THE EFFECT OF MEDITATION ON DEATH-THOUGHT ACCESSIBILITY AND WORLDVIEW DEFENSE IN RESPONSE TO MORTALITY SALIENCE

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Thesis directed by Professor Thomas Pyszczynski

Research suggests that people typically respond to reminders of their own death by suppressing death-related thoughts and becoming more negative in their attitudes to people who criticize their worldview. However, research has found that there is great variability in one’s reaction to reminders of death. The present study investigated the effect of a brief meditation on the way mortality salience affects death-thought accessibility (DTA) and worldview defense. One hundred twenty-nine adult novice meditators in the US were randomly assigned to either no-meditation or meditation groups, followed by a mortality salience (MS) or neutral prime. DTA was measured both immediately after MS and again after a delay, after which worldview defense was measured. Results showed that for the no-meditation condition, MS led to initial suppression and a delayed increase in DTA, and greater worldview defense. However, participants in the meditation condition did not respond to MS with increased worldview defense or suppression of death thoughts. Moderated mediation analyses showed that MS led to greater death-thought rebounds following suppression, which in turn increased worldview defense only among participants in the no-meditation condition. These relationships were moderated by meditation training, with meditation training completely eliminating the MS effects on both DTA and worldview defense. Possible explanations were discussed for these findings.
Keywords: terror management theory, worldview defense, death-thought accessibility, meditation, mindfulness
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CHAPTER 1
INTRODUCTION

In the past three decades, there has been considerable interest among clinicians and psychologists in meditation as an approach to reducing emotional distress (Bishop et al., 2004). Meditation involves complex practices that regulate emotions and attention, thereby influencing mental and related somatic events by engaging a specific attentional set (Lutz, Slagter, Dunne, & Davidson, 2008). This attentional set leads to an alert and non-judgmental acceptance when perceiving and monitoring all mental contents from moment to moment, including perceptions, sensations, cognitions, and emotions. It promotes a capacity for heightened, present-moment awareness (Kabat-Zinn, 2003). Through this non-judgmental focus on one’s internal experience, people can hold a deeper and more accurate knowledge of consciousness and reality, leading to a clearer understanding of oneself and one’s relationship to the world (Shapiro & Walsh, 2003). Although there is good evidence that meditation is helpful, it is not yet clear exactly how it produces these effects.

A few recent studies document that meditation and trait of mindfulness play an important role in reducing defensiveness in reactions to threatening events. More mindful American college students (Niemiec et al., 2010), and Korean Buddhists who regularly practiced meditation (Park & Pyszczynski, 2016a) did not show the defensive response to
thoughts of death that were found among low mindful individuals and non-Buddhists. Even a brief 20-minute Zen meditation eliminated mortality salience (MS) effects among Korean adults without previous meditation experience (Park & Pyszczynski, 2016a).

The proposed study aimed to replicate this finding with adult novice meditators in the US. It also further investigated the processes through which a brief mindfulness meditation eliminates MS effects. More specifically, this research assessed the possibility that the relationship between meditation and MS effects was mediated by a reduced tendency to suppress or avoid death-related thoughts that results from meditation.

**Meditation and Mindfulness**

Meditation can be defined as “a family of practices that train attention and awareness, usually with the aim of fostering psychological and spiritual well-being and maturity” (Shapiro & Walsh, 2003, p. 88). It involves complex practices that regulate emotion and attention that affect mental and somatic events by cultivating a specific attentional set (Lutz et al., 2008). Meditation has been practiced for thousands of years in Buddhism as a means of achieving a state of calm and also for religious purposes (Sedlmeier et al., 2012). The current study assessed, especially, the effects of Buddhist meditation technique, breathing meditation (Wallace & Shapiro, 2006).

For Buddhists, meditation practices aim to achieve liberation (enlightenment) by directly experiencing and observing reality as it really is, and serve as a means to end suffering (e.g., Harvey, 2004). The core tenets of Buddhism, namely, the Four Noble Truths, describes the suffering-enlightenment path (see Rahula, 1974): (1) Humans are surrounded by *dukkha*, (suffering, dissatisfaction); (2) The origin of *dukkha* is craving, a tendency to crave for and cling to a specific state of mind that is in fact transient...
(impermanence), which in turn leads to clinging; (3) Suffering can be ended via cessation of craving, which is the state of Nirvana (enlightenment); (4) One can free oneself from craving by practicing the Noble Eightfold Path. The eightfold path consist of three domains: (1) Morality (right speech, right action, & right livelihood); (2) Wisdom (right view & right intention); and (3) Meditation (right effort, right mindfulness, & right concentration). Right concentration and right mindfulness are two central components of meditation. Concentration is the control of the focus of one’s attention, keeping one’s awareness with one-pointedness on either an external or internal object as well as relaxing the mind. Mindfulness is defined as being aware, bare attention (receptive attention), detached observation, and effortless awareness of the presence at the present moment (Mikulas, 2007). Therefore meditation requires both concentrative and mindful skills. It should be noted that these eight aspects of the path are highly interdependent principles, thus each aspect simultaneously facilitates other aspects (Bodhi, 2008). For example, reducing clinging requires realizing the transient nature of what we cling to, which leads to better meditation, and practicing meditation also paves the way for cultivation of wisdom.

Though there are many meditative traditions within Buddhism, meditation can be broadly classified into two groups: Vipassana versus Samatha meditation (Goleman, 1988). The former emphasizes more mindfulness aspects, whereas the latter aims to relax the mind and free it from distraction. Although there are many different types of meditative techniques and each type of meditation emphasizes specific aspects of meditation (e.g., concentrative vs. mindful aspects), virtually all meditative practices involve a combination of these two approaches (Sedlmeier et al., 2012).
The trait of mindfulness has received increased attention from both clinical and experimental psychologists in the West. Mindfulness can be cultivated through regular meditation practice, resulting in reduced suffering and increases in positive personal qualities (Kabat-Zinn, 2003). A large body of research has reported the salutary effects of meditation. Meditation practices have been effective for treating anxiety-related disorder (Kornfeld, 1995), depression (Bitner, Hillman, Victor, & Walsh, 2003), chronic pain (Kabat-Zinn, 1984), anxiety (Pearl & Carlozzi, 1994), public speaking anxiety (Kirsch & Henry, 1979), and stress-coping strategies (Carlson, Speca, Patel, & Goodey, 2003). It has also been shown to increase pro-social behaviors (Ramsey & Jones, 2015), empathy (Birnie, Speca, & Carlson, 2010), and self-regulation (Tang et al., 2007). It is worth mentioning that Western psychologists are more interested in salutary effects of being mindful, but Buddhist traditions emphasize the quality of awareness itself (Rapgay & Bystrisky, 2009). In other words, Western psychologists have attempted to use meditative techniques adopted from various types of Buddhist meditation traditions to ameliorate psychological dysfunctions rather than as a path to religious fulfillment.

There have been a number of debates in psychological literature regarding how to best conceptualize mindfulness and related constructs. Kabat-Zinn is an early pioneer who defined mindfulness as “paying attention in a particular way, on purpose, in the present moment, and nonjudgmentally” (Kabat-Zinn, 1994, p4). Influenced by Kabat-Zinn’s definition of mindfulness, Bishop et al. (2004) proposed a two-component model of mindfulness, conceptualized as (1) the self-regulation of attention directed toward the immediate present, thereby enhancing the capacity of recognition of the mental events in the present moment, and (2) simultaneously maintaining a curious, open, and accepting
orientation toward one’s present moment experiences without any attempts to modify the contents of stimuli. Therefore, Bishop et al.’s definition of mindfulness embraces both an awareness aspect and acceptance/non-judgment/non-reactivity attitudes (Chambers, Gullone, & Allen, 2009). In a related vein, Brown and Ryan (2003) argue that mindfulness is a receptive sustained attention to and awareness of present events and experience, with an emphasis on present-centered awareness without habitual appraisal and cognitive manipulation. Recently, Baer and colleagues found that for novice meditators five distinctive facets seem to characterize mindfulness, namely: observing, describing, acting with awareness, nonreactivity to, and nonjudging of experience, thoughts, and emotion at the present moment (Baer et al., 2008).

Despite these relatively subtle differences in conceptualization of mindfulness among Western psychologists, most explanations emphasize attention-regulation that is characterized by full attention to and awareness of the experience of the present moment, and intentionally attending without judgment, cognitive elaboration (e.g., reappraisal, avoidance, or suppression of thoughts and emotions), and acceptance of whatever thoughts arise in the mind. As mentioned earlier, even though there are various types of meditative techniques, each meditative practice lies on a continuum, depending on how attentional processes are directed (Cahn & Polich, 2006). For example, one type of mindfulness meditations, the Vipassana tradition also emphasizes concentration exercises using appropriate objects (e.g., breathing, bodily sensation, mental events) on which one focuses until a certain level of concentration is achieved (da Silva, 1990). In particular, Zen meditation includes focused attention on breathing (concentration), coupled with an emphasis on practicing awareness, and breathing relaxation (Sekida, 1975).
In a similar vein, Lutz et al. (2008) propose a theoretical framework for understanding the relationship between meditative techniques and attentional processes. They proposed a two-stage meditation model. At the early stage of meditation, individuals develop concentrative (or focused attention; FA) meditation which involves continuous sustained attention on a selected object (i.e., breath, body sensations, external stimuli, mantra, or mental image). FA meditation requires the narrowing of awareness so that the mind only contains the intended object. Once attention strays, individuals are instructed to disengage in distracters and immediately to bring strayed attention back to the intended object. At this stage, FA meditation requires specific skills (e.g., letting-go) associated with monitoring the focus of attention, detecting distraction, shifting attention from the source of distraction, and redirecting attention. At a later stage, mindfulness meditation practices (open-monitoring or insight meditation; OM meditation) involve the expanding of awareness with no explicit focus (except awareness itself). In the OM stage, practitioners are instructed to allow any thought, feeling, or sensation to arise in consciousness while maintaining a nonreactive awareness to what is being experienced. At this later stage, detecting the source of distraction is not necessary; instead, it is necessary to be aware as much as possible even to extreme details (da Silva, 1990), and the OM meditation requires the minimal efforts of concentration (Mikulas, 2007). In addition, OM meditation often cultivates sustained awareness aimed at nonreactive and nonattached mental observation, without cognitive or emotional interpretation of the unfolding moment-to-moment experience (Cahn & Polich, 2006).

Multiple investigations have shown that meditation can enhance cognitive performances. Research has shown that attending an 8-week meditation training is
positively correlated with enhanced alerting attention (Jha, Krompinger, & Baime, 2007); meditators gradually improved attention processes (Valentine & Sweet, 1999); and long-term meditators showed higher performance in concentration accuracy, selective attention, attention switching, and sustained attention compared to no-meditators (Hodgins & Adair, 2010; Pagnoni & Cekic, 2007).

These increases in cognitive skills associated with meditation training may depend on, at least initially, the development of attentional control and inhibition of secondary elaborative processing of thoughts and emotions in response to stimuli (Baer, 2003). Lykins and Baer (2009) found that both meditation experience and trait mindfulness were significantly positively associated with openness to experience, reflection, psychological well-being, and self-compassion, and negatively associated with thought suppression, fear of emotion, difficulties in emotion regulation, cognitive failures, rumination, and psychological symptoms. Of particular relevance to the present research, decreased thought suppression can be cultivated through mindfulness meditation (Hepburn et al., 2009). For example, Richards (2014) found that college students who received a brief mindfulness intervention for 2 weeks showed increases in mindfulness and a significant reduction in thought suppression as measured by the White Bear Thought Suppression Inventory (Wegner & Zanakos, 1994) compared to those in a waiting-list control group.

In an examination of the effects of meditation on emotional interference, Ortner, Kilner, and Zelazo (2007) found experienced mindfulness meditators showed reduced interference from unpleasant pictures on the Emotional Interference Task (EIT, Study1). Experienced meditators were asked to categorize tones as high- or low-pitch after
viewing emotional or neutral pictures, and then their reaction time to tones were calculated. Longer duration of meditation practice was negatively associated with slower reaction times (RTs) after viewing unpleasant pictures. In a second study, novice meditators were randomly assigned to mindfulness meditation training, relaxation training, or no intervention groups. After a 7-week training, only the mindfulness meditation group showed a greater reduction from pre- to post-training in the EIT from unpleasant pictures compared to the other two groups.

Arch and Craske (2006) demonstrated that, even a 15-minute breathing meditation in novice meditators decreased the intensity and negativity of emotional responses to unpleasant picture slides, and increased willingness to remain in contact with negative picture slides compared to both participants in the unfocused attention and worrying groups. Erisman and Roemer (2010) conducted a study in which novice meditators with high levels of difficulties in emotional regulation were randomly assigned to either a brief mindfulness meditation condition (meditation group) or a control condition, and then watched negative, positive, and mixed film clips. Relative to the control group, the meditation group reported more positive affect after viewing the positive clips, and less negative affect after watching mixed film clips. These studies provide evidence that mindfulness leads to increased emotional flexibility and improved affect tolerance.

Chambers, Lo, and Allen (2008) assessed the impact of an intensive meditation practice on executive functioning, sustained attention, and affect by comparing novice meditators training after their first 10-day Vipassana meditation course with novice meditators who did not receive any training, over two time points (T1-before/ T2-after
training). The Digit Span Backward (DSB) was used to measure working memory and the Internal Switching Task (IST; Lo & Allen, submitted) provided a measure of the participants’ capacity for sustained attention and switching effects. The results showed that meditation training led to significant improvements in self-reported mindfulness and working memory, and decreases in depressive symptoms and rumination. On the sustained attention task, the meditation group demonstrated significantly longer RTs in the affective condition, relative to the neutral condition, than did the controls at Time 1. However, the meditation group’s overall RTs significantly improved from T1 to T2, whereas the controls’ did not. In addition, the meditation group demonstrated a greater improvement in RTs on affective switching tasks than neutral switching tasks. Thus, improvements in sustained attention in the affective condition might be associated with decreased depression and increased levels of mindfulness and working memory. This study suggests that mindfulness meditation leads to improved mood and emotional regulation along with working memory capacities by reducing emotional reactivity, especially to negative stimuli, thereby facilitating improvements in sustained attention. Moreover, a meta-analysis on the effectiveness of meditation conducted by Sedlmeier et al. (2012) revealed that the largest effects of meditation were obtained for the variables that were related to positive changes in relationship, state anxiety, negative emotion, and the lowest for learning and cognitive tasks. These findings suggest that changes in attentional processing of emotional information at least partially mediate the increased cognitive abilities produced by meditation.

Meditation might facilitate increased exposure to and acceptance of thoughts and emotions that may elicit defensiveness under normal circumstances. For example, college
students with higher trait mindfulness reported less use of defensive or avoidant coping and made greater use of approach coping, which in turn, was associated with less stress in response to social threats and faster recovery 30 minutes later (Weinstein, Brown, & Ryan, 2009). The authors suggest that less avoidant stress responses and approaching strategies mediated the relationship between mindfulness and well-being. In addition, because mindfulness training allows people to reflect on thoughts and emotions as transient phenomena, it helps individuals inhibit automatic evaluation and reduce defensiveness. In support of this assertion, Lueke and Gibson (2015) found that even a 10-min mindfulness meditation training leads white college students to show less implicit bias against African-Americans and older people on the race and age implicit association tests (IATs) than those in a control group. Mindfulness-training participants showed significantly lower activation of Black-bad and old-bad automatic associations than those in the control. This result indicates that without creating new associations between out-group and positive stimuli, mindfulness experience itself may reduce defensiveness.

Based on these findings, the purpose of present study was to assess the effects of meditation practice on the defensive responses to thoughts of death typically found in terror management research (for a review, see Pyszczynski, Solomon, & Greenberg, 2015). Besides the inherent interest in determining how meditation affects how people cope with thoughts of death, the extensive literature on the cognitive processes underlying these defensive responses provides an opportunity to learn more about the processes involved in the reduction of defensiveness found in previous research on meditation research. Specially, it enabled us to assess the possibility that increased openness to and reduced suppression of unpleasant thoughts plays a role in the reduction
in defensive attitudes that meditation produces.

**Terror Management Theory**

Terror Management Theory (TMT, Greenberg, Pyszczynski, & Solomon, 1986), derived from the work of Becker (1973), posits that the juxtaposition of self-preservation motives with humans’ awareness of the inevitability of death creates the potential for paralyzing terror. To cope with this potential for death anxiety, people have developed psychological buffer systems to remove death-related thoughts from awareness and make the inevitability of death less troubling. According to TMT, people manage this potential for anxiety by utilizing two defensive systems; namely, proximal (immediate) and distal (delayed) defenses (Arndt, Greenberg, Solomon, Pyszczynski, & Simon, 1997).

When death-related thoughts are in focal attention, people use the proximal defenses by immediately suppressing such thoughts to remove them from consciousness or pushing such thoughts into the distant future. Proximal defenses can also entail rational and logical efforts to minimize one’s vulnerability to mortality by exaggerating one’s health and hardiness or promising to adopt a healthier lifestyle (Pyszczynski, Greenberg, & Solomon, 1999). However, when death-related thoughts are no longer in focal attention but still highly accessible in the unconscious, people activate distal defenses. Distal defenses involve maintaining faith in one’s cultural world view and self-esteem, both of which buffer death-related anxiety (Greenberg, Solomon, & Pyszczynski, 1997).

Cultural worldviews are culturally shared beliefs that bestow a sense of symbolic or literal immortality that protect people from the threat of death (Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004). Religious beliefs are examples of literal immortality in that they promise eternal life to believers. In addition, people have devised
various cultural worldviews that provide standards of value to live by, thereby providing a way to transcend death for the people who uphold and maintain the values of their worldview. Self-esteem is a sense of self-worth that results from believing that one is living up to the standards of one’s cultural worldview (Solomon, Greenberg, & Pyszczynski, 1991). Over the past three decades, numerous studies have accumulated evidence that support TMT hypotheses across different countries. We briefly address the three core TMT hypotheses and review the empirical evidence these studies provide for TMT.

**Mortality salience hypothesis.** When reminded of their mortality, people try to bolster their worldviews and elevate their self-esteem because these psychological entities provide protection against the potential for anxiety associated with death-related thoughts (Greenberg et al., 1990). TMT research has found that Mortality Salience (MS) led to more positive reactions to those who validate one’s worldviews and more negative reactions of those who violate or challenge it (Greenberg et al., 1990). For example, Oschmann and Mathy (1994) found that German students in an MS condition, compared to those in the control condition, rated other German students more positively than they rated Turkish students, and sat farther away from a Turkish person than a German person in a waiting room. Hong Kong Chinese students evaluated a pro-Hong Kong essay author in a more positive way under the MS condition relative to a control group, and allocated more job vacancies to members of their ingroup (Tam, Chiu, & Lau, 2007). Wakimoto (2006) found that Japanese students who were strongly enculturated to the Japanese interdependent worldview responded to MS by viewing their success more negatively and rating themselves in a self-effacing manner, in accordance with the interdependent
cultural value of modesty and humility. However, MS decreased these tendencies among those less enculturated to the Japanese worldview, thus producing responses more in line with the typical Western individualistic mode of self-esteem maintenance. A follow-up study replicated this effect and showed that MS increased expectations of positive responses from friends for one’s self-effacing attributions (Wakimoto, 2009). Landau, Solomon, et al. (2004) found that right shortly after the 9/11 attacks, US participants who were reminded of their own mortality expressed a more strong preference for George W. Bush even though these participants favored Kerry (liberals) in the control condition. At the time of the study, President Bush strongly emphasized the patriotic and righteous values through media, which provided US citizens with security and a sense of meaning. Thus, President Bush served as a prototype of the American cultural worldview. MS also led to harsher punishment for those who transgress moral and cultural values (Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989); increased greed and endorsement of materialism (Cozzolino, Staples, Meyers, & Samboceti, 2004); enhanced nationalistic identity (Greenberg, Pyszczynski, Solomon, Simon, & Breus, 1994); and greater desire for material wealth (Kasser & Sheldon, 2000).

Anxiety-buffer hypothesis. If cultural worldviews and self-esteem are psychological mechanisms that provide protection against death-anxiety, then increasing these structures should relieve anxiety when people are reminded of death. Studies testing the anxiety-buffer hypothesis have shown that boosting self-esteem makes people less prone to anxiety and anxiety-related behavior in response to threats and that reminders of death increase diverse forms of self-esteem striving (Pyszczynski et al., 2004). For example, college students who received positive personality feedback reported lower
levels of self-reported anxiety in response to a graphic death-related video and reduced physiological arousal (e.g., skin conductance) in response to the threat of painful electrical shock (Greenberg et al., 1992) Research also shows that high self-esteem reduces defensive responses to MS. Harmon-Jones and colleagues (1997) found that increasing self-esteem with positive feedback on a personality test led to less negative views of an anti-US essay than receiving neutral personality feedback (control condition); and people who were predisposed to high self-esteem exhibited less worldview defense than did people with moderate self-esteem. MS increased identification with America and defense of America when self-esteem was not augmented; and enhanced self-esteem mitigated the effect of MS on worldview defense (Hohman & Hogg, 2015). High implicit self-esteem is especially associated with less defensive reactions to death reminders. While participants in low implicit self-esteem showed increased worldview defense after writing about death relative to those writing about a dental pain, those in high implicit self-esteem did not display worldview defense after an MS induction (Schmeichel et al., 2009).

Because self-esteem is subject to one’s cultural value, research has attempted to compare the buffering effects of individual versus collective self-esteem in individualist and interdependent cultures (see Park & Pyszczynski, 2016). Du et al. (2013) investigated the relationship between different types of self-esteem and self-reported death anxiety in Austrian and Chinese students. They found that personal but not collective self-esteem was associated with lower death anxiety among both Austrian and Chinese samples, and that both self-competence and self-liking predicted lower levels of death anxiety for Austrians but only self-liking did so for Chinese. However, a follow-up study showed
that relational self-esteem, involving one’s assessments of one’s relationships with others, was associated with lower death anxiety among Chinese participants.

**Death-thought accessibility hypothesis.** TMT researchers hypothesize that exposure to MS would increase the accessibility of death-related thoughts, but such thoughts are initially suppressed from consciousness because of their upsetting nature; however, these death thoughts become more accessible after a delay or distraction (Death-thought Accessibility – DTA; see Hayes, Schimel, Arndt, & Faucher, 2010), presumably because the suppression is eventually stopped. Arndt et al. (1997) had participants think about their mortality and then tested the accessibility to death-related thoughts measured by a word-stem completion task under cognitive loads at different time points. Participants in the MS condition were assigned to either high cognitive load or to low cognitive load conditions. Next, DTA was measured twice, right after the MS manipulation (an immediate measure), and after a delay in which both MS and distraction tasks were induced (a delayed measure). Participants completed word fragments with more death-related words only after the delay and not immediately after MS if they were under low cognitive load, but this pattern was reversed – death thoughts were highly accessible immediately after MS (Arndt et al., 1997). Because cognitive resources are required for thought suppression (Wegner, 1997), this shows that death-related thought are quickly suppressed under neutral conditions.

The DTA hypothesis predicts that weakening psychological protections should render death thoughts more accessible to consciousness (Schimel, Hayes, Williams, & Jahrig, 2007). College students who were told that they scored below average on an intelligence test (Hayes, Schimel, Faucher, & Williams, 2008) or those who were
reminded of their animal nature (Cox, Goldenberg, Pyszczynski, & Weise, 2007) showed increased DTA. These results support the assertion that conscious death-related thoughts lead to suppression of further death-related thought. After suppression ceases, death thoughts gradually become more accessible, which in turn motivates the distal defense strategies that reduce paralyzing death anxiety. Conversely, research has also showed that boosting self-esteem, affirming one’s worldview, or thinking about close attachment figures reduces DTA in response to MS (Hayes et al., 2010).

**Meditation, Mindfulness, and Mortality Salience**

Despite the large TMT literature supporting the dark side of MS effects, research also shows that individual differences heavily affect how people cope with existential threats. For example, whereas people higher in personal need for structure (PNS) respond to MS with increased preference for order, simplicity, and certainty, those lower PNS seek novel experience, greater tolerance for ambiguity and uncertainty, and a more open-minded approach to surroundings. Thus, TMT researchers have investigated how individual differences in PNS affect the MS effect. People with more openness to novelty, uncertainty, and ambiguity (low PNS) displayed less stereotypic thinking following MS (Landau, Johns, et al., 2004); and showed greater interested in exploring novel stimuli (Vess, Routledge, Landau, & Arndt, 2009) than those high in PNS. Moreover, a study by Juhl and Routledge (2010) that investigated the relationship between the level of PNS and MS on worldview defense revealed that MS decreased liking of the essay writer critical of the university only for those with high PNS, but not for those with low PNS (Study1); and MS increased aggressive religious worldview defense among Christian participants with high-PNS but for those with low PNS (Study
3). These results suggest that when people confront death reminders, cognitively flexible attitudes not only lead to increases in seeking novel experience but also render people less defensive in response to threats to their worldview.

Other recent studies suggest that mindfulness may also play an important role in reducing defensiveness in response to death awareness. Niemiec et al. (2010) investigated whether trait mindfulness, a receptive and accepting awareness to mental events, could mitigate defensive responses to death anxiety. Across seven studies, they assessed university students’ levels of trait mindfulness, measured by the Mindful Attention Awareness Scale (Brown & Ryan, 2003), which entails receptive attention to external and internal stimuli, and then manipulated MS followed by assessing various types of worldview defense, self-esteem strivings, and DTA. Results showed that MS increased defensive reactions, such as derogation of out-group members (Study 1 & Study 2), harsher judgment of social transgressions (Study 3), and self-enhancement strivings (Study 4) after a delay among those with low mindfulness, but those with high trait mindfulness were not reactive to MS. In addition, in Study 7, for participants with high mindfulness, DTA was higher in the MS/immediate condition than in the MS/delayed condition, but for those with low mindfulness, this pattern was reversed, suggesting the typical suppression-rebound effects of MS. The authors suggest that trait mindfulness affects the way people process conscious thoughts of death with more receptiveness and acceptance rather suppressing them, thereby eliminating the need for the secondary coping response to death thoughts. However, in these studies, trait mindfulness was assessed by a self-reported mindfulness scale rather than experimentally manipulating it; thus it is difficult to determine the causal relation between mindfulness and MS effects.
Because mindfulness is correlated with so many psychological traits and tendencies, it may be that any of these third variables were actually responsible for the reduced response to MS found by Niemiec et al (2010).

Park and Pyszczynski (2016a) conducted two separate studies to investigate the effects of a state of mindfulness induced by meditation and those associated with long-term meditation on defensive responses to MS among Korean adults in South Korea. In study 1, five groups (Novice-meditators without meditation (control), Novice meditators with meditation intervention, Buddhists before meditation, Buddhists after meditation, and Chronic meditators – Buddhists monks and laypeople whose average hours of meditation practice was more than 5 hours/day) were recruited to assess meditative effects following MS on worldview defense, specifically, pro-Korean bias and levels of self-compassion. Participants were randomly assigned to either MS or control conditions, and then completed a delay task, mood measure, worldview defense, and self-compassion measure. Results showed that MS led to increased worldview defense and lower self-compassion only for novice meditators prior to a meditative practice; but Buddhists before-meditation, Buddhists after-meditation, chronic meditators, and even novice-meditators who practiced their first 30-minute meditation did not show worldview defense following MS. Interestingly, the level of self-compassion gradually increased with meditation practice with chronic meditators showing highest self-compassion and controls showing the lowest. These results suggest that both short-term and long-term meditation practices eliminate MS effects. Even though these results provide preliminary support for the hypothesis that meditation reduces defensive responses to reminders of death, this study was not a controlled randomized experiment; thus it is impossible to
conclude that meditation caused these differences.

Study 2 assessed the effect of meditation by randomly assigning novice meditators at a meditation training to be assessed for responses to MS either before or after their first meditation experience, with dependent measures of worldview defense and self-compassion. While those in the before-meditation group were measured on all variables before meditation, those in the after-meditation were assessed immediately after a 30-min Zen meditation. All participants were randomly assigned either to MS or control groups and given the same measures as in Study 1. Results showed the same patterns of the Study 1, suggesting that a brief Zen meditation intervention eliminated the typical MS effects on ingroup bias and self-compassion. Interestingly, the level of death anxiety (measured by Templer’s Death Anxiety Scale, 1970), nationalism, religiosity, and age variables were not different among groups, but perceived alertness was significantly higher for those who did 30-min meditation (both control and MS conditions) than those who did not. Therefore, as predicted by Brown and Ryan (2003), a receptive awareness to the present moment without suppression or judgment seems to play a protective role against death-related thoughts without altering the meaning of death.

Present Study

The present study aimed to further investigate the effect of a state of mindfulness induced by a 20-minute brief mindful breathing meditation intervention, on how MS affects DTA and worldview defense among novice meditators in the US. To our best knowledge, there is as of yet no study directly testing the effect of state mindfulness on DTA and worldview defense after MS among Westerners. We predicted that: (1) A short-term meditation would increase a state of mindfulness; (2) meditation experience may
reduce self-reported anxiety (death anxiety and dental anxiety), if meditation practice leads to more acceptance of death thoughts; (3) meditation experience would eliminate the effect of MS on worldview defense; (4) because they are not suppressing death-related thoughts, after meditation, novice meditators in the MS condition would exhibit an immediate increase in DTA, which in turn would lead to reduced worldview defense. In contrast, participants without meditation would show the typical DTA effect of no immediate increase and a delayed increase in DTA, and later increased worldview defense effect as found in many previous TMT studies; and (5) this absence of an effect of MS on worldview defense after meditation would be mediated by the higher immediate and lower delayed levels of DTA expected to be found after meditation. In other words, we hypothesized that DTA would mediate the moderating effect of meditation on worldview in response to MS.
CHAPTER 2

METHOD

Participants

One-hundred forty college students from the University of Colorado, Colorado Springs (UCCS) and their adult relatives participated in the study. The current study included only novice meditators or those who had minimal meditation histories. The exclusion criteria were: (1) participants who had practiced mindfulness-related meditation on a daily/weekly basis for more than three months, and (2) those who had practiced meditation as a clinical intervention (e.g., meditation-related therapy, or meditation training for OCD, ADHD, and depression). However, people who practiced physical Yoga or Tai-chi trainings in which physical flexibility, balance, and relaxation were their main focus were still included in the study. Participants’ previous meditation histories, if applicable, were assessed by questions about their duration, frequency, and types of meditation in the demographic section of the study. Student participants were offered extra credit in exchange for their participation in the study and given an opportunity to invite their adult friends or relatives into the study to earn additional extra credit. The current study was conducted in a laboratory setting in which participants were tested in groups of two to six, and all participants received a 20-minute audio-taped mindful breathing meditation practice under the supervision of an experienced meditator.
Procedure

Upon arrival at the lab, participants were informed that the purpose of study was to examine the relationship among personality, cognition, and meditation among people who had minimal experience with meditation without revealing a specific purpose of the study in order to prevent any expectation bias. Upon completion of consent forms, participants were randomly assigned to either the meditation (experimental) condition or the no-meditation (control) condition. Participants in the no-meditation condition completed all measurements before practicing a 20-minute mindful breathing meditation. Those in the meditation condition first completed the trait mindfulness measurement, and then practiced a 20-minute mindful breathing meditation.

Next, they completed the same measures as the no-meditation group right after the meditation training. We chose to compare separate groups of participants before and after meditation training rather than using a placebo meditation control group because part of the incentive for participation in the study was receiving meditation training.

Next, participants were randomly assigned to either the MS condition or the dental pain (control) condition. Before the MS manipulation, participants were asked to complete the state mindfulness measurement. After the MS manipulation, participants were given the first DTA measure, then the mood measure (PANAS) and delay tasks. Next, they were asked to complete the second DTA task followed by a worldview defense measure. The brief demographic form and evaluation of meditation practice were included at the end. All participants were fully debriefed.
Materials

**Five facet mindfulness questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006).** In order to assess participants’ levels of trait mindfulness that might affect our main research interests, participants completed the FFMQ (Appendix A). This self-report questionnaire consists of 39 items assessing five identified trait mindfulness facets: observing, describing, acting with awareness, nonjudging, and nonreactivity. The FFMQ is a 5-point Likert scale (1 = never to 5 = always) with higher scores denoting greater mindfulness. This instrument is one of the most recently constructed mindfulness measures and can measure five mindfulness facets separately and reliably (Heeren, Douilliez, Peschard, Debrauwere, & Philippot, 2011). It had good internal consistency for each of the subscales (observe, $\alpha = .83$, describe, $\alpha = .91$, act with awareness, $\alpha = .87$, nonreact, $\alpha = .74$, and nonjudge, $\alpha = .89$; Baer et al., 2006). For the current sample, the total FFMQ and each subscale have demonstrated sufficient internal consistency: observe ($\alpha = .78$), describe ($\alpha = .86$), act with awareness ($\alpha = .85$), nonjudge ($\alpha = .89$), nonreact ($\alpha = .80$), and the total FFMQ ($\alpha = .85$).

**Toronto mindfulness scale (TMS, Lau et al., 2006).** The 13-item TMS was used to assess participants’ state of mindfulness immediately after meditation manipulation. The TMS consists of two factors: Curiosity and Decentering. The 6-item curiosity subscale reflects awareness of present moment experience with curiosity and openness. The 7-item decentering subscale reflects awareness of one’s present experience with some distance and detachment. Responses range from 1 (not at all) to 5 (very much) in the current study. Internal consistency for the curiosity, decentering, and the total TMS were 0.87, 0.69, and 0.84, respectively, in the current study (Appendix B).
Death-thought accessibility (DTA). DTA was measured twice, immediately after the MS induction and after delay tasks, by having participants fill in missing letters from 25 word fragments (Arndt et al., 1997; Harmon-Jones et al., 1997; Simon et al., 1997). Of the 25 words, four could be completed as either neutral or death-related words. Thus, total numbers of word fragments that participants were asked to fill in consisted of 50, with 8 death-related. For example, the word-fragment, “SK_ _ L” could be completed as the neutral word skill or as the death related word skull. Possible death-related words include buried, dead, grave, killed, skull, corpse, murder, and coffin (Appendix C). Order and lists of words in the first and the second DTA tasks were counterbalanced, and specific word fragments included in the first DTA measure were not presented in the second DTA measure.

Positive and negative affect measure. To assess whether the MS manipulation or meditation influenced the current mood state, participants completed the modified version of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). It served as a delay task as well as a mood measure for the study. The PANAS is a 20- item scale that measures both 10 positive (e.g., interested, alert) and 10 negative (e.g., distressed, anger) affect and has been used in a multitude of TMT studies. In the current study, we added three fear items (afraid, scared, fearful, frightened, & terrified; Lambert et al., 2014) and three additional serenity items (calm, relaxed, & at ease) which assess the relaxation component adopted from the PANAS-X (Watson & Clark, 1999). This enabled us to assess Lambert et al.’s (2014) recent claim that MS increases the specific emotion of fear when measured with these specific items. Therefore, in the study, the affect items can be categorized into five fear items (afraid, scared, fearful, frightened, &
terrified), three attentiveness items (alert, attentive, & determined), three serenity items (calm, relaxed, & at ease), seven general positive items (interested, excited, inspired, strong, enthusiastic, active, & proud), eight general negative items (irritable, distressed, ashamed, upset, nervous, guilty, hostile, & jittery), 13 total positive items, and 13 total negative items (Appendix D). Participants were asked how they felt “at the moment” for each statement using a 5-point Likert scale (1 = very slightly or not at all, 5 = extremely). Internal consistency estimates for each affect cluster in the current sample were adequate to excellent: serenity ($\alpha = .89$), attentiveness ($\alpha = .71$), fear ($\alpha = .91$), general positive affect ($\alpha = .86$), general negative affect ($\alpha = .81$), total positive affect ($\alpha = .86$), and total negative affect ($\alpha = .90$).

**Delay tasks.** Since immediately after the delay tasks, participants had to complete a word-completion task (a delayed DTA), we used delay/distraction tasks that did not require verbal abilities that might influence the ensuing tasks. The delay tasks consisted of two different parts: (1) simple mental abstraction task – the Shiply-2 Abstraction (Shipley, Gruber, Martin, & Klein, 2009) was presented and participants filled in either a number or a letter for each missing piece using inductive reasoning and (2) non-verbal fluid intelligent tasks – participants were given a series of diagrams or designs with a part missing and then were asked to select the correct part to complete the designs from a number of options. Items were drawn from the relatively easier pieces with minimal mental effects from both the Shipley-2 Block Patterns (Shipley et al, 2009) and Raven’s Progressive Matrices (Raven, Raven, & Court, 1998). For the current study, these tests served as only a distraction task, and we only used the relatively easier items from the original tests to prevent the potential for fatigue in participants. These tasks were not
analyzed because they served simply as distractions.

**Worldview defense measure.** Worldview defense was measured with 5 evaluative questions, as used in Greenberg et al. (1994). Participants were asked to read pro- and anti-US essays written by ostensibly foreign students and then to respond to 5 questions about each of the essays. The order of essays was counterbalanced. Of the five questions, three assessed impressions of the author (likeability, intelligence, and knowledge) and two assessed impressions of the essay itself. Participants rated each question using a 9-point Likert scale (1 = *not at all*, 9 = *totally*). For the current sample, anti-US essay (α = .90) and pro-US essay items (α = .88) were found to have excellent reliability. Following Greenberg et al. (1994), we made a composite defense score by subtracting the mean of the five anti-US essay items from the mean of the five pro-US essay items. Higher scores indicate greater US-bias, thus indicating more worldview defense (Appendix E).

**Demographics.** Participants’ characteristics related to age, gender, race, religious affiliation, religiosity, political orientation, levels of satisfaction with the US, and nationalism were measured. In addition, participants were asked to report whether they had experienced or been treated for any psychological problems, and if so, to specify their psychological distress. Meditation-related questions were asked to control for the effects of previous meditation experiences. For example, “Have you ever practiced any kinds of meditation, including yoga practice?” If participants responded “Yes,” they then were asked to indicate the average hours of meditation per day/week/month, the types of meditation, and how long they meditated.
Experimental Manipulation

**Mortality salience manipulation.** Participants were randomly divided into two groups. Half of them were reminded of their own death by completing Templer’s Death Anxiety Scale (DAS; Templer, 1970) and the others completed a dental pain anxiety measure using a modified version of Templer’s DAS in which the word "death" was replaced with "dental pain." Templer's DAS has been used as an MS manipulation in previous TMT studies (Burke, Martens, & Faucher, 2010). The DAS consists of 15 true or false questions. We used the total DAS scores so that higher scores indicate greater death anxiety. Additionally, we added one open-ended question that asked participants to describe emotional responses to their own mortality, which has been used in many TMT studies (Cox et al., 2009). These manipulations served not only to induce death-related thoughts but also to enable us to investigate whether a short-term meditation intervention would temporarily reduce anxiety in response to either death or dental pain.

**Meditation intervention.** Participants practiced a 20-min mindful breathing meditation aided by audio-taped instruction (www.freebuddhistaudio.com). The mindful breathing meditation is the common basis of many other forms of meditation, as well as the most widely used form of meditation for both Buddhists and non-Buddhist meditators (Wallace & Shapiro, 2006). This meditation technique also has been used in previous meditation studies (see Erisman & Roemer, 2010; Kabat-zinn, 1990; Wenk-Sormaz, 2005).

During the meditation session, participants were instructed to focus their attention on their breathing without judgment or suppression of thoughts/emotions, by first counting their breaths and later just simply observing the sensation of their breaths.
without counting. Whenever noticing their attention was wandering or straying, they were told to simply be aware of their state of mind and gently return their attention back to their breathing.

**Evaluation of meditation session.** To assess expectancies regarding meditation effects, participants were asked two questions: “How much do you expect the meditation to affect you” for the no-meditation group, and “How much did you engage with the meditation practice?” for the meditation group at the end of the demographic section.
CHAPTER 3
RESULTS

Participant Characteristics

Of the initial sample of 140 participants, 11 participants were removed from the analyses for the following reasons: three had practiced meditation as an intervention for psychological disorder; six were regular meditators who reported they had practiced meditation regularly for at least the last 3 months; and two suspected the MS manipulation. Thus, the final analysis included 129 participants (94 females, 32 males, and 3 non-identifiers) with ages ranging from 18 to 73 ($M = 22.05$, $SD = 7.17$). Their religious affiliation consisted of 48.1% Protestants, 18.6% Catholics, 9.3% atheists, 3.9% Buddhists, 2.3% other religious affiliations, and 14% no affiliations. Their race/ethnicity was 5.4% African-Americans, 62.8% Caucasian-Americans, 17.1% Hispanics, 7.8% bi/multi-cultures, 5.4% Asian/Pacific islanders, and 1.6% others. In addition, 44.2% of participants reported at least one psychological problem (Table 1).

Manipulation Check

Before conducting the main analysis, a series of preliminary one-way analysis of variance (ANOVA) were conducted to assess successful random assignment among experimental groups on the total FFMQ and the FFMQ subscales across the four conditions. The analyses yielded no significant difference between groups for observe,
\[ F(3,125) = 1.14, p = .335; \] aware, \[ F(3,124) = 1.88, p = .137; \] non-judge, \[ F(3,125) = 0.38, p = .766; \] non-react, \[ F(3,124) = 0.26, p = .858; \] describe, \[ F(3,125) = 1.45, p = .232; \] and total FFMQ, \[ F(3,123) = 0.84, p = .477. \] Descriptive statistics for all variables are presented in Table 2.

Table 1

<table>
<thead>
<tr>
<th>Participant Characteristics (N = 129)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>N (%)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>7 (5.4)</td>
</tr>
<tr>
<td>Caucasian</td>
<td>81 (62.8)</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>7 (5.4)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>22 (17.1)</td>
</tr>
<tr>
<td>Native American</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td>Bi/multiracial</td>
<td>10 (7.8)</td>
</tr>
<tr>
<td>Others</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
</tr>
<tr>
<td>Catholics</td>
<td>24 (18.6)</td>
</tr>
<tr>
<td>Protestants</td>
<td>62 (48.1)</td>
</tr>
<tr>
<td>Buddhists</td>
<td>5 (3.9)</td>
</tr>
<tr>
<td>Atheist</td>
<td>12 (9.3)</td>
</tr>
<tr>
<td>None</td>
<td>18 (14.0)</td>
</tr>
<tr>
<td>Others</td>
<td>3 (2.3)</td>
</tr>
<tr>
<td>Self-reported Psychological Problems*</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>35 (27.1)</td>
</tr>
<tr>
<td>Anxiety</td>
<td>49 (38.0)</td>
</tr>
<tr>
<td>PTSD</td>
<td>5 (3.9)</td>
</tr>
<tr>
<td>Alcohol or Drug Problem</td>
<td>2 (1.6)</td>
</tr>
<tr>
<td>Others</td>
<td>5 (3.9)</td>
</tr>
<tr>
<td>None</td>
<td>72 (55.8)</td>
</tr>
</tbody>
</table>

Item range      Mean (SD)

Nationalism     1 (not at all) to 7 (absolutely important) 4.63 (1.72)

Political Orientation 1 (extremely liberal) to 7 (extremely conservative) 3.94 (1.47)

US-satisfaction 1 (extremely dissatisfied) to 7 (extremely satisfied) 2.84 (1.25)

Religiosity     1 (not at all) to 10 (completely religious) 4.63 (3.05)

Notes. * Some participants gave multiple responses.
Table 2
Means and Standard Deviations for Trait and State Mindfulness, and DAS by Condition

| Measure | No-Meditation | | | Meditation | | |
|---------|---------------|------------------|------------------|---------------|------------------|------------------|------------------|
|         | MS M (SD) | Dental M (SD) | Total M (SD) | MS M (SD) | Dental M (SD) | Total M (SD) |
| FFMQ total | 3.10(0.54) | 3.24(0.50) | 3.17(0.52) | 3.24(0.36) | 3.27(0.45) | 3.26(0.40) |
| Observe | 3.23(0.62) | 3.17(0.86) | 3.20(0.75) | 3.43(0.58) | 3.41(0.65) | 3.42(0.61) |
| Describe | 3.09(0.81) | 3.37(0.75) | 3.23(0.78) | 3.37(0.57) | 3.43(0.73) | 3.40(0.65) |
| Awareness | 3.00(0.70) | 3.34(0.69) | 3.18(0.71) | 3.22(0.65) | 3.33(0.58) | 3.27(0.62) |
| Nonjudge | 3.07(0.80) | 3.23(0.93) | 3.16(0.86) | 3.28(0.77) | 3.21(0.69) | 3.24(0.73) |
| Nonreact | 3.03(0.64) | 3.04(0.65) | 3.04(0.64) | 2.94(0.53) | 2.93(0.73) | 2.94(0.63) |
| TMS total | 2.98(0.81) | 2.96(0.65) | 2.97(0.73) | 3.36(0.56) | 3.34(0.61) | 3.35(0.58) |
| Dec | 2.87(0.73) | 2.81(0.61) | 2.84(0.67) | 3.22(0.65) | 3.37(0.60) | 3.29(0.63) |
| Curiosity | 3.08(1.07) | 3.14(0.95) | 3.11(1.01) | 3.53(0.70) | 3.29(0.89) | 3.42(0.80) |
| DAS total* | 6.66(3.52) | 4.36(3.64) | 7.45(3.03) | 4.87(4.94) | 7.45(3.03) | 4.87(4.94) |

Notes. FFMQ = Five Facet Mindfulness Questionnaire, Awareness = Act with Awareness, TMS = Toronto Mindfulness Scale, Dec = Decentering. DAS = Death Anxiety Scale. *DAS was used for the MS group, dental anxiety for the control group.

State mindfulness. A series of 2 (Meditation) x 2 (MS) between-subject ANOVA were performed on the total TMS, and two TMS’ subscales (Decentering & Curiosity) to assess the brief effect of meditation on self-reported states of mindfulness. Consistent with the hypothesis, the meditation main effect was statistically significant on total TMS, $F(1,122) = 10.36, p = .002, \eta^2_p = .08$ (Figure 1), and on Decentering, $F(1,122) = 14.89, p < .001, \eta^2_p = .11$ (Figure 2), with participants who practiced meditation scoring significantly higher compared to those who did not on both the total TMS and
Decentering. For the Curiosity scale, a marginally significant meditation effect was detected, $F(1,124) = 3.51$, $p = .063$, $n_p^2 = .03$, with Curiosity scores of the meditation group being higher than those of the no-meditation group (Figure 3). Neither MS main effect nor interaction were statistically significant, $p > .36$. These findings suggested the meditation manipulation was successful such that participants who practiced meditation reported higher total TMS and Decentering compared to those in the no-meditation condition.

![Figure 1](image)

*Figure 1.* Total TMS as a function of MS and Meditation
Figure 2. Decentering as a function of MS and Meditation

Figure 3. Curiosity as a function of MS and Meditation
**Levels of death/dental anxiety.** Even though DAS and modified dental anxiety scale were primarily used as death/dental manipulation, we also investigated whether short-term meditation training would reduce either death-related or dental anxiety using independent-sample t-tests. Results (Table 2) revealed no significant differences among meditation and no-meditation groups on DAS, \( t(63) = -0.98, p = .33 \); and on dental anxiety, \( t(62) = -0.47, p = .64 \). The meditation training did not reduce either death-related or dental pain-related anxiety.

**Main Analyses**

**Death-thought accessibility.** A 2 (MS) x 2 (Meditation) between-subjects x 2 (Time: Time 1 vs. Time 2) within-subject mixed ANOVA was performed on the number of death-related words on the word-stem completion task. This analysis yielded the predicted statistically significant three-way interaction, \( F(1, 125) = 5.43, p = .021, \eta^2_p = .04 \) (Figure 4 & Table 3). No other effects emerged. Simple slope tests revealed that whereas death-related words increased marginally significantly after the delay in the no-meditation-MS condition, \( F(1, 125) = 3.10, p = .081 \), this pattern reversed in the no-meditation-control condition, \( F(1,125) = 5.35, p = .022 \). Looked at differently, immediately after the MS manipulation (T1), death-related thoughts were less accessible for both no-meditation-MS participants \( F(1,125) = 3.76, p = .055 \) and meditation-control participants \( F(1,125) = 4.21, p = .042 \) than for no-meditation-control participants. However, after delay (Time 2), DTA did not differ across conditions, \( ps > .10 \). In the meditation condition, no differences between these groups were significant (all \( ps > .55 \); Table 3). In the immediate assessment, DTA was lower for the MS than the control condition among participants who did not meditate, and did not differ between the MS
**Figure 4.** DTA as a function of Meditation and MS. Time 1 = immediate DTA, Time 2 = delayed DTA.

**Table 3**

*Means and Standard Deviations for PANAS, DTA, and Worldview Defense by Condition*

<table>
<thead>
<tr>
<th>Measure</th>
<th>No-Meditation</th>
<th>Meditation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MS M(SD)</td>
<td>Dental M(SD)</td>
</tr>
<tr>
<td>PANAS Serenity</td>
<td>3.79(0.90)</td>
<td>3.31(1.11)</td>
</tr>
<tr>
<td>Panas Attentive</td>
<td>2.98(0.95)</td>
<td>3.35(0.91)</td>
</tr>
<tr>
<td>Fear</td>
<td>1.08(0.17)</td>
<td>1.30(0.55)</td>
</tr>
<tr>
<td>G Positive</td>
<td>2.76(0.78)</td>
<td>2.87(0.77)</td>
</tr>
<tr>
<td>G Negative</td>
<td>1.32(0.33)</td>
<td>1.50(0.55)</td>
</tr>
<tr>
<td>T Positive</td>
<td>3.03(0.62)</td>
<td>3.05(0.69)</td>
</tr>
<tr>
<td>T Negative</td>
<td>1.22(0.25)</td>
<td>1.42(0.5)</td>
</tr>
<tr>
<td>DTA-T1</td>
<td>1.06(0.91)</td>
<td>1.52(0.97)</td>
</tr>
<tr>
<td>DTA-T2</td>
<td>1.44(1.22)</td>
<td>1.03(0.77)</td>
</tr>
<tr>
<td>WVD</td>
<td>2.07(2.05)</td>
<td>1.06(2.16)</td>
</tr>
</tbody>
</table>

*Notes.* PANAS = Positive and Negative Affect Schedule, G Positive = General Positive Affect, G Negative = General Negative Affect, T Positive = Total Positive Affect, T Negative = Total Negative Affect, DTA-T1 = DTA at Time 1 (immediate), DTA-T2 = DTA at Time 2 (delayed), and WVD = Worldview Defense.
and the control condition among those who meditated. In the delayed assessment, DTA did not differ among conditions.

These results indicated that for participants who did not receive meditation practice, MS led to initial suppression and delayed increases in DTA, reflecting a typical pattern of the suppression and rebound effects in reaction to reminders of death. However, participants who practiced meditation did not exhibit death-thought suppression and rebound effects at all. The results confirmed that meditation moderated the effects of MS on DTA.

**Worldview defense.** Preliminary analyses revealed that in the current study, worldview defense was statistically significantly associated with higher US-satisfaction, $r(129) = .27, p = .003$, and greater levels of nationalism, $r(128) = .28, p = .011$, and these two demographic variables did not interact with our two independent variables (all $p$s = ns). Thus to control for these relationships, we performed a 2 (MS) x 2 (Meditation) between-subject ANCOVA on worldview defense with US-satisfaction and nationalism as covariates. The ANCOVA revealed a statistically significant meditation main effect, $F(1, 122) = 6.26, p = .014, n^2_\text{p} = .05$, with participants in the no-meditation condition ($M_{\text{est}} = 1.46, SE_{\text{est}} = 0.23$) showing more worldview defense than those in the meditation condition ($M_{\text{est}} = 0.64, SE_{\text{est}} = 0.23$). An MS main effect did not emerge, $F(1, 122) = 0.54, p = .464, n^2_\text{p} < .01$.

However, the predicted interaction of MS with Meditation was statistically significant, $F(1, 122) = 7.27, p = .008, n^2_\text{p} = .06$ (Figure 5 & Table 3). Simple slopes analyses revealed that participants in the no-meditation-MS condition exhibited more worldview defense (higher pro-American bias) than those in the no-meditation-control
condition, $F(1,122) = 6.22, p = .014, n^2_p = .05$. In contrast, in the meditation condition, MS did not increase worldview defense, $F(1,122) = 1.90, p = .170, n^2_p = .02$. Looked at differently, following mortality salience, participants who did not receive meditation training displayed greater worldview defense compared to those who did, $F(1, 122) = 14.12, p < .001, n^2_p = .10$, but in the absence of MS, there was no difference between meditation and no-meditation conditions on worldview defense, $F(1,122) = 0.03, p = .861, n^2_p < .001$. These results showed that although participants who did not practice meditation displayed a typical MS effect on worldview defense, such that MS led to increased worldview defense, those who briefly practiced meditation did not, suggesting that the even a brief meditation practice eliminated defensive responses to MS.

Figure 5. Worldview defense as a function of MS and Meditation after controlling for US-satisfaction and nationalism.
Affect. Most previous TMT studies have not found MS to influence subjectively reported affect. However, a recent study by Lambert et al. (2014) showed that MS led to increases in fear-related affect only. Meditation/mindfulness research also reported that long-time practice of meditation (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008) or people with high trait mindfulness (Jimenez, Niles, & Park, 2010) reported lower levels of negative affect and higher levels of positive affect. Therefore, we tested whether the brief meditation training and reminders of death would influence the emotional state. We conducted a series of 2 (MS) x 2 (Meditation) ANOVA on scales assessing fear, attentiveness, serenity, general positive affect, general negative affect, total positive affect, and total negative affect. These analyses revealed that meditation led to significant increases in serenity, $F(1,125) = 15.64, p < .001, \eta^2_p = .11$; general positive affect, $F(1,125) = 7.08, p = .009, \eta^2_p = .05$; total positive affect, $F(1,125) = 13.69, p < .001, \eta^2_p = .10$; and marginally significant increases in attentiveness, $F(1,125) = 3.72, p = .056, \eta^2_p = .03$. No other effects emerged for positive-related affect clusters, all $ps > .13$. For fear and total negative affect, there were neither main effects nor interaction effects (all $ps > .10$). However, for the general negative affect, there was a marginally significant interaction between MS and meditation, $F(1,125) = 3.09, p = .081, \eta^2_p = .02$. Simple slope tests revealed that with MS, the meditation group scored higher on general negative than the no-meditation group, $F(1,125) = 4.02, p = .047, \eta^2_p = .03$. No other comparisons yielded significant difference between groups, $ps > .28$. In addition, the analysis yielded a marginally significant MS-Meditation interaction on attentiveness, $F(1,125) = 3.56, p = .061$. For the MS condition, the meditation condition reported significant higher
attentiveness compared to the no-meditation condition, $F(1,125) = 7.34, p = .008, \eta^2_p = .06$, but the attentiveness scores did not differ in the control condition, $p > .97$. No other effects emerged (Table 3).

In sum, participants who practiced meditation reported higher positive affect including serenity, attentiveness, and general positive affect compared to those who did not receive meditation training. Interestingly, after being reminded of their own death, people with meditation practice also reported higher levels of general negative affect compared to those without meditation training. These results indicated that those with meditation training were more likely aware of both positive and negative affect (except fear) and less likely to suppress their emotions.

**Moderated mediation analyses.** As seen above, the effects of MS on worldview defense and on DTA were moderated by meditation practice. Participants without meditation displayed a typical MS effect: an immediate suppression and delayed increase of DTA, and greater worldview defense in reaction to MS, whereas those with meditation training did not show such effects at all. Based on these findings, we tested: (1) whether MS would lead to high DTA after delay, which in turn, would cause worldview defense (DTA at Time 2 as a mediator), and (2) the effects of MS on worldview defense through heightened DTA would depend on meditation training (meditation as a moderator). In order to test this pathway, we conducted a moderated mediation analysis using the PROCESS macro by Hayes (2012), with 5,000 bootstrap estimates for the construction of 95% bias-corrected confidence intervals (CIs). This method allows the estimation of both the direct and indirect pathways using bootstrap CIs. For the hypothesis testing, if zero value is the outside of the bootstrapped CI, the indirect effect significantly differs from
zero, indicating that the null hypothesis is rejected (Hayes, 2013; see also Preacher, Rucker, & Hayes, 2007). Predictor variable (MS) was dummy coded as “MS = 0.5” or “Control = - 0.5”, and moderator (Meditation) as “Meditation” = 0.5” or “No-Meditation = - 0.5” as recommended by Hayes. (2013).

The moderated mediation analyses revealed that the delayed DTA did not mediate the MS-worldview defense relationship for either the no-meditation ($B = 0.12, SE = 0.10, 95\% CI: -0.01 to 0.42$) or the meditation condition ($B = 0.01, SE = 0.08, 95\% CI: -0.12 to 0.23$). The direct effect of MS on worldview defense was significant for the no-meditation condition ($B = 1.03, SE = 0.46, p = 0.028, 95\% CI: 0.12 to 1.94$) but not for the meditation condition ($B = -0.70, SE = 0.48, p = 0.145, 95\% CI: -1.64 to 0.25$). See Figure 6. Such results suggested that the level of delayed DTA did not mediate the effects of MS on worldview defense.

Figure 6. Mediating effects of DTA (T2) on the effects of MS on worldview defense (WVD) as a function of meditation (MED). Dashed lines represent covariates. US-SAT = US-Satisfaction, NAT = Nationalism. * $p < .05$, **$p < .01$. 
However, the analysis on the DTA showed that only the MS-no-meditation group exhibited marginally significant increases in DTA from T1 to T2 compared to the other three conditions, suggesting that those without meditation tended to display the suppression and rebound effects of death thoughts. Thus, we investigated whether the death-thought rebound effects would mediate the effects of MS on worldview defense. Given that the death-thought rebound (DTR) was conceptualized as increased death thoughts following death-thought suppression, we made a composite index of DTR by subtracting the number of death-related words at T1 from the number of death-related words at T2, with higher scores indicating higher levels of death-thought rebound. We hypothesized that the effects of MS on worldview defense would be mediated by the death-thought rebound effects (DTR as a mediator), and that this pathway would be moderated by meditation (Meditation as a moderator). Nationalism and US-satisfaction were controlled as covariates on worldview defense. The analyses revealed the significant MS x Meditation interaction both on the MS-DTR pathway (path $a$), $B = -1.00$, $p = .022$, CI: $-1.85$ to $-0.15$, and on the MS-worldview defense pathway (path $c'$), $B = -1.53$, $p = .024$, CI: $-2.86$ to $-0.21$. See Figure 8. The pathway from DTR to worldview defense ($b$) was significant, $B = 0.29$, $p = .032$, CI: 0.03 to 0.55. Follow-up analyses showed that the indirect effect of MS on worldview defense through DTR was positive among participants without meditation ($B = 0.25$, $SE = 0.14$, 95% CI: 0.06 to 0.65), indicating that MS led to greater death-thought rebound effects, which in turn increased worldview defense among participants in the no-meditation condition. After controlling for the DTR, the direct effect of MS on worldview defense was no longer significant ($B = 0.90$, $SE = 0.47$, $p = .056$, 95% CI: -0.02 to 1.82). However, for participants with meditation, neither
indirect effects ($B = -0.04, SE = 0.09, 95\% CI: -0.24 to 0.12$) nor direct effects ($B = -0.64, SE = 0.47, p =.182, 95\% CI: -1.57 to 0.30$) were significantly different from zero (See figure 7). These results suggested that participants in the no-meditation condition initially suppressed death-related thoughts and produced a greater rebound of death-related thoughts after the delay, and these rebounded death thoughts increased the worldview defense. However, the meditation intervention completely eliminated such effects, indicating the MS-worldview defense via the DTR pathway was moderated by meditation.

Figure 7. Mediating effects of DTR (death-thoughts rebound) on the effects of MS on worldview defense as a function of meditation. * $p <.05$, **$p<.01$
CHAPTER 4
DISCUSSION

The present study was designed to investigate whether a brief mindfulness meditation would mitigate death-thought accessibility and worldview defense in response to death-related thoughts. Specifically, this study assessed the possibility that the relationship between meditation and MS effects was mediated by a reduced tendency to suppress/avoid death-related thoughts that resulted from meditation. In addition, we examined the impact of meditation in reaction to MS on affect and state mindfulness. To the best of our knowledge, no previous study has directly examined whether a one-time brief mindful breathing meditation training can decrease worldview defense and suppression of death-related thoughts in adult Americans without prior meditation experience. Participants among groups did not differ in trait mindfulness and other individual measures, suggesting that at the baseline, there was no difference on these related individual characteristics among groups. The intention of this study was to determine whether a brief mindful breathing meditation training that emphasized cultivating receptive/non-reactive attentional awareness (mindfulness) would reduce defensiveness in response to MS, without changing the context of threats and activating secondary elaboration processing.
As predicted, novice American meditators who received a 20-minute one-time mindful breathing meditation and those who did not responded differently to the reminders of death. Whereas the latter consistently displayed increased worldview defense in reaction to MS, the former did not augment worldview defense following MS. This result confirmed that brief meditation training eliminated MS effects on worldview defense. For DTA, participants in the meditation condition did not suppress the death-related thoughts and also did not show increased DTA after delay; however, for those in the no-meditation condition, MS led to initial suppression of death-related thoughts, and then delayed increases in DTA. Moreover, we found that this death-thought rebound mediated the MS-worldview defense relation, which was moderated by meditation practice. In other words, MS led to higher death-thought rebound, which in turn increased worldview defense only among participants without meditation but not among those with meditation. Taken together, these findings offer strong support for the assertion that meditation leads to reduction in defensive responses to threatening information – death thoughts. Meditation experience also increased state mindfulness and positive affect, serenity, and attentiveness, and even negative affect (except fear). There are several explanations for these findings.

As expected, brief meditation training increased a state of mindfulness, especially decentering ability in which thoughts or emotions are perceived as temporal mental events rather than an objective representation of reality (Safran & Segal, 1990). Similar results were observed in Lau et al.’s (2006) research showing that greater meditation experience was associated with increases in decentering. However, the brief meditation training did not decrease either self-reported death-related or dental-related anxiety in the
current study, suggesting participants’ perceived anxiety levels – either death or dental – were the same across the groups.

Based on these findings above, the fact that brief meditation eliminated MS effects on worldview defense was intriguing. For the no-meditation condition, MS led to increased worldview defense, consistent with previous TMT research, whereas for the meditation condition, there was no difference in worldview defense between MS and control conditions. This finding was consistent with previous findings that high trait mindfulness was associated with lower pro-American defense among American college students (Niemiec et al., 2010); and findings that experimentally induced mindfulness decreased worldview defense among Korean novice meditators; and that Buddhists with varying experience of meditation in South Korea also were not reactive to MS (Park & Pyszczynsk, 2016a). Our findings provide strong evidence that even a short-term meditation training can reduce defensive responses to MS in two quite different cultures.

In dealing with threatening information, meditation researchers have suggested that mindful people perceived threatening information as less threatening (Baer, 2003) because they view thoughts as events in the mind rather than an accurate representation of reality and self-view (decentering; Safran & Segal, 1990). Thus this increased state of decentering led participants to view death-related thoughts as a transient phenomenon, rather than fundamental and enduring threats. Frewen, Evans, Maraj, Dozois, and Partridge (2008) provided empirical evidence that dispositional mindfulness was negatively correlated with negative thought frequency and positively correlated with perceived ability to let go of negative thoughts.

In addition, mindfulness meditation systematically cultivates special sets of
present-centered attention that emphasize non-reactive, non-judgmental, accepting awareness (Chambers et al., 2009), something that is referred to as metacognitive insight (Bishop et al., 2004). Improved metacognitive ability leads to being less reactive to threatening information. With this reasoning, an increased state of decentering led participants to view death-related thoughts as a transient phenomenon. Furthermore, non-reactive awareness led meditators to prevent habitual and automatic self-defensive responses in reaction to MS.

To better understand the underlying cognitive process in reaction to MS, we initially hypothesized that after meditation, novice meditators would exhibit an immediate increase and delayed decreases in DTA. In contrast, participants without meditation would show the typical DTA effect of no immediate increase and a delayed increase in DTA. In other words, under the normal circumstance, people would actively suppress death-related thoughts, but when this suppression ceases (due to delay or distraction), these death thoughts would be more accessible (Arndt et al, 1997; Hayes et al., 2010). For people who received meditation training, this pattern would be reversed, in that mindfulness was expected to reduce thought suppression (Baer et al., 2006). Our results generally support this reasoning but in a somewhat different manner. In terms of suppression-rebound effects of DTA, as hypothesized, we found that those in the MS-no-meditation condition showed the trend of the death-thought suppression and rebound effects similar to previous TMT studies (Harmon-Jones et al., 1997). MS led to more suppression of death-related thoughts only among those in the no-meditation condition. In contrast to our prediction, those in the meditation condition did not show immediate increases in DTA following MS. In addition, immediate DTA in the meditation-control
condition was significantly lower than in the no-meditation-control condition, and the immediate DTA between MS and control among those who meditated was not different. In addition, the fact that DTA after delay did not differ among groups (all \( p > .10 \)) also contradicted our prediction.

These results give rise to several intriguing questions. First, Niemiec et al.’s (2010) findings showed that those with higher trait mindfulness exhibited initial increases and delayed decreases in DTA following MS, suggesting that more mindful people showed less suppression of death thoughts. In our study, immediately after meditation training, people had less access to death-related thoughts; subsequently, they did not display the suppression-rebound effects. Secondly, our finding did not replicate other TMT studies that after a delay, DTA was significantly higher in the MS condition than control condition.

To understand these findings, we conducted two moderated mediation analyses. The delayed DTA (DTA at Time 2) did not mediate the MS-worldview defense relationship nor was it moderated by meditation experience. From these null findings of delayed DTA, it could be inferred that the quantitative differences in delayed DTA alone could not directly mediate the relationship between the MS-worldview defense relationships.

However, we still observed, even though marginally, death-thought suppression and rebound effects in the MS-no-meditation group. Therefore, we conducted a moderated mediation analysis by using the change in DTA from Time 1 (immediate) to Time 2 (delayed) as a mediator on the MS-worldview defense pathway. Among no-meditation participants, MS led to high death-thought rebound between Time 1 and 2
(Death-thoughts Rebound; DTR), which in turn, was associated with more worldview defense. On the other hand, meditation practice prevented death-thought suppression and DTR, and eliminated the increased worldview defense that MS produced in the no-meditation condition. These moderated mediation analyses showed that DTR mediated the MS-worldview defense pathway, but that this was moderated by meditation.

The role of DTR in MS-worldview defense relationships makes sense because when death thoughts have rebounded to become more accessible, people have to be more defensive against potential threats, and to activate secondary defensive strategies – worldview defense and self-esteem striving (Arndt, Greenberg, & Cook, 2002). Arndt et al. (1997) explained that a suppression of death-related thoughts was not necessary for worldview defense to occur but, rather, increased death-thought accessibility after suppression is what elicits defensive responses.

Two relevant theories help to explain this absence of significant effects of MS on DTA/DTR among those with meditation. The first is Brown and Ryan’s analysis of mindfulness (2003). According to this theory, mindfulness consists of awareness that monitors internal and external states, and attention, the process of focusing conscious awareness. Awareness and attention are characterized as more sustained consciousness of present experience and a receptive/open state of mind, wherein attention coupled with awareness simply observes internal or external stimuli as they occur. In contrast, mindlessness, antithetic to mindfulness, is a defensively motivated state wherein what one experiences is habitually or automatically filtered through cognitive manipulation (i.e., cognitive reappraisal & elaboration). Thus, meditation broadened receptive attention, the continuous monitoring one’s state of mind, thereby preventing habitual
responses to stimuli. In other words, this sustained receptive attention itself may have
reduced the accessibility of death-related thoughts. This possibility was already observed
in previous TMT research. Delayed increases in DTA and the worldview defense
occurred in a nonconscious cognitive processing system; thus, thinking about death more
consciously and rationally may have reduced subsequent activation of the suppression-
rebound effects of death thoughts (Hayes et al., 2010). Consistent with this possibility,
Simon et al. (1997) found that participants who thought about death rationally did not
produce delayed increases in DTA.

The second explanation is that those with meditation training developed the skills
that inhibit elaboration processing (Bishop et al., 2004), especially thought suppression
and emotional avoidance (Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008). In
other words, mindful mediation is intentionally paying attention to present moment
experience with acceptance and curiosity cultivated by a non-judgmental attitude. Once
one's attention has wandered from this orientation, it is back to a more flexible and open
state of awareness (Kabat-zinn, 1994). Within the TMT literature, Landau, Johns, et al.
(2004) found that participants who read information that threatened a belief in a just
world increased DTA only among high-PNS participants. Their findings imply that
cognitive flexibility and openness to experiences, which is thought to play a key role in
mindfulness, was associated with lower levels of death-thought accessibility.
Furthermore, researchers (Bowen, Witkiewitz, Dillworth, & Marlatt, 2007) claimed that,
in fact, the frequency of intrusive unwanted thoughts itself may not be crucial factors in
coping with those thoughts. Bowen et al. (2007) found that although novice meditators
who practiced a 10-day *Vipassana* meditation training reported a greater decrease in
attempts to avoid unwanted thoughts, they did not report a significant decrease in frequency of intrusive thoughts.

Taken together, our null mediation finding with respect to delayed DTA and a significant finding of DTR raises the possibility that the accessibility of death-related thoughts are not sufficient to cause increased worldview defense; rather, rebound following death-thought suppression seems to play a critical role in eliciting worldview defense. In contrast, immediately after meditation training, participants’ receptive attention could be more sustained in the present moment, which made death-related thoughts less accessible to them. This is the reason why MS did not lead to an initial increase in DTA among those with meditation. Thus, as hypothesized, those with meditation training did not exhibit death thoughts suppression and eventually did not produce rebound effects following suppression.

Further evidence of decreased thought suppression and emotional avoidance was found when we analyzed the impact of meditation on affect. Individuals who practiced meditation reported higher levels of positive affect, serenity (similar to a relaxed state), attentiveness, as well as general negative affect except fear. Interestingly, after being reminded of their own death, those in the meditation condition reported higher levels of negative affect and attentiveness than those in the no-meditation condition. Buddhist meditation, especially focused meditation training, is intended to developed simultaneous qualities of relaxation, attentional stability, and vividness; in the meditative state, people often experienced relaxation as well as heightened attention (Wallace & Shapiro, 2006). Our data yielded a similar pattern, such as increased relaxation and attentiveness after meditation, but the higher attentiveness and negative affect were more salient among MS
participants. Previous TMT research found that MS led to an apparently defensive increase in the accessibility of positive emotional information, and made individuals favor positive emotional associations (DeWall & Baumeister, 2007). This suggests that MS led to a nonconscious shift toward more pleasant and positive information. In contrast, mindfulness involves accepting whatever emotions arise, without trying to change them (Kabat-Zinn, 1990). Our results suggest that those in the no-meditation condition were motivated to reduce negative affect, whereas those in the meditation condition did not avoid these negative emotions.

An alternative explanation of heightened negative affect among meditators under MS is that under the state of mindfulness, participants were more likely aware of and more accepting of their emotional experience, because mindfulness emphasizes increasing awareness of and accepting all emotional experience, regardless of its valence and intensity (Chambers et al., 2009). This view was supported in our previous study of Korean Buddhist meditators. No-meditation controls exhibited higher levels of positive affect over negative affect, whereas chronic meditators who had not recently meditated and Buddhist meditators after meditation training did not show this pattern (Park & Pyszczynski, 2016a).

It should be noted that our affect data may appear somewhat inconsistent with other studies showing that long-time meditators reported higher levels of emotional well-being, with higher scores on positive affect than non-meditators (Keune & Forintos, 2010); and significantly reduced negative affect after intensive meditation training (Chambers et al., 2008). The fact that our study included only novice meditators may explain this discrepancy.
To sum up, our results provide robust evidence that meditation can eliminate MS effects. The strength of the current study is that we directly manipulated MS and meditation intervention to reduce the possibility that third variables may confound the results. To our best knowledge, no previous study has examined the effect of meditation-induced state of mindfulness on reactions to existential threats, which included self-reported as well as implicit measures in cognition, affect, and social domains simultaneously. Our observations are in line with our previous findings showing that both long-term and short-term meditation practice in South Koreans showed reduced defensiveness in reaction to existential threats (Park & Pyszczynski, 2016a). Our results suggest that even a one-time brief meditation could reduce defensiveness in reaction to MS, and temporarily increase serenity, attentiveness, and positive affect. Future studies will be needed to assess how long the effects of short-term mindfulness last.

Nonetheless, a number of limitations warrant discussion. One limitation was a relatively smaller effect size for the DTA analyses ($n_p^2 = .04$) compared to worldview defense ($n_p^2 = .06$). Even though our findings provide strong evidence for the salutary effects of a state of mindfulness, the null finding regarding delayed DTA should be reconsidered and be replicated among different populations in future studies. Another limitation is that the data were collected primarily from college students and small numbers of their family members at a single university in the Mountain region of the US, which might limit the generalization to the rest of the population.

Future studies are needed to investigate possible differences in how meditation would affect MS effects between normal populations and those with clinical diagnoses. Previous TMT literature reported that mildly depressed individuals responded to MS with
greater worldview defense (Simon, Greenberg, Harmon-Jones, Solomon, & Pyszczynski, 1996). Other research has shown that people with clinically significant trauma symptoms resulting from the disruption of the normal death anxiety-buffering functions showed no evidence of worldview defense (Pyszczynski & Kesebir, 2011). In the current study, 45% of participants had self-reported psychological problems, even though we could not identify whether these psychological problems reached the levels of clinical diagnosis. Based on previous findings that clinical populations were reactive to MS in different ways, future studies are needed to investigate possible differences in how meditation influences MS effects between those with and without clinical diagnoses. It is also important that future studies should compare effects of short- and long-term effects among novice meditators with those of people with more meditation experience.

In conclusion, our findings provide strong evidence that meditation can eliminate the effects of MS on worldview defense, in particular, through its effect on death-thought suppression. Future studies should examine the long-term and short-term effects of meditation among various populations.
REFERENCES


APPENDIX A

Five Facet Mindfulness Questionnaire

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

<table>
<thead>
<tr>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td></td>
<td>never or very rarely true</td>
<td>rarely true</td>
<td>Sometimes true</td>
<td>often true</td>
<td>always true</td>
</tr>
</tbody>
</table>

_____ 1. When I’m walking, I deliberately notice the sensations of my body moving.
_____ 2. I’m good at finding words to describe my feelings.
_____ 3. I criticize myself for having irrational or inappropriate emotions.
_____ 4. I perceive my feelings and emotions without having to react to them.
_____ 5. When I do things, my mind wanders off and I’m easily distracted.
_____ 6. When I take a shower or bath, I stay alert to the sensations of water on my body.
_____ 7. I can easily put my beliefs, opinions, and expectations into words.
_____ 8. I don’t pay attention to what I’m doing because I’m daydreaming, worrying, or otherwise distracted.
_____ 9. I watch my feelings without getting lost in them.
_____ 10. I tell myself I shouldn’t be feeling the way I’m feeling.
_____ 11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.
_____ 12. It’s hard for me to find the words to describe what I’m thinking.
_____ 13. I am easily distracted.
_____ 14. I believe some of my thoughts are abnormal or bad and I shouldn’t think that way.
_____ 15. I pay attention to sensations, such as the wind in my hair or sun on my face.
_____ 16. I have trouble thinking of the right words to express how I feel about things.
_____ 17. I make judgments about whether my thoughts are good or bad.
_____ 18. I find it difficult to stay focused on what’s happening in the present.
19. When I have distressing thoughts or images, I “step back” and am aware of the thought or image without getting taken over by it.
20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.
21. In difficult situations, I can pause without immediately reacting.
22. When I have a sensation in my body, it’s difficult for me to describe it because I can’t find the right words.
23. It seems I am “running on automatic” without much awareness of what I’m doing.
24. When I have distressing thoughts or images, I feel calm soon after.
25. I tell myself that I shouldn’t be thinking the way I’m thinking.
26. I notice the smells and aromas of things.
27. Even when I’m feeling terribly upset, I can find a way to put it into words.
28. I rush through activities without being really attentive to them.
29. When I have distressing thoughts or images, I am able just to notice them without reacting.
30. I think some of my emotions are bad or inappropriate and I shouldn’t feel them.
31. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.
32. My natural tendency is to put my experiences into words.
33. When I have distressing thoughts or images, I just notice them and let them go.
34. I do jobs or tasks automatically without being aware of what I’m doing.
35. When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about.
36. I pay attention to how my emotions affect my thoughts and behavior.
37. I can usually describe how I feel at the moment in considerable detail.
38. I find myself doing things without paying attention.
39. I disapprove of myself when I have irrational ideas.
APPENDIX B

The Toronto Mindfulness Scale

Instructions: We are interested in what you have experienced during last 15 minutes. Below is a list of things that people sometimes experience. Please read each statement. Next to each statement are five choices: “(1) not at all,” “(2) a little,” “(3) moderately,” “(4) quite a bit,” and “(5) very much.”

Please indicate the extent to which you agree with each statement. In other words, how well does the statement describe what you just experienced, just now?

_____ 1. I experienced myself as separate from my changing thoughts and feelings.

_____ 2. I was more concerned with being open to my experiences than controlling or changing them.

_____ 3. I was curious about what I might learn about myself by taking notice of how I react to certain thoughts, feelings or sensations.

_____ 4. I experienced my thoughts more as events in my mind than as a necessarily accurate reflection of the way things ‘really’ are.

_____ 5. I was curious to see what my mind was up to from moment to moment.

_____ 6. I was curious about each of the thoughts and feelings that I was having.

_____ 7. I was receptive to observing unpleasant thoughts and feelings without interfering with them.

_____ 8. I was more invested in just watching my experiences as they arose, than in figuring out what they could mean.

_____ 9. I approached each experience by trying to accept it, no matter whether it was pleasant or unpleasant.

_____ 10. I remained curious about the nature of each experience as it arose.

_____ 11. I was aware of my thoughts and feelings without overidentifying with them.
12. I was curious about my reactions to things.

13. I was curious about what I might learn about myself by just taking notice of what my attention gets drawn to.
APPENDIX C

WORD COMPLETION TASK

We are simply pre-testing this questionnaire for future studies. Please complete the following by filling letters in the blanks to create words. Please fill in the blanks with the first word that comes to mind. Write one letter per blank. Some words may be plural. Thank you.

1. TEA __
2. CO __ SE
3. D __ R
4. SP __ D
5. BR __ K
6. SH __
7. FRA __
8. TH __
9. FO __
10. CAR __ T
11. M __ R __ ER
12. TR __
13. C __ T
14. HO __ S __
15. R __ D __ O
16. H __ T
17. DI __ S
18. BU __ LD __ NG
19. FO __ ER
20. GRA __
21. PENC __
22. LA __ R
23. __ UND
24. KI __ ED
25. B __ K
SAMPLE WORD COMPLETION TASK

Please complete the following by filling letters in the blanks to create words. Please fill in the blanks with the first word that comes to mind. Write one letter per blank. Some words may be plural. Thank you.

1. CO _ _ S
2. PLA _ _
3. _ _ CH
4. WAT _ _
5. FO _ _
6. DE _ _
7. _ _ NG
8. B _ T _ LE
9. S _ RE
10. P _ _ TURE
11. FL _ W _ R
12. BUR _ _ D
13. K _ _ GS
14. CHA _ _
15. CL _ _ K
16. COFF _ _
17. LA _ _
18. SPR _ _
19. _ _ DE
20. SK _ _ L
21. P _ P _ R
22. MOV _ _
23. TR _ _
24. POST _ _
25. M _ _ N
APPENDIX D

The PANAS

This scale consists of a number of words that describe different feelings and emotions.

Read each item and then mark the appropriate answer in the space next to that word.

Indicate to what extent you feel this way at the moment, that is, how you feel right now.

<table>
<thead>
<tr>
<th>1 Very slightly or not at all</th>
<th>2 A little</th>
<th>3 moderately</th>
<th>4 Quite a bit</th>
<th>5 extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>_____ interested</td>
<td>_____ irritable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_____ distressed</td>
<td>_____ alert</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_____ excited</td>
<td>_____ ashamed</td>
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<td>_____ at ease</td>
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<td>_____ fearful</td>
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APPENDIX E

Social Judgment Task

This study is concerned with foreigners’ views of the US and Americans reactions to these views. We have collected several essays written by foreigners about America. We have selected two essays for you to read and evaluate.

Please read each of the following essays and respond to the questions that follow each essay.

The first thing that hit me when I came to this country was the incredible freedom people had. Freedom to go to school, freedom to work in any job you want. In this country people can go to school and train for the job they want. Here anyone who works hard can make their own success. In my country most people live in poverty with no chance of escape. In this country people have more opportunity for success than in any other and success does not depend on the group belong to. While there are problems in any country, America truly is a great nation and I don’t regret my decision to come here at all.

1. How much do you like this person?
   1  2  3  4  5  6  7  8  9
totally
   not at all

2. How intelligent did you think this person was?
   1  2  3  4  5  6  7  8  9
totally
   not at all
3. How knowledgeable did you think this person was?
1 2 3 4 5 6 7 8 9
not at all totally

4. How much did you agree with this person’s opinion?
1 2 3 4 5 6 7 8 9
not at all totally

5. From your perspective, how true do you think this person’s opinion is?
1 2 3 4 5 6 7 8 9
not at all totally

When I first came to this country from my home in I believed it was the “land of opportunity” but I soon realized this was only true for the rich. The system here is set up for rich against the poor. All people care about here is money and trying to have more than other people. This no sympathy for people. Its all one group putting down others and nobody cares about the foreigners. The people only let foreigners have jobs like pick fruit or wash dishes because no American would do it. Americans are spoiled and lazy and want everything handed to them. America is a cold country that is unsensitive to needs and problems of foreigners. It thinks it’s a great country but it’s not.

Questions:
1. How much do you like this person?
1 2 3 4 5 6 7 8 9
not at all totally

2. How intelligent did you think this person was?
1 2 3 4 5 6 7 8 9
not at all totally

3. How knowledgeable did you think this person was?
1 2 3 4 5 6 7 8 9
not at all totally
4. How much did you agree with this person’s opinion?

1  2  3  4  5  6  7  8  9
not at all  totally

5. From your perspective, how true do you think this person’s opinion is?

1  2  3  4  5  6  7  8  9
not at all  totally
APPENDIX F

University of Colorado
Colorado Springs
Institutional Review Board (IRB) for the Protection of Human Subjects

Date: 8/31/2015

IRB Review

APPROVED

IRB PROTOCOL NO.: 16-028
Protocol Title: The Relationship Between a State of Mindfulness and Mortality Salience on Death-Thought Accessibility and Worldview Defense (a.k.a. "Personality, Cognition, and Meditation")
Principal Investigator: Young Chin Park
Faculty Advisor if Applicable: Dr. Tom Pyszczynski
Application: New Application
Type of Review: Expedited
Risk Level: No more than Minimal Risk
Renewal Review Level (If changed from original approval) if Applicable: N/A No Change
This Protocol involves a Vulnerable Population: N/A (No Vulnerable Population)
Expires: 8/30/2016

*Note, if exempt: If there are no major changes in the research, protocol does not require review on a continuing basis by the IRB. In addition, the protocol may match more than one review category not listed.
Externally funded: ☒ No ☐ Yes

Thank you for submitting your Request for IRB Review. The protocol identified above has been reviewed according to the policies of this institution and the provisions of applicable federal regulations. The review category is noted above, along with the expiration date, if applicable.

Once human participant research has been approved, it is the Principal Investigator’s (PI) responsibility to report any changes in research activity related to the project:

- The PI must provide the IRB with all protocol and consent form amendments and revisions.
- The IRB must approve these changes prior to implementation.
- All amendments recruiting study subjects must also receive prior approval by the IRB.
- The PI must promptly inform the IRB of all unanticipated serious adverse (within 24 hours). All unanticipated adverse events must be reported to the IRB within 1 week (see 45CFR46.103(b)(2)). Failure to comply with these federally mandated responsibilities may result in suspension or termination of the project.
- Renew study with the IRB prior to expiration.
- Notify the IRB when the study is complete

If you have any questions, please contact Research Compliance Specialist in the Office of Sponsored Programs at 719-255-3903 or irb@uccs.edu

Thank you for your concern about human subject protection issues, and good luck with your research.

Sincerely yours,

Michael Sanderson

Michael Sanderson, MBA
IRB Committee Member