can be used in smaller samples because bootstrapping allows for greater statistical power while simultaneously minimizing the type I error (Hayes & Preacher, 2014). Supplemental analyses using PROCESS will be discussed following the primary analysis section.

Initial Hypothesized Model

The results of the tested hypothesized SEM model are summarized in Table 4. Overall global fit indexes were poor suggesting that the hypothesized model could be improved, $\chi^2(10) = 26.12, p = .004$. The fit indexes and their respective values are: GFI = .87, CFI = .83, TLI = .64, NFI = .77 and RMSEA = .19. The hypothesis that dispositional mindfulness positively correlates with meaning in life was not supported ($\beta = .01, p = .98$). Executive functioning and positive reappraisal did not significantly positively correlate with presence of meaning in life.
Specifically, the direct effect of executive functioning on meaning in life resulted in the following standardized $\beta = .131, p = .346$. The direct effect of positive reappraisal on meaning in life was trending towards significance, but not significant, $\beta = .281, p = .063$.

**Table 4** Regression Weights for Hypothesized Model

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Lower</th>
<th>Upper</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Functioning $\leftarrow$ D. Mindfulness</td>
<td>-.051</td>
<td>--</td>
<td>.137</td>
<td>.433</td>
</tr>
<tr>
<td>Executive Functioning $\leftarrow$ D. Mindfulness</td>
<td>.017</td>
<td>-.195</td>
<td>--</td>
<td>.566</td>
</tr>
<tr>
<td>Pos-Reappraisal $\leftarrow$ Executive Functioning</td>
<td>.219</td>
<td>-.217</td>
<td>.415</td>
<td>.153</td>
</tr>
<tr>
<td>Pos-Reappraisal $\leftarrow$ D. Mindfulness</td>
<td>.275</td>
<td>.044</td>
<td>.510</td>
<td>.030</td>
</tr>
<tr>
<td>Trails B $\leftarrow$ Executive Functioning</td>
<td>.248</td>
<td>--</td>
<td>.456</td>
<td>.232</td>
</tr>
<tr>
<td>Interference $\leftarrow$ Executive Functioning</td>
<td>.568</td>
<td>--</td>
<td>.744</td>
<td>.208</td>
</tr>
<tr>
<td>Digit Span $\leftarrow$ Executive Functioning</td>
<td>1.458</td>
<td>1.141</td>
<td>--</td>
<td>.000</td>
</tr>
<tr>
<td>Meaning-IL $\leftarrow$ Executive Functioning</td>
<td>.131</td>
<td>--</td>
<td>.304</td>
<td>.346</td>
</tr>
<tr>
<td>Meaning-IL $\leftarrow$ Executive Functioning</td>
<td>.281</td>
<td>-.024</td>
<td>.580</td>
<td>.063</td>
</tr>
<tr>
<td>Meaning-IL $\leftarrow$ D. Mindfulness</td>
<td>-.002</td>
<td>-.318</td>
<td>.290</td>
<td>--</td>
</tr>
</tbody>
</table>

*Note. n = 47*

The second hypothesis proposed that dispositional mindfulness would positively correlate with positive reappraisal and executive functioning. As predicted there was a statistically significant relationship between dispositional mindfulness and positive reappraisal, $\beta = .275, p = .030$. Conversely, this pattern was not observed for executive functioning, $\beta = .017, p = .566$. To test mediational effects for executive functioning and positive reappraisal on the relationship between dispositional mindfulness and meaning in life, the author examined corresponding significance tests ($p < .05$) for tests of indirect effects. Mindfulness and meaning in life were not mediated by either positive reappraisal ($p = .171$) or by executive functioning ($p = .089$). The interaction between mindfulness and stress did not have a significant effect on executive functioning, $\beta = -.013, p = .483$. Thus, mindfulness and meaning in life were
independent of executive functioning and executive functioning was not significantly influenced by the relationship between mindfulness and stress.

Revised Model

The original hypothesized model was limited in several ways. First, the model tested may have been affected by the small sample size in the current study. The model was complex particularly when compared against the sample size. Further, model statistics indicated that the model was a poor fit, which may compromise interpretation of direct and indirect effects. To examine if an alternative model could be produced, the author revised the model to improve fit. The results of the revised model are found in Figure 2 and Table 5.

The model significantly improved with modification, $\chi^2(8) = 4.09, p = .85$. The fit indexes improved from the original model. The values were as follows: GFI = .97, CFI = 1.00, TLI = 1.44, NFI = .87 and RMSEA = .01. While the model significantly improved, only the relationship between mindfulness and positive reappraisal were significant ($\beta = .280, p = .02$). Executive functioning did not mediate the relationship between mindfulness and meaning in life ($p = .332$).

Table 5 Regression weights for revised model

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Lower</th>
<th>Upper</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Functioning $\leftrightarrow$ D. Mindfulness</td>
<td>.005</td>
<td>-.294</td>
<td>.446</td>
<td>.787</td>
</tr>
<tr>
<td>Pos.-Reappraisal $\leftrightarrow$ D. Mindfulness</td>
<td>.280</td>
<td>.044</td>
<td>.481</td>
<td>.021</td>
</tr>
<tr>
<td>Digit Span $\leftrightarrow$ Executive Functioning</td>
<td>.284</td>
<td>...</td>
<td>.463</td>
<td>.232</td>
</tr>
<tr>
<td>Interference $\leftrightarrow$ D. Mindfulness</td>
<td>.272</td>
<td>...</td>
<td>.442</td>
<td>.336</td>
</tr>
<tr>
<td>Trails B $\leftrightarrow$ Executive Functioning</td>
<td>1.461</td>
<td>1.120</td>
<td>...</td>
<td>.000</td>
</tr>
<tr>
<td>Meaning-IL $\leftrightarrow$ Pos-Reappraisal</td>
<td>.291</td>
<td>-.100</td>
<td>.536</td>
<td>.092</td>
</tr>
<tr>
<td>Meaning-IL $\leftrightarrow$ Executive Functioning</td>
<td>.134</td>
<td>...</td>
<td>.463</td>
<td>.232</td>
</tr>
</tbody>
</table>

Note. $n = 47$
Supplemental Analysis

As discussed, given that the final sample size was below expected power estimates PROCESS was performed. In order to determine the appropriate sample size for this, power analyses were conducted. The power of a statistical analysis refers to the likelihood that the test would produce a statistically significant result, given that the variable outcome is in fact being tested. Witte and Witte (2007) define statistical power of a hypothesis as the probability of detecting an effect or rejecting the null hypothesis. Power analyses were conducted to data collection to determine the appropriate sample size for a meaningful result using an F test. This power analysis was conducted using the computer program G*Power which determined that with 3 predictors and an effect size of .25 an N of 47 was required at minimum (Erdfelder, Faul, & Buchner, 1996).

Mediation Analyses

To examine dispositional mindfulness as a predictor of mediators (executive functioning and positive reappraisal) and to examine executive functioning and positive reappraisal as a mediator of the association between dispositional mindfulness and meaning in life, PROCESS Model 4 was used (see Figure 4) (Hayes, 2013). Dispositional Mindfulness was entered as the predictor variable (X; z-scored); presence of meaning in life was entered as the criterion variable (Y; z-scored). Executive functioning and positive reappraisal were entered as the mediator variables (M). The cognitive model included adjustment for covariates (IQ and Processing Speed). A 95% confidence interval using 10,000 bootstrap resamples was computed.

In the proposed model, greater dispositional mindfulness did not predict increases in meaning in life (path c β = 0.70, p = .51). Greater dispositional mindfulness also did not predict increases in executive functioning or positive reappraisal (Executive functioning, path a β = -
0.37, \( p = .30 \); Positive Reappraisal path a \( \beta = 1.37, \ p = .11 \). In sum, dispositional mindfulness did not predict increases in meaning in life, executive functioning, or positive reappraisal.

Regarding executive functioning and positive reappraisal as predictors of meaning in life (path b), increases in executive functioning did not predict increased meaning in life (path b \( \beta = .79, \ p = .43 \)), while there was a trend towards increased meaning in life via increased positive reappraisal (path b \( \beta = 1.9, \ p = .06 \)). In sum, the direct effect of dispositional mindfulness on meaning in life remained insignificant. That said, accounting for meaning in life after accounting for mediators was also insignificant (all path c’ \( ps > .05 \)). Results can be found in Figure 3.

**Moderated Mediation Analyses**

To determine if perceived stress moderates the association between dispositional mindfulness and executive functioning in the model mentioned above. Hayes’ PROCESS macro for Model 7 was used (see Figure 5). In a moderated mediation model, perceived stress was entered as a moderator (W) of the association between dispositional mindfulness (X) and executive functioning (M) in the mediation model described above. Overall, given dispositional mindfulness lack of predictive ability for meaning in life, there was no evidence of moderated mediation (Index of moderated mediation 95% CIs included zero; see Table 6).

**Table 6 Results from moderated mediation analyses**

<table>
<thead>
<tr>
<th>Model</th>
<th>Mediator</th>
<th>Moderator of Path A</th>
<th>Index of moderated mediation</th>
<th>Evidence of moderated mediation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Index</td>
<td>Standard Error</td>
</tr>
<tr>
<td>Model 1</td>
<td>Executive Functioning</td>
<td>PSS</td>
<td>-0.0199</td>
<td>0.0497</td>
</tr>
</tbody>
</table>

*Note: n = 47.*
CHAPTER FIVE

Discussion of Results

This chapter will discuss the implications of the results presented in Chapter 4. First, findings from preliminary analyses are addressed, including their relationship to the previous literature and clinical implications. Second, the results from primary/supplemental hypothesis testing are discussed, as well as their relationship to the previous literature. Next, a discussion of clinical implications will be presented. Lastly, explanations for the results and limitations to the current study are put forth.

This study investigated the relationship between dispositional mindfulness and meaning in life, while taking into consideration older adults’ available cognitive resources and use of positive reappraisal. The primary purpose of this study was to determine if the relationship between dispositional mindfulness and meaning in life is mediated by executive function and positive reappraisal. Additionally, this study examined the moderation effect of perceived level of stress on the relationship between dispositional mindfulness and executive functioning. The study utilized a cross-sectional design and structural equation modeling to answer the research questions.

Preliminary Analyses

Preliminary analyses were conducted to first describe the sample and the variables, and to determine whether to control for demographic categories in analyzing the primary hypotheses. Using a series of MANOVAs, participants did not differ across the major study variables based on the demographic categories (i.e., gender, ethnicity, educational attainment, marital status). Additionally, the major study variables’ mean, standard deviation, and reliability coefficients were examined to ensure consistency with the standardization sample. All values were consistent with previous validation studies.
Next, bivariate correlations were performed. Correlation analysis revealed that positive reappraisal was positively correlated with meaning in life. Specifically, participants who engaged in more positive reappraisal reported higher presence of meaning in life. Though correlations have been made, causation cannot be implied. Even so, this finding is largely consistent with the current literature and highlights the role of positive reappraisal as an active coping strategy that promotes reengagement with stressful events in order to make new meaning (Garland, Gaylord & Park, 2009).

Bivariate correlations also revealed that perceived stress was negatively correlated with both positive reappraisal and meaning in life. Specifically, increased perceived stress was associated with less frequent use of positive reappraisal as well as decreased presence of meaning in life. Previous research on post-traumatic growth (see Tedeschi & Calhoun, 2004 for review) points to a curvilinear relationship between stress and positive psychological outcomes, such that higher levels of chronic stress overwhelm the system and make it more difficult to engage in positive reappraisal (Helgeson, Reynold & Tomich, 2006). Of note, the mean statistic for perceived stress in this study was 14.9, which corresponds to moderate levels of stress. Qualitative analysis of the specific responses suggested that stress sources were chronic (e.g., chronic medical conditions, loss of independence) rather than acute (e.g., death of a loved one, recent loss of a job/financial resource). Taken together findings are in line with research that highlights the notion that high levels of chronic stress (as opposed to moderate) leads to decreased adaptation (Seery, Holman & Silver, 2010).

**Primary Analyses**

It was hypothesized that dispositional mindfulness would positively correlate with presence of meaning in life for older adults. Based on the results of the path analysis model with SEM, H1 (a) was not supported. Next, I expected that executive functioning and positive
reappraisal would positively correlate with presence of meaning in life. Executive functioning and positive reappraisal did not significantly positively correlate with presence of meaning in life H1 (b). Next, I predicted that dispositional mindfulness would be positively correlated with positive reappraisal H2 (a) and executive functioning H2 (b). Based on the SEM analysis, as predicted, there was a statistically significant relationship between dispositional mindfulness and positive reappraisal. Conversely, this pattern was not observed for executive functioning.

In examining for mediational effects, I hypothesized that the relationship between dispositional mindfulness and presence of meaning in life would be mediated by positive reappraisal and executive functioning H3 (a). Mindfulness and meaning in life were not mediated by either of the proposed factors, which is not surprising given the lack of direct effect between dispositional mindfulness and meaning in life. Lastly, I proposed that the mediational effect of executive functioning would be moderated by perceived stress. The interaction between mindfulness and stress did not have a significant effect on executive functioning and did not support the hypothesis H4 (a). An explanation for null findings will now be discussed.

Overall, the majority of findings did not support the proposed hypotheses with one notable exception: dispositional mindfulness was significantly related to positive reappraisal. When entered into the model, as predicted, dispositional mindfulness significantly related to positive reappraisal. This finding is consistent with literature that suggests mindfulness facilitates flexible selection of new cognitive reappraisals (Garland et al., 2017). The hypothesized mechanism through which this occurs is decentering (i.e., greater psychological "space"), which is defined as the recognition that thoughts and feelings are merely components of one’s true experience that remain separate from the self (Segal, Williams, & Teasdale, 2002). This recognition allows for the broadening of attention to previously unnoticed information,
which leads to more adaptive appraisals (Garland, Farb, Goldin & Fredrickson, 2015). In support of the findings, research on older adults has suggested that mindfulness may capitalize on their tendency to prioritize motivational goals related to the preservation of life’s meaningful experiences through increased attentional control and emotion regulation abilities (Zaragoza & Prakash, 2017).

Again, this study provided evidence that dispositional mindfulness promotes the use of positive reappraisal strategies. While this study emphasized increased wellbeing in late life, a large proportion of older adults still experience anxiety and depression (Nowland, Wuthrich & Rappee, 2015). Additionally, late life is often associated with increased medical complications, cognitive decline and changes in functional status, death of loved ones, as well as relocation (Fikesenbaum, Greenglass & Eaton, 2006). In contrast, positive reappraisal, a meaning-based coping strategy, is associated with improve physical health and psychological well-being in older adults. Therefore, positive reappraisal can function as a valuable coping technique for older adults, particularly as they cope with unavoidable stressors. Based on the findings, promoting positive reappraisal through mindfulness (i.e., decrease maladaptive automatic responses to environmental stimuli through greater mindfulness) may be particularly beneficial for older adults.

**Explanation of Findings**

The majority of the hypotheses in the present study were noted supported. The lack of proposed associations between the study variables was surprising given the previously discussed literature on mindfulness, positive reappraisal, executive functioning and meaning in life (Garland et al., 2009; Mather, 2012; van Vugt, 2015). In the presence of these null findings, two possible explanations are plausible: (1) the findings may reflect the true state of these variables
and (2) the findings do not reflect the true nature of the relationships and, instead, are influenced by methodological issues (Kazdin, 2003).

Assuming the first explanation was true, the observed relationships, or lack-there-of, in the present study would reflect their true state in nature (Kazdin, 2003). Indeed, while studies have found that mindfulness is related to increases in positive reappraisal, meaning in life (Garland et al., 2009), and executive functioning (Moynihan et al., 2013), the majority of research to date has been done with younger adults. Research focusing on the relationship between the executive functioning and mindfulness in older adults has produced more mixed results. For example, many studies specific to older adults have found non-significant associations between dispositional mindfulness, working memory, inhibition and quality of life (Mallya & Fiocco, 2015) as well as both significant and non-significant associations between mindfulness and set-shifting (Prakash et al., 2015).

In examining research that utilized interventions, mixed findings also exist. For example, one study that evaluated improvements in attentional control via working memory following a robust mindfulness intervention, found no significant improvements compared to a wait list control group (O’Conner et al., 2014). In another study, there were no differences between TMT part A and B or a verbal fluency task in a Mindfulness-base stress reduction group compared to reading and relaxation comparison groups (Mallya & Fiocco, 2016). Similarly, though research on dispositional mindfulness and stress in older adults has been established (Prakash et al., 2015), positive reappraisal and presence of meaning in life (particularly as it relates to MMT) has only been studied in younger populations. Taken together, it may be the case that the major study variables are less salient for older adults.
It may also be the case that methodological limitations have contributed to the observed findings. Assuming the second explanation is true (the findings do not reflect the true nature of the relationships), the following methodological issues are worth considering: (1) inadequate measurement of key variables, (2) insufficient statistical power, and (3) sample selection. Each of these methodological issues is discussed below.

**Construct measurement**

**Dispositional Mindfulness.** To start, dispositional mindfulness did not predict executive functioning or meaning in life. This finding is in contrast to the literature at large, which has shown that mindfulness is associated with increased cognitive flexibility (Moore & Malinsowski, 2009), inhibition (Teper & Inzlicht, 2003) and working memory (Jha et al., 2010). Moreover, dispositional mindfulness been showed to improve wellbeing (Creswell et al., 2012) and increase meaning in life (Garland et al., 2017). Initial thoughts for this discrepant finding may relate to the way in the current study defined and measured dispositional mindfulness. This study used the MAAS to measure dispositional mindfulness across one factor: the frequency of open attention to and awareness of events occurring throughout day-to-day consciousness (Brown & Ryan, 2003). The MAAS was chosen, in part, due to its emphasis on mindlessness (e.g., “I find myself doing things without paying attention”), which is more easily understood and perhaps a more common experience within the general population (Van Dam, Earleywine & Borders, 2010). However, given what is known about decreases in attentional processing via normal aging processes, it may have been more appropriate to use scales that measure dispositional mindfulness along additional core factors. One example the Philadelphia Mindfulness Questionnaire (PHLMS; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008) which measures dispositional mindfulness along two subscales: present moment awareness and nonjudgmental acceptance. In support of this, Splevins et al. (2009) found that specific
components of mindfulness conferred greater benefits than others in different domains. For example, accepting was related to a reduction in depressive symptoms, while other facets were not. Future studies should incorporate measures of dispositional mindfulness that focus on additional components other than attention (i.e., acceptance, awareness).

Additionally, mindfulness was measured as a dispositional trait, rather than an intervention induced state. Indeed, many of studies cited above examine the effects of mindfulness interventions (Farb et al., 2010; Moore & Malinsowki, 2009). Training often focuses on three different types: (1) focused attention meditation; (2) open monitoring meditation without selective focus (Lutz, Slagter, Dunne, & Davidson, 2008); and (3) loving-kindness meditation, which involves the cultivation of love and compassion toward oneself and others (Fountain-Zaragoaza & Prakash, 2017). Perhaps a mindfulness-based intervention would show more robust effects on the outcome measures. Future studies may wish to create and standardize such training programs in randomized designs that include active comparison groups to better characterize the benefits of mindfulness training moving forward.

Lastly, the particular items on the MAAS may have been inappropriate with an older adult population. For example, sample items on the MAAS included: “I forget a person’s name almost as soon as I’ve been told it for the first time” and “I drive places on ‘automatic pilot’ and then wonder why I went there.” Extensive research suggests that normal aging is commonly associated with decreases in the efficiency of information processing observed through reductions in processing abilities such as short-term memory (Rog & Fink, 2013). These same cognitive abilities are often affected in depression, which according to research occurs in approximately 1 in 15 older adults over the course of 1 year (Mojtabai, & Olfson, 2004). As a result, questions on the MAAS may be confounded by age related cognitive changes, particularly
in a population of older adults whose mean age was 85. Lastly, given the fact that the mindfulness data was slightly, though not significantly, negatively skewed, it seems likely that older adults may have over reported dispositional mindfulness, perhaps in an effort to decrease one’s experience with common cognitive changes associated with aging.

**Executive functioning.** Executive functioning was not significantly related to any of the major study variables. This finding is also discrepant with previous research that indicates executive functions are a precursor to successful engagement in emotion regulatory strategies (Mather, 2012) and are enhanced through mindfulness (van Vugt, 2015). A possible explanation relates to the fact that participants did not differ significantly across the major study variables based on the demographic categories (i.e., gender, ethnicity, educational attainment, marital status). This likely speaks to the heterogeneity of the sample population as ethnicity and educational attainment do impact performance on cognitive testing in clinical settings (Manly, 2008). For example, cross-cultural variation in neuropsychological test performance has been observed with regards to ethnicity (Schwartz et al., 2004) and early environmental factors (Byrd, Miller, Reilly, Weber, Wall & Heaton, 2006). As an example, specific to this study, lower levels of education have been shown to significantly impact performance on Trails A and B for older adults, necessitating a separate set of norms (Tombaugh, 2004). Keeping that in mind, most participants where non-Hispanic White and over 90% of the sample had above 12 years of education. Heterogeneity may have impacted the observed findings.

Given the MAAS’s emphasis on attention, significant results for executive functioning may have been more likely if the current study chose to use measures related to attentional control. Attentional control is defined as the ability to effectively process information by selecting relevant information while simultaneously ignoring irrelevant, interfering information.
in order to carry out one’s goal (Petersen & Posner, 2012). The concept of focusing on attention control is underscored by research that documents age-related declines in various aspects of attention, such as selective and sustained attention (Zaragozza & Prakash, 2016). This type of attention is typically measured through computer-based visual search tasks such as the NIH Toolbox Flanker Inhibitory Control and Attention Test (Slotkin et al., 2012). Other potential options could have been the Conner’s Continuous performance test (CPT-III) or the Ruff 2 and 7 Selective Attention Test (Ruff & Allen, 1996), which have also been used in prior research.

Lastly, the measure of intelligence used may not have adequately controlled confounds. This is because potential cognitive declines (i.e., discrepancies from premorbid intelligence measures) were not obtained. It is possible that cognitive decline or the difference between predicted and obtained IQ could be more sensitive measure particularly for high functioning older adults. Future studies may wish to include a measure of premorbid functioning such as the Wechsler Test of Adult Reading (WTAR; Wechsler, 2001).

**Statistical Power**

Another possibility is that the study had insufficient statistical power to detect a difference that did in fact exist. Specific to structural equation modeling (SEM), many fit indices are based on the large sample-size dependent goodness of fit tests (Kline, 2004). SEM’s ability to recover model estimates with small samples is limited and increases the likelihood of obtaining non-significant findings. Given the relatively small sample size N= 47, it is possible that a real effect was missed by simply not taking enough data, especially given the model’s complexity. However, it is important to note that other similar neuropsychological studies with comparable sample sizes utilizing similar regression techniques have found similar findings (e.g., Londeree, Whitmoyer & Prakash 2016; Mallya & Fiocco 2015; Prakash, 2011; Fountain-
Zaragoza). Moreover, bivariate correlations and beta values do not suggest that increased number of participants would have yielded significant findings.

As a final note, additional tests known to be relatively robust to small sample sizes were computed and did not yield improved results. As discusses previously, PROCESS, a computational tool for path analysis-based mediation and moderation that utilizes a bootstrapping approach to effect size estimation (Hayes, 2013; Preacher & Hayes, 2004) was used. PROCESS can be used in smaller samples because bootstrapping confers greater statistical power while minimizing the type I error rate (Hayes & Scharkow, 2013). Even so, based on preliminary correlational findings, the overall model and findings were not expected to improve. Largely consistent with the original SEM model, the findings did not support the proposed hypotheses. This suggests that though power may be a potential contributing factor, it is not necessarily the reason for the observed findings.

**Sample Selection**

An additional explanation for the observed results is sampling bias, which likely exerted a greater impact on the results than the variables themselves. This research studied a convenience sample of older adults. Those who volunteered to participate likely differ from the population at large. Put differently, participants who took part in the study expressed interest in cognitive testing and thus may share some inherently similar characteristics (e.g., stronger cognitive functions, high levels of self-efficacy). Moreover, in examining the demographics of the study participants, only approximately 20% had less than 16 years of education. In fact, many participants had 18-20 years of education. Therefore, the current sample is only representative of highly educated older adults. Moreover, mean full scale IQ (WASI-II 2-Subtest IQ= 116) was in the high average range and 1 SD above the population mean. Taken together, the study’s educated sample showed evidence of high cognitive reserve (i.e., resilience to age-
related brain changes via education and occupational attainment) throughout testing (Stern, 2012). Therefore, the sample is restricted in terms of generalizability to the overall population. This lowers the chances of observing a linear relationship between the cognitive measures and other study variables. Regardless, this is a rare sample that deserves attention in future research looking to highlight the protective role one’s life experiences in overall brain health.

In a similar vein, this sample, in comparison to their same-aged peers, performed above expectation with regards to verbal and nonverbal reasoning abilities as well as on tests of processing speed and executive functioning. Interestingly, the participants in the present sample displayed higher than average meaning in life (MIL mean = 27) and above average utilization of positive reappraisal based on a norm group of adults 65 years of age and older (Positive reappraisal mean = 13.27). The participants also displayed moderate levels of dispositional mindfulness based on guidelines provided by Loucks et al. (2016). Taken together, observation of sample characteristics suggests that older adults in this sample more frequently engaged in positive reappraisal and saw life as having a valued meaning and purpose. They also reported being generally mindful. Taken together, it appears that the present sample displayed high levels of all variables with less variation originally expected. This also impacts generalizability to the general population.

Clinical Implications

In terms of clinical implications, results suggest that using mindfulness interventions with older adults who are faced with stressors may be beneficial. In this study, older adults who were higher in dispositional mindfulness more frequently used positive reappraisal strategies. Though variability exists, individuals often face chronic stress (as opposed to acute) related to caregiver burden, grief and the loss of one’s financial and physical independence in the context of aging (Lavretsky & Newhouse, 2012). Therefore, providing mindfulness interventions to
older adults may enhance their ability to reinterpret chronic stressors as benign or even beneficial. For example, a mindfulness-based group geared towards caregivers of spouses with neurodegenerative diseases such as Parkinson’s disease or Alzheimer’s disease may increase acceptance via improved ability to positively reappraise.

Given evidence of the usefulness of positive reappraisal during acute stressors such as medical illness (Garland et al., 2015), the current findings highlight the potential benefits of early intervention with older adults. For example, research shows that continued mindfulness practice over time leads to measurable improvements in mood and cognition (Zeidan, Johnson, Diamond, David and Goolkasian, 2010). Taken together with the findings of this study, providing older adults with opportunities for mindfulness practice (e.g., access to local classes, printed resources or online materials/apps) may help to create a buffer against acute stressors when they do arise.

Lastly, though executive functioning was not predictive of increased meaning in life, it appears that cognitive functions that normally decline with age, such as working memory, and processing speed, are independent of one’s felt meaning in life. This is promising and suggests that despite current functioning, older adults who are capable of learning dispositional mindfulness techniques can engage in positive reappraisal during stressful events. Doing so early, before individuals encounter life stressors is optimal, being that research shows that dispositional mindfulness increased over time with consistent practice (Garland et al., 2017).

**General Limitations**

There are several general limitations in this research. The first limitation is that a large portion of the data was by self-report. Therefore, responses are subject to self-serving biases. Prior research has noted that generally, individuals rate their lives as meaningful irrespective of their current circumstances (Heizelman & King, 2013). Furthermore, responses to positive reappraisal and dispositional mindfulness may be influenced by social desirability. A second
limitation is the representativeness of the sample. The data was collected within continued care retirement communities. The results based on this sample, with a greater portion of White, affluent older adults does not generalize to older adults who reside in different areas of the U.S., or other types of independent living (private home, apartment, etc.). A third limitation is that other variables may have accounted for or be linked to the results of the study. For example, psychiatric and medical factors that influence cognitive functioning were not included in this study. Fourthly, many of the participants in the study were older than the established norm group. This was true for measures of intellectual functioning as well as some aspects of executive functioning, such as cognitive inhibition and set-shifting. This was also true for some self-report measures such as meaning in life. Lastly, as discussed previously, the majority of the sample endorsed high levels of meaning in life, moderate levels of stress as well as having generally high average performances on tests of intellectual functioning and executive functioning. That said, restricted variability within the data may have limited the representativeness of the sample to the general population.

Future Directions

Based on current findings, future research should examine the appropriateness of using the MAAS when assessing for dispositional mindfulness in older adults. Given that mindfulness is considered a multifaceted construct, it may also be useful to focus on examining which components of mindfulness offer greatest cognitive and/or emotional benefit. Given that dispositional mindfulness predicted positive reappraisal, future researchers may wish to further investigate the proposed mechanism underlying the significant association between dispositional mindfulness and positive reappraisal (i.e., decentering). Because positive reappraisal requires some degree of meaning making, it may be fruitful to include qualitative data in future studies. For example, capturing older adults’ changing relationship to decentering in the midst of creating...
new narratives could lead to a better understanding of the links between mindfulness and positive reappraisal. More generally, investigating the efficacy of manualized treatments as well as more broad-based lifestyle mindfulness interventions focused on facilitating positive reappraisal in older adults is warranted. Lastly, though the proposed SEM model demonstrated that a one-unit increase in the predictor variables did not significantly predict variance in meaning in life that does not mean a relationship couldn’t exist. It could be that very low dispositional mindfulness, positive reappraisal, and executive functions are deleterious for meaning in life. Rather than being treated as linear variables that effect meaning in life incrementally, significant findings may have been discovered if regression techniques that measure curvilinear relationships were utilized. Future studies may explore this idea.

**Conclusion**

The purpose of the current study was to investigate the potential role of executive functioning and positive reappraisal in mediating the relationship between dispositional mindfulness and presence of meaning in life for older adults. The study’s design and initial hypotheses were grounded in a conceptual model based on the previous literature. Based on this model, dispositional mindfulness was proposed to increase meaning in life in older adults who more frequently engaged in positive reappraisal and had the cognitive resources (i.e., executive functions) available to do so. Moreover, based on this model, stress was proposed to weaken the effect of dispositional mindfulness on executive functions. Bivariate correlations revealed a positive association between positive reappraisal and meaning in life, as well as a negative association between perceived stress, positive reappraisal and meaning in life. The overall hypothesized SEM model was not supported, with one notable exception: dispositional mindfulness was significantly related to positive reappraisal. This study adds to the body of research examining positive psychological processes in older adults. Future studies should
continue to explore the relationship between dispositional mindfulness and positive reappraisal as it relates to indices of wellbeing and adjustment stressful life events (change in mobility status, illness, etc.).
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APPENDIX A

Informed Consent

Linking Dispositional Mindfulness to Positive Psychological Processes in Older Adults: Executive Functioning, Positive Reappraisal and Meaning in Life

Researcher’s Affiliation: Kristen Wesbecher is a student in the Counseling Psychology PhD program in the Department of Professional Psychology and Family Therapy at Seton Hall University.

Purpose: Some people think in the past, some think in the present, and others in the future. This project’s goal is to see if the way people think (past, present or future) changes how much meaning they feel in their lives. It will also study the influence of stress and aging. If choosing to participate, it will take about 30-45 minutes to complete.

Procedure: After reading this consent and agreeing to participate in this study, volunteers will be scheduled to participate in an assessment that contains two parts: (1) a brief thinking skills test; (2) a self-report (questions filled out by self) survey packet. They will be scheduled with either Kristen Wesbecher, or her research assistant Yubelky Rodriguez. A third research assistant, Sonay Culpepper will assist only with scheduling and the completion of the self-report packet. The thinking tests will take up to 30 minutes while the self-report survey will take up to 15 minutes to complete.

The thinking skills tests include:
- The Wechsler Abbreviated Scale of Intelligence—which measures intelligence, or general thinking ability.
- The Wechsler Adult Intelligence Scale—which measures speed of thinking and working memory, or how well people can keep more than one thought in their mind at a time.
- The Stroop Color and Word Test- which measures inhibition, or the ability to stop doing or thinking something that isn’t helpful in the moment.
- Trailmaking Test-which measures cognitive flexibility, or the ability to think in new ways.

The self-report measures include:
- The Trait Mindful Attention Awareness Scale—which measures one’s ability to be in the present moment without getting distracted.
- Cognitive Emotion Regulation Questionnaire—which measures the ability to think about stressful situations as harmless or even good.
- Meaning in Life Questionnaire—which measures how much meaning and purpose someone thinks their life has.
- Perceived Stress Scale—which measures the amount of stress in daily life.

Voluntary Participation: Participation in this study is voluntary. This means that you only participate in the study if you choose to. If at any time participants wish to stop the study they
may do so without penalty. The decision to participate will not impact any services at the retirement community where you live.

**Anonymity:** In an effort to maintain anonymity (remain unknown), this research will not include names anywhere on the testing materials. Participants will be given a code number and two separate lists, which together can link participants to their ID number will be kept in separate, locked drawers. Only Dr. Cruz, and Kristen Wesbecher will have access to the list of participants.

**Confidentiality:** Data collected will not be reported individually, that is one by one. All data will be combined so that no participants’ responses are seen alone. All materials collected will be confidential. Completed responses will be kept in a secure location and will only be available to Kristen Wesbecher and her research mentor Dr. Daniel Cruz, PhD. Data will be stored electronically on a USB memory key and kept in a locked, secure office.

**Risks:** There is little risk to participating in the study. Some level of frustration (annoyance or upsetting feeling) may be felt when participating in the brief neuropsychological evaluation, which is designed to be challenging, or hard to all individuals. To minimize these risks, participants will have a break(s) in order to lessen frustration. Participants will also be reminded that they can withdraw from testing at any time.

**Benefits:** Although participants will not benefit directly from participating in this study, responses will help to provide evidence about the influence of mindfulness (ability to be in the present moment without getting distracted) in factors related a more enjoyable life as we get older. Having a better understanding of the role of mindfulness in late life can inform interventions aimed at successful aging.

**Contact Information for Questions:** If the volunteer has questions about the study, they may be directed to Kristen Wesbecher, MS either in person or by phone at (845) 238-6206. Dr. Daniel Cruz, PhD can be reached by email at Daniel.Cruz@shu.edu. Questions about the rights of subjects may be directed in person to Dr. Ruzicka, Director of the Institutional Review Board (IRB), or by telephone: 973-313-6314.

_____________________________  ______________________  ____________
Name                               Signature                  Date

*Please note participants will be given a copy of the signed and dated Informed Consent Form.*
APPENDIX B

Letter of Solicitation

Dear Potential Participant:

Thank you for your interest in this research project. I am a student in the Counseling Psychology PhD program in the Department of Professional Psychology and Family Therapy at Seton Hall University who is interested in studying factors that make life more enjoyable as we get older.

Some people think in the past, some think in the present, and others in the future. This project’s goal is to see if the way people think changes how much meaning they feel in their lives. It will also study the influence of stress and aging.

Before taking part in this study, participants will be asked questions through a test called “The Mini-Mental State Examination” to measure current cognitive functioning (attention and memory skills). If a score at or above what is needed to participate is achieved, the study then asks people to fill out demographic questions about themselves like age, gender and what they did for work. There are also four self-report surveys (questions you fill out on your own) that I will describe below. Lastly, it involves participation in a short neuropsychological assessment (a test done one on one with the researcher to measure thinking abilities) to look at executive functioning (thinking skills like planning, organizing and remembering) that is also described below. **The study will take about 45 minutes.**

The thinking skills tests include:
- The Wechsler Abbreviated Scale of Intelligence-which measures intelligence, or general thinking ability.
- The Wechsler Adult Intelligence Scale-which measures speed of thinking and working memory, or how well people can keep more than one thought in their mind at a time.
- The Stroop Color and Word Test- which measures inhibition, or the ability to stop doing or thinking something that isn’t helpful in the moment.
- Trailmaking Test-which measures cognitive flexibility, or the ability to think in new ways.

The self-report measures include:
- The Trait Mindful Attention Awareness Scale-which measures one’s ability to be in the present moment without getting distracted.
- Cognitive Emotion Regulation Questionnaire –which measures the ability to think about stressful situation as harmless or even good.
- Meaning in Life Questionnaire-which measures how much meaning and purpose someone thinks their life has.
- Perceived Stress Scale-which measures the amount of stress in daily life.

Adults over the age of 65 are able to take this survey. Participation is voluntary and individuals can stop at any time without bad results. The study is anonymous (information cannot identify participants). Also, all information collected will be kept confidential (kept secret) and stored in a secure location that will only be available to Kristen Wesbecher, Dr. Daniel Cruz, PhD as well as her two research assistants Yubelky Rodriguez, MA and Sonay Culpepper, BA.

Thank you,

Kristen Wesbecher, M.S.
APPENDIX C

Procedure Script

Script for telling volunteers that they do not qualify for the study based on their performance on the Mini Mental State Examination needs to be submitted. See Below:

“Thank you for your participation in this study! I want to thank you for taking the time to volunteer today. For some people this assessment is longer, while for others it is shorter. That being said, this concludes the end of our time together, as we have gathered all the information we need.”
APPENDIX D

IRB Approval

REQUEST FOR APPROVAL OF RESEARCH, DEMONSTRATION OR RELATED ACTIVITIES INVOLVING HUMAN SUBJECTS

All material must be typed.

PROJECT TITLE: Linking Dispositional Mindfulness to Positive Psychological Processes in Older Adults: Executive Functioning, Positive Reappraisal & Meaning in Life.

CERTIFICATION STATEMENT:

In making this application, I (we) certify that I (we) have read and understand the University’s policies and procedures governing research, development, and related activities involving human subjects. I (we) shall comply with the letter and spirit of those policies. I (we) further acknowledge my (our) obligation to (1) obtain written approval of significant deviations from the originally-approved protocol BEFORE making those deviations, and (2) report immediately all adverse effects of the study on the subjects to the Director of the Institutional Review Board, Seton Hall University, South Orange, NJ 07079.

[Signature]

Researcher - [Name], M.S.

[Date]

**Please print or type out names of all researchers below signature.
Use separate sheet of paper, if necessary.**

My signature indicates that I have reviewed the attached materials of my student advisee and consider them to meet IRB standards.

[Signature]

Research Faculty Advisor - [Name], Ph.D., ABPP

[Date]

**Please print or type out name below signature**

The request for approval submitted by the above researcher(s) was considered by the IRB for Research Involving Human Subjects Research at the [Date] meeting.

The application was approved [ ] not approved [ ] by the Committee. Special conditions were [ ] were not [ ] set by the IRB. (Any special conditions are described on the reverse side.)

[Signature]

DIRECTOR,
SETON HALL UNIVERSITY INSTITUTIONAL REVIEW BOARD FOR HUMAN SUBJECTS RESEARCH

[Date]
Appendix E

Proposal Approval

SETON HALL UNIVERSITY
COLLEGE OF EDUCATION AND HUMAN SERVICES
OFFICE OF GRADUATE STUDIES

APPROVAL FOR DISSERTATION PROPOSAL

Candidate, Kristen D. Wesbecher, has successfully completed all requisite requirements. This candidate’s proposal has been reviewed and the candidate may proceed to collect data according to the approved proposal for dissertation, under the direction of the mentor and the candidate’s dissertation committee.

If there are substantive differences between what has been approved in the proposal and the actual study, the final dissertation should indicate, on a separate page in the Appendix, the approval of the committee for those changes.

Title of Proposed Dissertation: Linking Dispositional Mindfulness to Positive Psychological Processes in Older Adults: Executive Functioning, Positive Reappraisal & Meaning in Life.

Dissertation Committee:

Mentor (sign/date): Daniel Cruz, Ph.D.

Committee Member (sign/date): Minsun Lee, Ph.D.

Committee Member (sign/date): Matthew Graziano, Ph.D.

External Reader (sign/date): Adriana Dunn, Ph.D.

Approved by Seton Hall University Institutional Review Board on _____________.

Department Chairperson (sign/date): Ben Beitin, Ph.D.
APPENDIX F

Measures

DEMOGRAPHIC INFORMATION
Please complete the following information, remembering that we cannot identify anyone with this data.

1. Age: _______

2. Sex: _______ Female _______ Male _______ Other

3. Ethnicity

_______ African-American
_______ Asian-American
_______ White
_______ Hispanic American
_______ Native American
_______ Biracial/Multiracial (Specify: __________________)
_______ Other (Specify: ______)

4. Highest Level of Education

_______ No High School
_______ Some High School
_______ High School Graduate
_______ Associate’s Degree/Trade School
_______ Bachelor’s Degree
_______ Master’s Degree
_______ Ph.D./M.D./J.D.

5. Occupation: __________________

6. Marital Status: __________________

7. Average hours of exercise per week: ________________

8. Average hours of sleep per night: ________________
Meaning in Life Questionnaire

**MLQ** Please take a moment to think about what makes your life feel important to you. Please respond to the following statements as truthfully and accurately as you can, and also please remember that these are very subjective questions and that there are no right or wrong answers. Please answer according to the scale below:

<table>
<thead>
<tr>
<th>Absolutely Untrue</th>
<th>Mostly Untrue</th>
<th>Somewhat Untrue</th>
<th>Can't Say</th>
<th>Somewhat True</th>
<th>Mostly True</th>
<th>Absolutely True</th>
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<tbody>
<tr>
<td>1</td>
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<td>5</td>
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1. _____ I understand my life’s meaning.
2. _____ I am looking for something that makes my life feel meaningful.
3. _____ I am always looking to find my life’s purpose.
4. _____ My life has a clear sense of purpose.
5. _____ I have a good sense of what makes my life meaningful.
6. _____ I have discovered a satisfying life purpose.
7. _____ I am always searching for something that makes my life feel significant.
8. _____ I am seeking a purpose or mission for my life.
9. _____ My life has no clear purpose.
10. _____ I am searching for meaning in my life.
Day-to-Day Experiences

Instructions: Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

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<tr>
<th></th>
<th>1</th>
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<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>1</td>
<td>Almost Always</td>
<td>Very Frequently</td>
<td>Somewhat Frequently</td>
<td>Somewhat Infrequently</td>
<td>Very Infrequently</td>
<td>Almost Never</td>
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</table>

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
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<th>3</th>
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<tbody>
<tr>
<td>I could be experiencing some emotion and not be conscious of it until some time later.</td>
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<td>I break or spill things because of carelessness, not paying attention, or thinking of something else.</td>
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<td>I find it difficult to stay focused on what’s happening in the present.</td>
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<td>I tend to walk quickly to get where I’m going without paying attention to what I experience along the way.</td>
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<td>I tend not to notice feelings of physical tension or discomfort until they really grab my attention.</td>
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<td>I forget a person’s name almost as soon as I’ve been told it for the first time.</td>
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<td>It seems I am “running on automatic,” without much awareness of what I’m doing.</td>
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<td>I rush through activities without being really attentive to them.</td>
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<td>I get so focused on the goal I want to achieve that I lose touch with what I’m doing right now to get there.</td>
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<td>I do jobs or tasks automatically, without being aware of what I’m doing.</td>
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<td>I find myself listening to someone with one ear, doing something else at the same time.</td>
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PERCEIVED STRESS SCALE

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

0 = Never   1 = Almost Never   2 = Sometimes   3 = Fairly Often   4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly?
   0  1  2  3  4

2. In the last month, how often have you felt that you were unable to control the important things in your life?
   0  1  2  3  4

3. In the last month, how often have you felt nervous and “stressed”?
   0  1  2  3  4

4. In the last month, how often have you felt confident about your ability to handle your personal problems?
   0  1  2  3  4

5. In the last month, how often have you felt that things were going your way?
   0  1  2  3  4

6. In the last month, how often have you found that you could not cope with all the things that you had to do?
   0  1  2  3  4

7. In the last month, how often have you been able to control irritations in your life?
   0  1  2  3  4

8. In the last month, how often have you felt that you were on top of things?
   0  1  2  3  4

9. In the last month, how often have you been angered because of things that were outside of your control?
   0  1  2  3  4

10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
    0  1  2  3  4
**Cognitive Emotion Regulation Questionnaire**

**How do you cope with events?**

*Everyone gets confronted with negative or unpleasant events now and then and everyone responds to them in his or her own way. By the following questions you are asked to indicate what you generally think, when you experience negative or unpleasant events.*

<table>
<thead>
<tr>
<th><strong>Question</strong></th>
<th><strong>1.</strong></th>
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<tbody>
<tr>
<td>1. I feel that I am the one to blame for it</td>
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<td>2. I think that I have to accept that this has happened</td>
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<td>3. I often think about how I feel about what I have experienced</td>
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<td>4. I think of nicer things than what I have experienced</td>
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<td>5. I think of what I can do best</td>
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<td>6. I think I can learn something from the situation</td>
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<td>7. I think that it all could have been much worse</td>
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<td>8. I often think that what I have experienced is much worse than what others have experienced</td>
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<td>9. I feel that others are to blame for it</td>
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<td>10. I feel that I am the one who is responsible for what has happened</td>
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<td>11. I think that I have to accept the situation</td>
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<td>12. I am preoccupied with what I think and feel about what I have experienced</td>
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<td>13. I think of pleasant things that have nothing to do with it</td>
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<td>14. I think about how I can best cope with the situation</td>
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<td>15. I think that I can become a stronger person as a result of what has happened</td>
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<td>16. I think that other people go through much worse experiences</td>
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<td>17. I keep thinking about how terrible it is what I have experienced</td>
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<td>18. I feel that others are responsible for what has happened</td>
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<td>19. I think about the mistakes I have made in this matter</td>
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<td>20. I think that I cannot change anything about it</td>
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<td>21. I want to understand why I feel the way I do about what I have experienced</td>
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<td>22. I think of something nice instead of what has happened</td>
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<td>23. I think about how to change the situation</td>
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<td>24. I think that the situation also has its positive sides</td>
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<td>25. I think that it hasn’t been too bad compared to other things</td>
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<td>26. I often think that what I have experienced is the worst that can happen to a person</td>
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<td>27. I think about the mistakes others have made in this matter</td>
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<td>28. I think that basically the cause must lie within myself</td>
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<td>29. I think that I must learn to live with it</td>
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<td>30. I dwell upon the feelings the situation has evoked in me</td>
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<td>31. I think about pleasant experiences</td>
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<td>32. I think about a plan of what I can do best</td>
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<tr>
<td>33. I look for the positive sides to the matter</td>
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</table>
34. I tell myself that there are worse things in life

35. I continually think how horrible the situation has been

36. I feel that basically the cause lies with others

Thank you for filling out the questionnaire!
Figure 1. Conceptual Model

Figure 1. Conceptual model depicting proposed relationship between variables used to guide research hypotheses.
Figure 2. Results of Revised SEM Model

Figure 2. Mediation model depicts executive functioning and positive reappraisal as mediators between dispositional mindfulness and meaning in life. Model was adjusted for IQ and processing speed; e = error.
**Figure 3.** Mediation model with PROCESS

![Mediation Model Diagram]

*Figure 3.* Mediation model depicts executive functioning and positive reappraisal as mediators between dispositional mindfulness and meaning in life using PROCESS model 4. Model was adjusted for IQ and processing speed.