

DIE AT THE RIGHT TIME: OPTIMAL TIME DELAYS IN TERROR MANAGEMENT

THEORY

by

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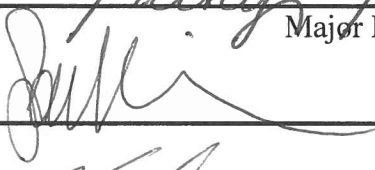
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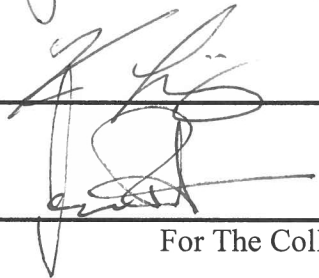
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Die at the Right Time: Optimal Time Delays in Terror Management Theory

“Death, the one appointment we all must keep, and for which no time is set.”

- Burkett and Abrahams (1948 [motion picture])

The prospect of death poses several unique problems. That is, the uncertainty of when it will happen combined with the certainty that it inevitably must happen is capable of creating a terrifying tension in humans. Over the past 30 years, terror management theory (TMT; Greenberg, Pyszczynski, & Solomon, 1986) has strived to explain the various consequences of the tension produced by our combined desire to live with the knowledge that we must die (see e.g., Burke, Martens, & Faucher, 2010 for a review). While the theoretical components of TMT have been well supported by hundreds of experiments (e.g., Burke et al.; Steinman & Updegraff, 2015), unanswered questions pertaining to basic hypothetical mechanisms still remain. Specifically, it is largely agreed, and well supported, that a delay is necessary between the contemplation of death and the measurement of the dependent variable(s); however, the appropriate delay length needed is hardly ever controlled as a specific time. A consistent finding across recent meta-analyses suggests that studies with longer delays (e.g., 7-20 min) produce significantly larger effects than those with shorter delays (e.g., 2-6 min; Burke et al.; Steinman & Updegraff). The purpose of the current work is to determine the ideal time course of a mortality salience (MS) prime so as to reliably produce the strongest TMT effects. Specifically, the present studies will examine the timing between conscious deliberation of death and the rebound of unconscious DTA (i.e., death-thought accessibility; Study 1), worldview defense (Study 2), and the potential conditional processes through which mortality awareness affects belief validation (Study 3).

Terror Management Theory

Inspired by the work of Becker (1971, 1973, 1975) and various other social scientists and philosophers (e.g., Darwin, 2004; Freud, 2018; Kierkegaard, 1957, 1980; Lifton, 1983), TMT has been applied to a variety of problems unique to human experience (e.g., religious experience, creation of art, political ideology, etc.). Combining evolutionary, psychodynamic, cognitive, anthropological, and social psychological perspectives, TMT posits that humans possess certain cognitive capabilities that are unique from other species (e.g., abstraction, the creation of symbols, prospection). These capabilities allow for, among other things, the projection forward in time to hypothetical situations that can be mentally simulated in the absence of direct experience. However, a negative byproduct of our evolved cognitive complexity is the unique awareness of our inevitable death. The awareness of the certainty of one's mortality in an organism that has evolved a strong desire for continued existence has the potential to create psychological tension, which can result in "terror" at the prospect of non-existence. A partial solution to deal with the uniquely human dread of death's certainty was the creation of culture to suppress our anxieties.

Culture appears as a stable and enduring system. Among other things, this functional illusion allows for existence to continue relatively unimpeded by intrusive death-thoughts. Terror management theory has defined cultural worldviews as shared symbolic constructions that a) order reality in meaningful ways, b) are perceived as permanent and enduring, c) prescribe standards of value to be lived up to by individuals within the culture, and d) provide some hope of immortality (Pyszczynski, Solomon, & Greenberg, 2003; Pyszczynski, Solomon, & Greenberg, 2015). The prospect of immortality can be either literal or symbolic. Literal immortality is the possibility of continued existence after biological death (e.g., an afterlife,

heaven, hell, reincarnation), while symbolic immortality is being part of something greater than oneself that endures continuing one's relevance after biological death, such as through one's children, work, or reputation (i.e., one's impact on the world does not end with death). A central tenant of TMT is that cultural worldviews are essential in the development and maintenance of self-esteem (i.e., living up to the standards of value prescribed by one's culture; Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004). Taken together, TMT argues that maintaining faith in one's cultural worldview and self-esteem provides a protective shield against the potential for anxiety that results from awareness of the inevitability of death.

In support, hundreds of studies, conducted in countries around the world (e.g., United States, Canada, Germany, France, Italy, Israel, Iran, India, Tibet, China, Japan, Korea, & Australia), have demonstrated evidence for TMT and its central hypotheses. The most commonly assessed hypothesis in the terror management literature is the *morality salience hypothesis* (MS). This states that if cultural worldviews and self-esteem provide protection from death anxiety, then reminders of mortality should promote increased defense of these structures (Pyszczynski et al., 2003; Pyszczynski et al., 2015). That is, to prevent thoughts of death from entering into conscious awareness, it becomes necessary to increase faith in one's cultural worldview or bolster one's self-esteem. Numerous empirical studies have provided support for the MS hypothesis. For example, following reminders of death, individuals have been shown to increase the penalty for moral transgressors and more highly reward those who are morally virtuous (Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989), behave aggressively toward those who challenge their political worldviews (McGregor et al., 1998), deny their animal nature (Goldenberg et al., 2001), and to seek close romantic relationships (Mikulincer, Florian, & Hirschberger, 2003). In one seminal study, MS led Christian participants to evaluate in-group

members (i.e., fellow Christians) more favorably and outgroup members (i.e., Jews) more negatively (Greenberg et al., 1990). While the full scope of the MS hypothesis is well beyond the scale of this article (for a comprehensive review see e.g., Burke et al., 2010), overall, the literature supports the proposition that derogative responses are common defenses against existential threats (Pyszczynski, Sullivan, & Greenberg, 2015), and these negative responses are exaggerated by reminders of one's own mortality.

Proximal and Distal Defenses and the Role of DTA

Initially, TMT studies demonstrated that participants defended their cultural beliefs with positive in-group biasing, negative outgroup evaluations, and more severe appraisals of moral transgressors following MS inductions (Greenberg et al., 1990; Rosenblatt et al., 1989). However, some early experiments also revealed weaker, or conflicting, results when death contemplation was processed at deeper levels (e.g., elaborative discussion of feelings and fears associated with death; Greenberg, Pyszczynski, Solomon, Simon, & Breus, 1994). The incompatibility of such patterns ultimately led researchers to develop the dual process model of TMT, which makes explicit distinctions between *proximal* and *distal* types of defense (Pyszczynski, Greenberg, & Solomon, 1999). This model is couched in the logic of Wegner's (1994) ironic process theory, which demonstrated that actively trying to remove a thought from conscious awareness (e.g., "do not think of a white bear;" Wegner, Schneider, Cater, & White, 1987) increased the likelihood that the thought would return after active suppression ceased (i.e., rebound effects). According to this perspective, it takes effort for the conscious component of one's mind to change a thought. While the conscious motivation controls the change in one's state of mind, an unconscious mechanism is checking how effective this process is by scanning for signs of the suppressed thought. Ironic processes have been shown to be more likely in

relation to stressful thoughts, including death cognition, which can produce anxiety (Routledge & Juhl, 2010; see Figure 1 for a theoretical pathway following a death prime reproduced from Arndt, Cook, & Routledge, 2004).

With respect to TMT, proximal defenses serve to minimize the threat of mortality while simultaneously shifting the awareness of it outside of focal attention. Proximal defenses may include the active suppression of death-related thoughts, denial of immediate vulnerability to mortality, or increasing behavior that will reduce physical deterioration (e.g., exercise; Arndt, Schimel, & Goldenberg, 2003). For example, research has shown that when mortality-related thoughts are in focal attention, women will increase their intentions to protect themselves from harmful UV rays (Routledge, Arndt, & Goldenberg, 2004). Similarly, participants who were led to believe that greater emotionality was associated with a shorter lifespan exhibited biased responses to emotionally related questions (Greenberg, Arndt, Simon, Pyszczynski, & Solomon, 2000). In other words, when death was in focal attention, participants took steps to appear less emotional and therefore less susceptible to early mortality. This research suggests that proximal defenses are engaged immediately following MS and are a form of active suppression that initially serves to lower DTA (Greenberg et al., 1994).

A key component of TMT is that following a delay, DTA becomes heightened outside of conscious awareness (e.g., Greenberg et al., 1994). This deep activation (Wegner & Smart) of death-related thoughts engage symbolic, or distal defenses, which are indirect and seemingly irrational, as they serve to strengthen faith in one's worldview and/or pursue self-esteem. For instance, returning to the results of Routledge et al. (2004), women expressed greater interest in sun-tanning products and services following reminders of mortality and a delay if their self-

esteem was based on their physical appearance. In another study, Taubman-Ben-Ari and Findler (2003) found that

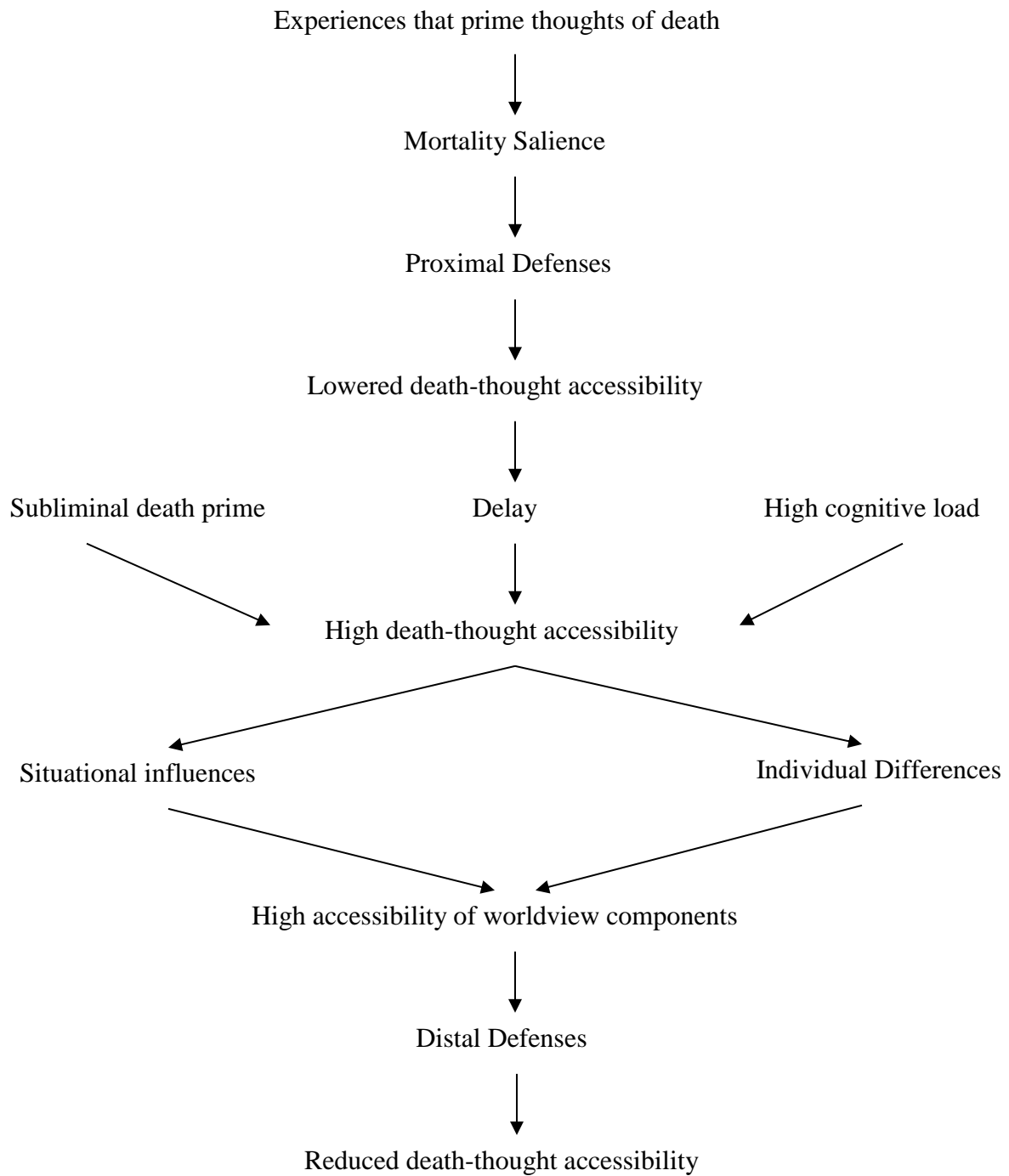


Figure 1. Cognitive architecture of terror management.

following a MS manipulation and distraction task (i.e., delay), middle-aged adults with low self-esteem expressed greater willingness toward health-promoting behaviors compared to young adults who were unaffected; presumably because death-related health concerns are not symbolically important to younger adults. Interestingly, researchers found that both young and middle-aged adults expressed greater willingness to participate in health promoting activities compared to older adults immediately following reminders of death (i.e., a proximal defense). When death is outside of focal attention participants typically demonstrate worldview belief validation such as exaggerated in-group biasing (Rosenblatt et al., 1989), outgroup derogation or aggression (McGregor et al., 1998), and increased identification with self-relevant factors such as country, religion, ethnicity, or close others (see e.g., Burke et al., 2010 for an extensive review).

Previous research has examined proximal and distal terror management effects within the same study. In support of the dual process model, for example, Greenberg et al. (1994) demonstrated that worldview defense was more likely to occur following a brief MS manipulation. When death concerns were held in focal awareness by having participants complete a second mortality reflection task, individuals were less likely to defend their cultural beliefs presumably because active suppression of death-related thoughts was still occurring. Thus, if thoughts of mortality increase worldview defense when such cognitions are unconscious but highly accessible, then having participants continually think about death following a MS manipulation should lead to less defense of one's cultural beliefs relative to a condition where thoughts of death can recede from focal awareness. This was supported in two additional experiments conducted by Greenberg and colleagues (1994). Specifically, in comparison to individuals who were distracted following a death salience prime, persons who were asked to

keep thoughts of mortality in conscious awareness did not evaluate pro-American and anti-American authors differently. These findings suggest that individuals are effectively able to suppress mortality-related concerns following a death manipulation (i.e., proximal defense). However, when such thoughts become highly accessible following a delay, greater worldview defense and self-esteem maintenance become activated (i.e., distal defense).

Before concluding this section on the dual process model of TMT, it is important to discuss how researchers have assessed the accessibility of death-thoughts (i.e., DTA). Based on the dual defense model, Pyszczynski et al. (1999) argued that explicit thoughts of death are initially suppressed but become accessible following a brief delay. To initially test this, Greenberg and colleagues (1994) created a word-fragment completion task to measure the accessibility of death-related thoughts. Similar to assessments utilized in priming experiments (Bassili & Smith, 1986; Gilbert & Hixon, 1991; Tulving, Schacter, & Stark, 1982), researchers reasoned that the way in which individuals complete target word fragments (e.g., GRA _ _) reveals whether mortality awareness is unconsciously salient (e.g., *grave*) or not (e.g., *grant*). Greenberg et al. theorized that completing a greater number of words with death-related themes would indicate heightened DTA (i.e., deep activation of mortality). To disguise the scales critical assessment items, researchers included 20 other word fragments that could only be completed with neutral, non-death-related words. Participants are instructed to work through the questionnaire quickly, answering each fragment with the first word that comes to mind.

Although a majority of terror management work has used some variation of Greenberg et al.'s (1994) six-item word-fragment measure (see e.g., Hayes, Schimel, Arndt, & Faucher, 2010; Steinman & Updegraff, 2015 for reviews), another common approach to measuring DTA involves reaction times, assessed using a lexical decision task (Arndt, Cook, Goldenberg, & Cox,

2007; Hayes, Schimel, & Williams, 2008; Schimel, Hayes, Williams, & Jahrig, 2007). During a lexical decision task, participants are asked to make quick and accurate judgments about letter strings as to whether they are a “word” or a “non-word.” The rationale behind this type of experimental procedure is that faster average response times to various word categories indicate that the categorical construct is more highly accessible to the individual (see Bargh & Chartrand, 2000). With respect to TMT, participants should react faster and make fewer categorization errors in response to death-related words relative to other word categories (e.g., negative words; Schimel et al., 2007) following MS and a delay. Previous research by Fritsche, Jonas, and Fankhänel (2008) supported this pattern of results demonstrating faster response times to death words compared to neutral words following an explicit death prime and two delay tasks (i.e., the PANAS, and an 11-item sleep pattern questionnaire). An additional benefit of using a lexical decision task is to assess different constructs simultaneously. For example, in work by Arndt and colleagues (2007), researchers presented individuals with 60 trials, with half of the words being non-words (e.g., quert, fraw) while the remaining words were neutral (e.g., picture, tree), negative (e.g., danger, evil), or death-related (e.g., dead, skull). If the obtained results are specific to heightened mortality awareness, then researchers should expect an increase in DTA (i.e., significantly faster response latencies to death words) and not negative thoughts in general. Following previous research, the current studies utilized a lexical decision task to measure the accessibility of death-related thoughts as an outcome (Study 1) and mediator (Study 3).

The Present Research

Since Pyszczynski et al.’s (1999) work, it has become standard practice to include a delay following an explicit MS manipulation to elicit distal terror management effects. Examining the meta-analytic findings of Burke et al. (2010) reflects the theoretical importance of using some

type of delay, finding that most MS experiments ($\approx 93\%$) utilized at least one distraction between death induction and the assessment of distal dependent variable(s). Among the experiments examined in the meta-analytic work, approximately 68% used one task, 22% reported using two tasks, and only 3% of the studies used three tasks ($\approx 7\%$ of experiments had no delay). While it is commonly accepted that delays are necessary, explicit time intervals are rarely ever specified. Burke and colleagues found, for example, that studies that employed three distraction tasks (e.g., mood scale, puzzle task, & filler questionnaire; Friedman & Rholes, 2008) or two delay tasks yielded significantly higher effect sizes when compared to single or no-delay experiments. Further, although it is common practice to include a 3-5 min delay between the administration of an explicit death prime and distal defense assessment (Pyszczynski et al., 1999), Burke et al. revealed that studies with longer delays (7-20 min; e.g., Echebarria-Echabe, 2013; Friedman & Rholes, 2008) produced significantly larger effects than those with shorter delays (2-6 min). This same pattern of significant differences between increased delays facilitating larger effect sizes has also been found with respect to DTA (Steiman & Updegraff, 2015).

The current studies were thus designed to examine the specific timing behind the cognitive architecture of TMT (see Figure 1). As previously stated, the literature typically refers to “brief delays” (Hayes et al., 2010), or focuses on the number of intervening tasks between induction and assessment (Burke et al., 2010). However, these delays can vary from study to study and participant to participant based on the number and type of filler activities presented. The present research introduced between zero to five separate filler tasks, which were timed, to create 0-15 min of controlled distraction. Specifically, each task was pilot tested to get an appropriate average time length for completion, and all timed task combinations formed groups of 0, 5, 10, and 15 min delays. All of the distraction tasks have been used in prior TMT research.

As summarized by Burke et al. (2010), the most common delay ($\approx 48\%$) utilized by researchers is the 20-item Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), or the 60-item expanded version of the measure (PANAS-X; Watson & Clark, 1992). These questionnaires ask participants to rate their current mood on a 5-point scale (1 = *not at all*; 5 = *extremely*) with 10 (or 30) of the items being focused on positive affect (e.g., *excited*, *inspired*) and 10 (or 30) of the items being focused on negative affect (e.g., *afraid*, *nervous*). Other commonly used delay tasks include filler personality questionnaires (e.g., Schmeichel et al., 2009), word search puzzles (e.g., Greenberg et al., 1994), and/or having individuals read a one-page story excerpt (Camus, 1958: *The Growing Stone*; Harmon-Jones et al., 1997).

To assess distal defenses, Studies 2-3 utilized two common measures of worldview defense. First, an abbreviated version of the Multidimensional Social Transgression Scale (MSTS; Florian & Mikulincer, 1997; Cox, Goldenberg, Arndt, & Pyszczynski, 2007) was used. Typically, the MSTS contains 20 vignettes depicting violations of both intrapersonal (e.g., body mutilation; serious damage to life) or interpersonal natures (e.g., threats to family members/friends; a loss of social identity). Vignettes are presented as excerpts from “newspaper articles,” each of which details a specific type of transgression (e.g., embezzling money from inner-city children) and the resulting consequences (e.g., children are left with nothing). For each vignette participants are asked to indicate the degree of the transgressions severity along with the strictness of the ensuing punishment. Studies utilizing the MSTS have found that the scale serves as a measure of defensiveness in that persons express harsher judgments following thoughts of mortality versus a control (Florian & Mikulincer, 1997). The abbreviated version of the MSTS has also been used in past research to more directly tap into moral transgressions directly associated with worldview violations (e.g., flag burning & immigration; Cox et al., 2007).

Another measure of belief validation involves evaluating authors of essays from ostensible foreigners who either share the participant's worldview, or not (Greenberg et al., 1990; Greenberg et al., 1992). In the United States findings generally indicate that, following MS, responses to a pro-American essayist (e.g., "America truly is a great nation") become more favorable while responses to the anti-American essayist (e.g., "America is a cold country that is insensitive to needs and problems of foreigners") become more negative. Derogation of the anti-American essayist is inferred with this measure, as lower essayist ratings indicate a greater perceived lack of intelligence and likability.

Overall, to the extent that an MS manipulation increases thoughts of death, and hence increases proximal defense mechanisms, participants should display a lower accessibility of mortality-related thoughts when no delay is given (i.e., 0 min). However, DTA should gradually increase in significance up until distal defenses (i.e., cultural worldviews, self-esteem) are engaged. Utilizing a lexical-decision task to measure DTA, Study 1 explored the length of time needed to observe when conscious concerns about death are removed from focal attention (i.e., increased reaction-times to mortality-related words). Second, to the extent that distal defenses increase after a delay, with longer delays (7-20 min) resulting in stronger effects than shorter ones (2-6 min; Burke et al., 2010), Study 2 examined the average amount of time it takes for worldview defense to reach its peak following thoughts of death and various delay conditions (0, 5, 10, vs. 15 min). Based on the meta-analytic results of Burke and colleagues, it was hypothesized that people would be more likely to validate their beliefs following 10-15 min as compared to 0-5 min delays (i.e., thought suppression; proximal defenses engaged). Finally, incorporating the results of the prior experiments, Study 3 was designed to include DTA and worldview defense within the same study, thereby testing the overall TMT architecture using a

conditional process model (Hayes, 2017). It was hypothesized that the combination of an MS prime with longer delays (i.e., 10-15 min) would exert a significant indirect effect on worldview defense through increased DTA.

Study 1

The first experiment was designed to assess the optimal time delay (i.e., 0, 5, 10, vs. 15 min) needed to detect DTA effects when using a lexical decision task. According to TMT (i.e., Pyszczynski et al., 1999), active suppression should occur immediately following MS. It was therefore hypothesized that there would be no significant differences between death and control conditions on the accessibility of mortality-related thoughts in the 0 min delay condition. The 5 min delay, however, was chosen as it is in line with conventionally recommended terror management results (Greenberg et al., 1994; Pyszczynski et al., 1999). As such, the current study hypothesized a difference between conditions at 5 min, with the MS group resulting in greater DTA as compared to the television control group. Finally, the 10 and 15 min delay conditions were chosen based on Burke et al. (2010) and Steinman and Updegraff's (2015) meta-analytic results demonstrating that more pronounced TMT effects occur following longer delays. Therefore, the current studies hypothesized the strongest effects (i.e., fastest response times to death words) in these groups following MS as compared to control primes.

Method

Participants

Two-hundred-sixty-two participants were recruited from a university in the Southwest United States. A priori exclusion criteria were applied to the sample eliminating those who did not pay attention to the tasks ($n = 2$), discovered the purpose of the study ($n = 15$), or who had previously participated in a study involving a MS prime ($n = 65$). One-hundred-eighty

participants (120 female) remained for analysis. A power analysis (Faul, Erdfelder, Lang, & Buchner, 2007) indicated that this sample was slightly under the recommended sample size ($N = 211$), but adequate for detection of moderate effects. The sample was predominantly Caucasian (76.7%) with ages ranging from 18-37 ($M_{\text{age}} = 20.12$, $SD = 2.29$). All participants were told that the study pertained to “personality and individual differences” and were awarded class credit for their participation.

Materials and Procedure

Participants were tested on an individual basis in a group setting (ranging from 2-10 persons). All materials and procedures were programmed and presented using Qualtrics software. After reading and signing an informed consent, persons completed individual difference filler scales to bolster the cover story of the experiment. In fixed order, participants completed the Personal Need for Structure scale (PNS; Neuberg & Newsom, 1993), Experiences in Close Relationships scale (ECR; Brennan, Clark, & Shaver, 1998), and the Rosenberg Self-Esteem scale (Rosenberg, 1965; see Appendices for full scales). Although not the main reason for this research, internal reliabilities for all scale items were good (α 's $\geq .84$).

Next, participants were randomly assigned to one of two writing conditions, either priming thoughts of death or a neutral topic (i.e., watching television; Dechesne, Greenberg, Arndt, & Schimel, 2000). As the Mortality Attitudes Personality Survey (MAPS) is the most widely used induction for MS (Burke et al., 2010), this was chosen to elicit reminders of death in the current study. Participants assigned to the MS condition were asked two open ended questions about their mortality: “Please briefly describe the emotions that the thought of your own death arouses in you” and “Jot down, as specifically as you can, what you think happens to

you as you physically die and once you are physically dead.” The wording was identical in the control condition except “death” was replaced with “watching TV.”

Following the writing prime, all participants were randomly assigned to one of four variable time delay conditions: 0, 5, 10, or 15 min. During the timing conditions, individuals completed between zero to five filler tasks including the PANAS-X (Watson & Clark, 1992; 2 min), the Big Five questionnaire (John & Srivastava, 1999; 2.5 min), *The Growing Stone* reading task (2.5 min), and neutral crossword puzzles (3-5.5 min). Timing was controlled through computer settings in Qualtrics as the program automatically advanced persons through the tasks. For example, in the 10 min delay condition, participants were given 2 min to complete the PANAS-X, 2.5 min to complete the Big-Five, and 5.5 min to complete a neutral crossword puzzle (for full timing conditions see Table 1). All filler tasks were chosen based on previous TMT research (Burke et al., 2010), with the PANAS being included (i.e., 5-15 min conditions) to demonstrate the obtained effects were specific to reminders of death and not negative affect (see e.g., Lambert et al., 2014).

Table 1
Delay Conditions and Task Timing

Time Delay	Distractor Tasks				
	PANAS-X	Big-5	Growing Stone	Puzzle 1	Puzzle 2
0 min	-	-	-	-	-
5 min	2 min	-	-	3 min	-
10 min	2 min	2.5 min	-	5.5 min	-
15 min	2 min	2.5 min	2.5 min	5 min	3 min

Following the delay, participants were directed to complete a lexical decision task (i.e., Inquisit 4 [computer software], 2015), which was the main dependent measure of DTA. This task instructs participants to work quickly and accurately to evaluate whether a string of letters presented to them is a valid English word, or a non-word by tapping the ‘I’ and ‘E’ keyboard

keys, respectively. There were 60 experimental trials, which consisted of 30 non-words (e.g., *gnanz, blaild*), 18 neutral words (e.g., *picture, bottle*), 6 negative words (e.g., *fail, fight*), and 6 death words (e.g., *killed, dead*) all presented in completely randomized order (see Schimel et al., 2007 for similar procedures). Response times were collected in milliseconds (m), with all correctly identified words in each group being averaged together for analysis. Heightened DTA was evaluated as faster average response times to target death words.

Based on recommendations by Bargh and Chartrand (2000), RT values exceeding 2000 ms or under 200 ms were classified as incorrect and therefore excluded from analysis. Additionally, only correctly identified words were used to create group composites. Previous research (Schimel et al., 2007) already matched death and negative words on word frequency and length; however, neutral words were only matched for word frequency and these comparisons were not reported. This has important implications for the current study, as Bargh and Chartrand indicated that various word features, such as length, frequency of use, valance, etc., can facilitate faster or slower RT's in lexical decision tasks. Therefore, in the current experiment, timing for neutral words was included as a covariate to control for individual differences in task performance (see Arndt et al., 2009 for similar procedures). After completion of the lexical decision task, participants completed survey demographics, were debriefed, and thanked for their participation.

Results and Discussion

Mood Check

Analyses were conducted to see whether MS influenced persons' affective states. Of the 180 participants tested, 148 completed the PANAS-X. Subscales for positive affect ($\alpha = .95$), negative affect ($\alpha = .88$), fear ($\alpha = .82$), and fatigue ($\alpha = .88$) all displayed good internal

consistency. Each subscale was used as a dependent measure for a series of 2(MS: death vs. control) \times 4(Time Delay: 0, 5, 10, vs. 15 min) ANOVAs (i.e., Analysis of Variance). To adjust for multiple comparisons and the inflation of familywise error a Bonferroni correction was used establishing the region of significance at $p \leq .01$.

ANOVA results indicated no main effects or interactions on negative affect, $F_s < 1.06$, $p_s > .35$; fear, $F_s < .79$, $p_s > .46$, or fatigue, $F_s < .86$, $p_s > .36$. While there was no significant main effect of time delay, or interaction with MS on positive affect, $F_s < .99$, $p_s > .37$, there was a marginally significant main effect of MS, $F(1, 135) = 5.53$, $p = .02$, $\eta^2 = .04$, such that those exposed to the MS prime ($M = 2.39$, $SD = .99$) reported less positive affect compared to the control ($M = 2.78$, $SD = .99$).

Primary Analysis

Based on previous research designs (Arndt et al., 2007; Schimel et al., 2007), a 2(MS: death vs. tv) \times 4(Time Delay: 0, 5, 10, vs. 15 min) \times 2(Word Type: death vs. negative) mixed model analysis of covariance (ANCOVA) using word-type as the within-subjects dependent factor, and neutral word completion time as a covariate was the main analysis. The results revealed no significant main effects, $F_s \leq 2.46$, $p_s \geq .12$, or 2-way interactions with repeated measures, $F_s \leq .57$, $p_s \geq .45$. However, the between-subjects 2-way interaction for MS \times Time Delay was significant, $F(3, 171) = 2.83$, $p = .04$, $\eta^2 = .05$. The hypothesized 3-way interaction was marginally significant, $F(3, 171) = 2.11$, $p = .10$, $\eta^2 = .02$.

For the marginal three-way interaction, simple main effects analyses revealed significant differences between death ($M = 512.33$, $SE = 15.21$) and control ($M = 585.41$, $SE = 13.36$) conditions for death-related words following a 10 min delay ($p < .001$; see Figure 2). All other comparisons between death and control conditions across other time delays were non-significant

($ps \geq .29$; see Table 2 for group means). Further, although there was no significant effect of timing within the tv conditions ($ps \geq .19$), after MS, persons experienced greater DTA following a 10 min delay as compared to the other conditions (i.e., 0, 5, & 15 min), $F = 12.98$, $p < .001$, $\eta^2 = .06$. The remaining comparisons within death conditions were non-significant, $ps \geq .29$.

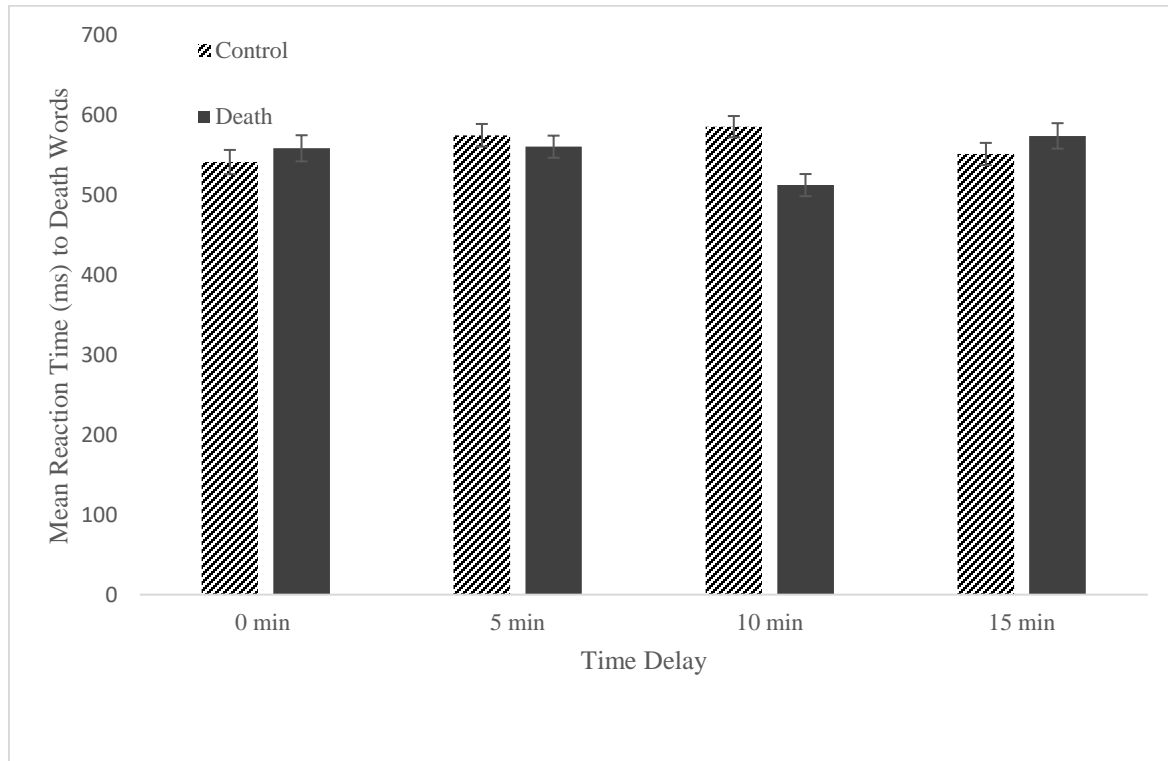


Figure 2. Mean response time latencies (ms) to death words while controlling for neutral words.

Table 2
Means across Conditions on Death-Thought Accessibility

Time Delay	Condition	
	Death	Control
0 min	558.39 (16.35) ^b	541.21 (15.14)
5 min	560.37 (13.87) ^c	574.69 (14.17)
10 min	512.33 (15.21) ^{abcd}	585.41 (13.36) ^a
15 min	573.89 (15.93) ^d	551.29 (13.88)

Note. The table provides adjusted marginal means with standard errors in parentheses. Matching superscripts indicate significant differences between group means $p < .05$.

The results of Study 1 suggest that the optimal assessment for DTA following an MS prime occurs after 10 min, which appears to challenge the oft-unspecified brief delays utilized by past research (i.e., 3-5 min; Hayes et al., 2010; Pyszczynski et al., 1999). However, these findings are in line with meta-analytic results suggesting stronger TMT effects in response to longer delays (Burke et al., 2010; Steinman & Updegraff, 2015). Interestingly, the current results seem to suggest that DTA naturally dissipates after 15 min; presumably slipping from deep activation to the recesses of complete unconsciousness (Pyszczynski et al., 1999; Wegner, 1994).

This first study has important implications for TMT. While most terror management theorists are in agreement that some type of delay is necessary between a death prime and the assessment of DTA and distal defenses, the original dual process model generally recommended delays ranging from 3-5 min for distal defenses (Pyszczynski et al., 1999), presumably with heightened DTA occurring somewhere in-between. However, in practice, these distal processes are often assessed sooner than recommended, or more typically, time delays are simply not calculated. Results from Study 1 suggest that more time may be necessary than most studies allow for before DTA is capable of detection, and that delays at the far end of the spectrum may actually miss DTA activation entirely. However, the current study should be interpreted cautiously for a few reasons.

First, while the predicted 3-way interaction was marginally significant, at no point did simple main effects indicate a difference between death and negative words (although the closest comparison between them occurred following MS at the 10 min mark, $p = .13$). As there was no significant difference between death and negative stimuli, the current study does not replicate previous research (Arndt et al., 2007; Schimel et al., 2007; Hayes et al., 2008) and cannot definitively conclude that the observed effects are specific to death, even though there were no

main effects or interactions on negative words. However, while MS may be priming death and negative content more generally at the unconscious level, it is worth reiterating that mood checks showed no differences in self-reported negative affect or fear at the conscious level. Second, the hypothesized time course effects of gradually increasing DTA were not observed. To recall, it was hypothesized that DTA effects should move from non-significance at 0 min, to significant at 5 min, to increasing significance at 10-15 min. Instead, there was the hypothesized increase in significance of DTA at 10 min following MS, and the hypothesized non-significance between conditions following no delay (i.e., proximal). There were no other hypothesized differences between MS and control conditions (p 's $\geq .29$). While non-significant, the pattern of means (Figure 2) does somewhat suggest that DTA begins increasing at 5 min, before becoming most prominent at 10 min. The lack of significance following a 15 min delay suggests that DTA may not necessarily continue to get stronger with more time.

The current study suggests a rather narrow window for optimal DTA assessment. However, this effect is only from a single study and therefore is in need of replication and converging support; especially since previous research has demonstrated effects with shorter delays. While shorter delays (e.g., 5 min) may not be optimal, they have displayed measurable differences in the past, albeit largely with word-stem completion measures, which may not be as sensitive as RT data. However, if a 10 min delay is the optimal time for DTA assessment because death-thoughts are truly in deep activation, then distal defenses should be occurring around this time as well. Distal defenses are thought to occur in response to heightened DTA, outside of focal awareness, in order to reduce the unconscious impact of death salience. If distal defenses result in measurable significance following a 10-15 min delay, then there would be converging support for the observed pattern of DTA presented in Study 1. Study 2 was designed

with these considerations in mind to examine when distal defenses were strongest following MS and variable delays.

Study 2

Study 2 was designed to examine distal defense patterns following variable time delays. As the hypothetical model of TMT (Figure 1) illustrates, heightened DTA occurs before worldview defenses. Thus, based on the previous results, Study 2 hypothesized that if DTA is in deep activation following a death prime and a 10 min delay, then distal defenses should not measurably manifest until these pre-conditions are met. Additionally, there may be a time delay between heightened DTA and increased distal defenses. It was thus hypothesized that distal effects would manifest around 10 min, but become stronger with longer delays (i.e., 15 min delay). Based on the results of Study 1, there should be no significant differences between death and control conditions following 0 or 5 min delays as these conditions are simply not long enough for death concerns to move to deep activation (i.e., active proximal suppression is still theoretically occurring). However, within the death condition, significant differences between 0-5 min delays and 10-15 min are hypothesized with longer delays resulting in harsher punishment of moral transgressors (i.e., distal defenses).

Method

Participants

In an attempt to expand the utility of the current findings to a wider demographic, the present study utilized Amazon's Mechanical Turk (MTurk), to sample 190 participants from an online community of survey takers. Eligibility criteria to participate in the study included having taken less than 50 experiments on MTurk, being a United States citizen, and being over the age of 18. Forty-two participants were excluded for failing attention checks embedded in the study,

leaving 148 participants (69 male) for analysis. A power analysis indicated that this was slightly under powered ($N = 171$) but an acceptable sample size for detecting moderate effects. Ages ranged from 18-70 ($M_{\text{age}} = 36.89$, $SD = 12.04$) and the sample was predominantly Caucasian (83.1%). All participants were awarded \$2.00 for their participation.

Materials and Procedure

Materials, instructions, and timing setups were identical to Study 1 with the following exception: the lexical decision task was replaced with a measure of worldview defense (i.e., MSTs; Cox et al., 2007). The brief MSTs consists of four vignettes wherein different societal norms are violated. The vignettes consist of a) a scholarship executive embezzling money from low-income students, b) a group of college students burning the American flag while protesting, c) a frustrated thief destroying a sculptor's work of art, and d) a disgruntled immigrant destroying a day's worth of crops. For each vignette the severity of the wronging and the degree of punishment were assessed on 7-point Likert-type scales, with higher scores indicating greater severity of offense and prescribed punishment. Vignettes were presented in the fixed order previously outlined. Following previous research by Cox et al., the specific worldview defensive vignettes (i.e., flag burning & immigration) were averaged together to create a composite score ($\alpha = .85$) of general worldview defense. The other two vignettes were included as fillers that were immoral but not related to worldview defense.

Results and Discussion

Mood Check

Similar to Study 1, analyses were conducted to ensure that the explicit death prime was not eliciting increased affective states. Of the 148 participants, 104 completed the PANAS-X. Analyses of variance tests revealed no significant main effects or an interaction between MS ×

time delay on positive affect ($\alpha = .92$), $F_s < 1.42$, $p_s > .25$; negative affect ($\alpha = .95$), $F_s < 1.71$, $p_s > .19$; fear ($\alpha = .94$), $F_s < .53$, $p_s > .47$, or fatigue ($\alpha = .88$) subscales, $F_s < 1.77$, $p_s > .18$.

Primary Analysis

A 2(MS: death vs. tv) \times 4(Time Delay: 0, 5, 10, vs. 15 min) between-subjects ANOVA was performed on worldview defense scores. Analysis revealed no significant main effects of either MS or Time Delay, $F_s \leq 1.94$, $p_s \geq .13$; however, the predicted interaction was significant, $F(3, 140) = 4.34$, $p = .006$, $\eta^2 = .08$ (see Figure 3).

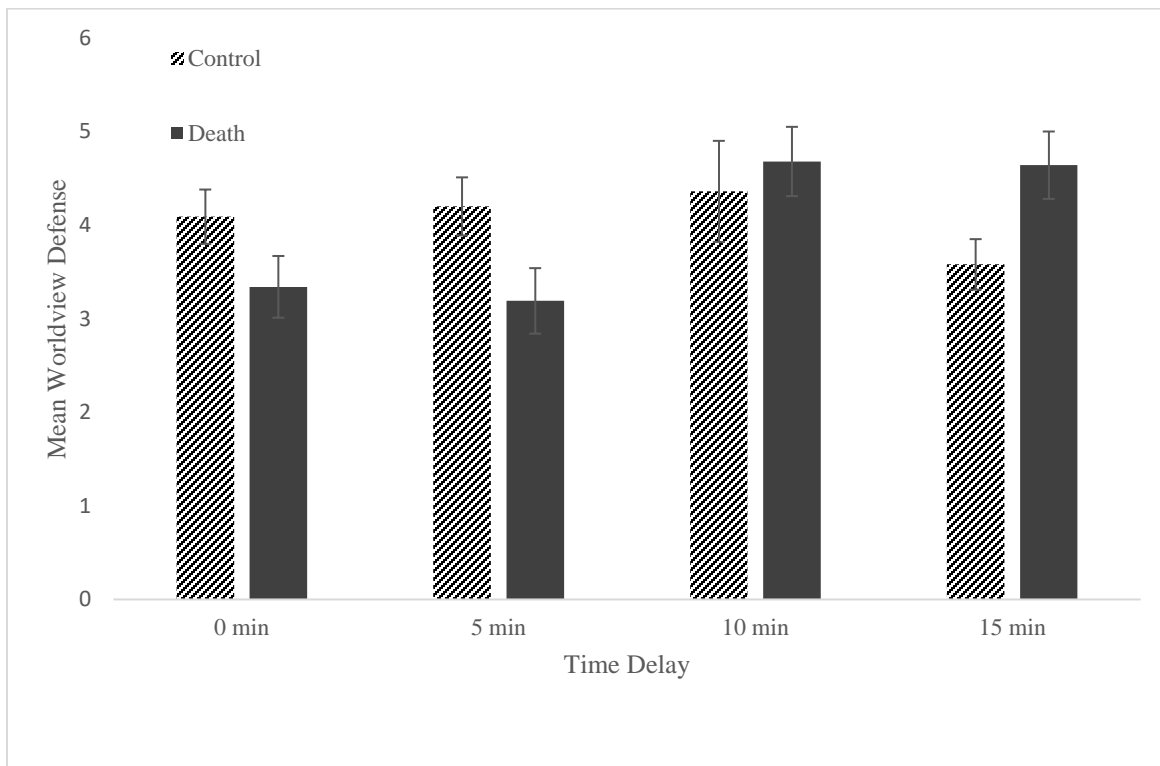


Figure 3. Mean worldview defense at variable time delays.

Simple main effects revealed differences between MS and control conditions following 5 and 15 min delays ($p_s \leq .03$, $\eta^2_s \leq .03$; see Table 3), but not 0 and 10 min delays ($p_s \geq .09$, $\eta^2_s \leq .02$). Interestingly, while the difference between control ($M = 3.58$, $SE = .27$) and death ($M = 4.64$, $SE = .36$) groups following a 15 min delay were in the hypothesized direction, the

difference between control ($M = 4.20$, $SE = .31$) and death ($M = 3.19$, $SE = .35$) groups following a 5 min delay were in the inverse direction (i.e., MS led to increased leniency for worldview transgressors; Figure 3). Additionally, after MS, there was no significant difference between 0 min and 5 min conditions ($p = .75$), but both were lower than 10 min and 15 min conditions ($ps \leq .009$), which did not differ from one another ($p = .93$; see Table 3).

Table 3
Means across Conditions on Worldview Defense

Time Delay	Condition	
	Death	Control
0 min	3.34 (.33) ^{ab}	4.09 (.29)
5 min	3.19 (.35) ^{cde}	4.20 (.31) ^e
10 min	4.68 (.37) ^{ac}	4.36 (.54)
15 min	4.64 (.36) ^{bd}	3.58 (.27) ^f

Note. Means and standard errors for worldview defense. Matching superscripts indicate significant differences between group means $p < .05$.

While in the no delay condition there was no significant difference between MS and control groups, the pattern was the same as the 5 min delay condition which was significant. In both cases the shorter delay demonstrated inverse worldview defense. This unexpected result shows a reversal of typical worldview defense when death is still ostensibly in focal attention (i.e., 0-5 min delays). Interestingly, proximal defenses may activate the opposite of distal processes, as the need to suppress death-thoughts may supersede immediate worldview concerns. In support of this result, previous research has demonstrated similar patterns of lower distal defenses following reinstatement of conscious death-related thoughts (Arndt, Greenberg, Pyszczynski, & Solomon, 1997). This finding has important implications for TMT research. If shorter delays are still assessing proximal defense patterns because death has not moved to deep activation, than it is possible for researchers to end up with results directly opposite from their hypotheses. This is not to say that such hypotheses are necessarily wrong, but rather that the

obtained results may not reflect the theorized defensive strategy. Results from the current study suggest that typical distal defenses in line with past TMT research occur following longer delays.

While there was no significant difference between MS and control following a 10 min delay, the 10 and 15 min delays were significantly different from the 0 and 5 min delays in the MS condition. Additionally, both of the longer delays (i.e., 10-15 min) exhibited the hypothesized pattern of results, with greater worldview defense occurring in the MS condition. The current results support the previous meta-analytic findings (Burke et al., 2010) suggesting that longer delays lead to stronger distal effects. Additionally, this pattern supports the observed results from the previous study. Distal defense patterns seem to begin when DTA has been shown to be heightened, after a 10 min delay. However, distal worldview defenses are significantly different from control following a 15 min delay, when DTA has been previously shown to have dissipated. It could be that heightened DTA was not observed following a 15 min delay because worldview defenses had become active, which would support the current findings; but since the first study did not assess worldview defenses this claim cannot yet be substantiated.

While the results of Studies 1 and 2 found converging theoretical support, further studies are needed to replicate, extend, and combine these findings. Therefore, with the previous results in mind, Study 3 was designed to test overall optimal timing effects for both DTA and worldview defense, as well as the conditional processes of MS and time through DTA on worldview defense.

Study 3

Study 3 was designed as a comprehensive test of the TMT cognitive architecture (i.e., Figure 1). Specifically, as depicted in Figure 4, a conditional process model was utilized in the current study. The first step in this type of study design is to test the main effects of death

condition (a^1 path) and timing (a^2 path) and their 2-way interaction (a^3 path) on DTA scores. Following the results of the first experiment, it was hypothesized that MS and a 10 min delay would result in the highest accessibility of death-related thoughts (i.e., faster response times on a lexical decision task). No other significant effects were expected to emerge.

For the model's second step, I examined how MS (c^1 path), timing (c^2 path), and the interaction between the two variables (c^3 path) had a conditional direct influence on worldview defense scores. The results from Study 2 would suggest that worldview defense should be greatest when death-related thoughts are highly accessible, but outside of focal attention. Therefore, it was hypothesized that MS participants would be more likely to defend their cultural beliefs following a longer delay (i.e., 10 -15 min) rather than a shorter one (i.e., 5 min).

Third, one goal of this conditional process model is to examine the associative link between the mediator (i.e., DTA) and the outcome (worldview defense, i.e., b -path). Based on past TMT theory and research (Pyszczynski et al., 2015), heightened DTA should lead to greater belief validation. A similar relationship was expected here in that participants' should be more likely to defend their cultural worldviews when thought of death are salient, regardless of the independent variables included in the model (i.e., MS, timing, & their 2-way interaction entered as covariates; Preacher, Rucker, & Hayes, 2007).

Finally, in examination of the entire model, the last step to this type of design is to explore the relationship between MS (c^1 path), timing (c^2 path), and their 2-way interaction (c^3 path) on worldview defense as a function of DTA. Given that heightened death cognition is expected to emerge after 10 min (Study 1), with worldview defenses being activated following a 10-15 min delay (Study 2), it was hypothesized that the persons who would be the most defensive are the ones who experience heightened death cognition as a function of MS and a 10

min delay. No significant effects were expected to emerge across the remaining conditions. Integrating everything together, the full conditional process model was assessed using the PROCESS macro (Model 8; Hayes, 2017) with DTA as the mediator (see Figure 4). All relevant effects were also submitted to a mini-meta analysis to see relative strength of various time delays following MS.

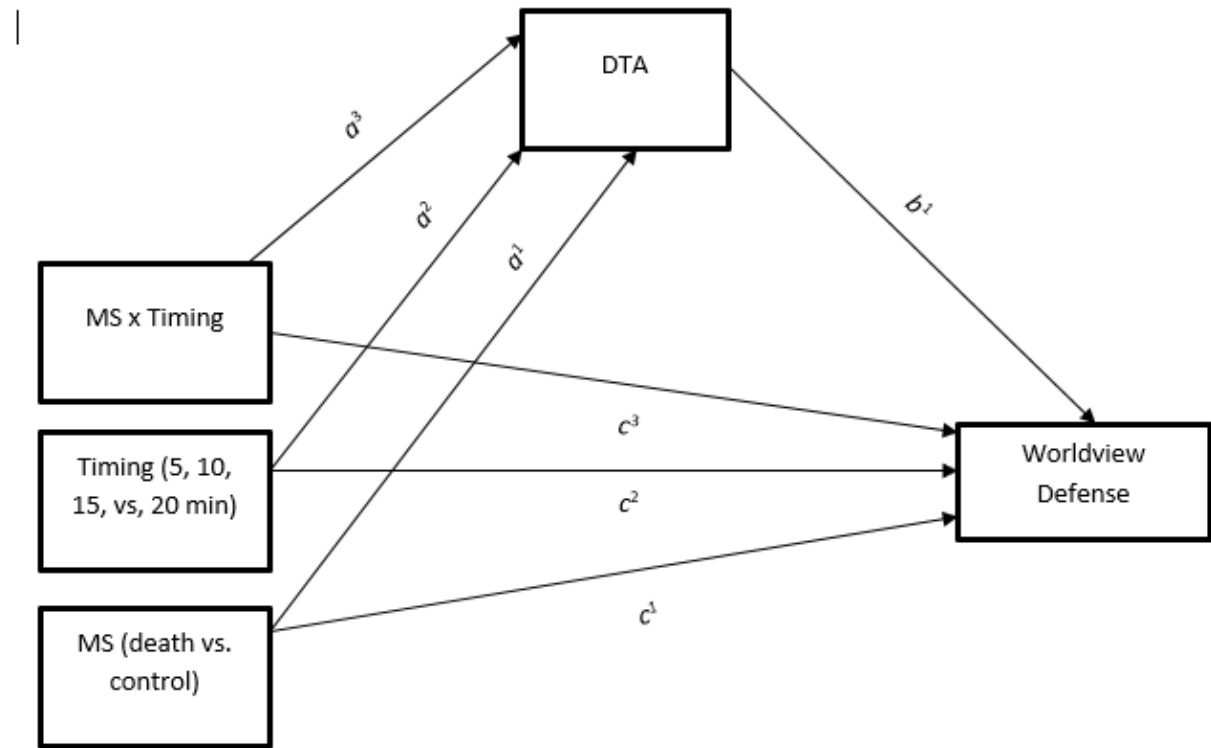


Figure 4. Conditional process model.

Method

Participants

The current sample was comprised of university students and online participants recruited through Amazon’s MTurk ($N = 475$). Initially, 238 participants were recruited through MTurk and paid \$2.00 for their participation. Adding to this 237 students were recruited from a private university in the Southwest United States where they received course credit in exchange for their

participation. However, after screening for similar study participation ($n = 78$), attention checks ($n = 23$), American citizenship ($n = 26$), and honest responses ($n = 3$), the final sample was comprised of 352 individuals (178 MTurk participants, 174 students). Of the remaining sample an additional seven participants were dropped due to incomplete responses to critical dependent measure items answering none of the worldview defense questions leaving a final sample of 345 participants (226 females). Ages ranged from 18-70 years ($M_{age} = 27.73$, $SD = 11.46$) and the sample was predominantly Caucasian (78.8%). A power analysis for a completely between subject 12 cell design (i.e., all combined between subjects variables) with a moderate effect size indicated a desired sample of $N = 341$.

Materials and Procedure

Everything was identical to the previous studies with the following exceptions. For parsimony, the 0 min initial delay was dropped from the design as nothing was of statistical significance in the previous studies. Following Experiments 1-2, participants first completed the individual difference filler measures designed to bolster the cover story. All participants were then assigned to an open-ended death prime, or control (i.e., watching tv) task followed by random assignment to one of three variable time delay conditions (see Table 1).

Following Study 1, all participants completed a lexical decision task to assess DTA as the conditional mediator, followed by a more commonly utilized measure of worldview defense (i.e., pro & anti-American essays; Greenberg, Simon, Pyszczynski, Solomon & Chatel, 1992). For this dependent variable, American participants are given two essays to read in counterbalanced order: (a) someone who is in support of the United States (e.g., “America truly is a great nation and I don’t regret my decision to come here at all”) and (b) someone who is against the country (e.g., “America is a cold country that is insensitive to needs and problems of foreigners”). After

reading each essay, individuals in the current experiment answered five questions (e.g., “How much do you like this person?,” “How intelligent is this person?”) on 9-point Likert-type scale (1 = *not at all*; 9 = *totally*). Both the pro ($\alpha = .90$) and anti-essayist ($\alpha = .95$) questions indicated good internal consistency. Following past research (Greenberg, et al.) the dependent measure was computed as a mean difference score between the aggregate pro and anti-American essays. A high score (i.e., more positive) indicates a pro-American bias.

Results and Discussion

Mood Check

Following the previous two studies, analyses were conducted to examine whether MS was eliciting increased affective states. A series of 2(MS: death, control) \times 3(Time Delay: 5, 10, 15 min) between-subjects ANOVA’s were conducted, with a Bonferroni correction applied due to multiple comparisons ($p \leq .01$).

Results revealed no main effects or an interaction for fatigue ($\alpha = .85$), $F_s < 1.28$, $p_s > .28$. As well as no main effects or an interaction for positive affect ($\alpha = .86$), $F_s < 2.73$, $p_s > .10$. However, for fear ($\alpha = .80$), $F(2, 339) = 11.60$, $p = .001$, $\eta^2 = .02$, and negative affect ($\alpha = .88$), $F(2, 339) = 11.61$, $p = .001$, $\eta^2 = .02$, MS elicited greater fear ($M = 1.46$, $SE = .06$) and negative affect ($M = 1.50$, $SE = .05$) compared to the respective controls ($M = 1.20$, $SE = .05$; $M = 1.25$, $SE = .05$).

Conditional Process Model

***a*-paths.** The first analysis was done to replicate and extend the results of Study 1, and to establish the *a*-paths in the current conditional process model. A 2(MS: death, control) \times 3(Time Delay: 5, 10, 15 min) between subjects ANCOVA was conducted on death-word reaction times with neutral words as the covariate. There was a main effect for MS, $F(1, 339) = 8.11$, $p =$

.005, $\eta^2 = .02$, such that MS lead to faster reaction times to death words ($M = 540.74$, $SE = 3.85$) compared to the control condition ($M = 555.88$, $SE = 3.66$); but there was no main effect of time, $F < .04$, $p > .96$. However, the interaction was marginally significant, $F(2, 339) = 2.32$, $p = .10$, $\eta^2 = .01$. Neutral words as the covariate were also significant, $F(1, 339) = 436.23$, $p < .001$, $\eta^2 = .55$. Simple main effects for the interaction did provide one interesting significant result between death ($M = 533.87$, $SE = 7.87$) and the control conditions ($M = 563.92$, $SE = 6.53$) on death-word reaction times following a 5 min delay, $F(1, 339) = 8.62$, $p = .004$, $\eta^2 = .02$. All other comparisons between death and control conditions were non-significant, $F_s < 2.56$, $p_s > .11$. The means and standard errors for the 2-way interaction are presented in Table 4.

Table 4.
Condition by Time Delay on Death-Thought Accessibility a-path

	Time Delay		
	5 min	10 min	15 min
Death	533.87 (7.87) ^a	540.23 (5.98)	548.13 (6.09)
Control	563.92 (6.53) ^a	554.39 (6.53)	549.34 (5.95)

Note. Standard errors in parentheses. Matching superscripts indicate significant difference at $p < .05$.

c-paths. To examine a link between MS and variable time delays on worldview defense (i.e., replicating Study 2), a 2(MS: death, control) \times 3(Time Delay: 5, 10, 15 min) between-subjects ANOVA was conducted on essay difference scores. There were no significant main effects of MS, time delay, or an interaction, $F_s \leq 1.25$, $p_s \geq .29$. Additionally, simple main effects revealed no significant differences between MS and control conditions following any time delay, $F_s \leq 2.79$, $p_s \geq .10$ (see Table 5).

Table 5.

Condition by Overall Time Delay on Worldview Defense c-path

	Time Delay		
	5 min	10 min	15 min
Death	1.47 (.43)	2.62 (.33)	2.20 (.33)
Control	2.40 (.36)	2.42 (.36)	2.24 (.33)

Note. Standard errors in parentheses.

***b*-path.** Using the PROCESS macro (Hayes, 2017) the *b*-path was computed while controlling for MS, time, and their interaction. Since death words were the mediator neutral words were entered into the model as a covariate. Results created bootstrapped confidence intervals for all effects. First, while controlling for MS, time delay, and their interaction the *b*-path of DTA to worldview defense was significant $b = .01$ ($SE = .003$), $t = 2.57$, $p = .01$, CI: .002, .01. All direct effects (i.e., *c*-paths) remained non-significant. Interestingly, the *a*-paths calculated with bootstrapped confidence intervals now produced not only a significant main effect of MS, $b = -29.68$ ($SE = 9.03$), $t = -3.29$, $p = .001$, CI: -47.43, -11.92, but a significant interaction between MS and time delay, $b = 14.42$ ($SE = 6.65$), $t = 2.17$, $p = .03$, CI: 1.34, 27.50 (see Figure 5).

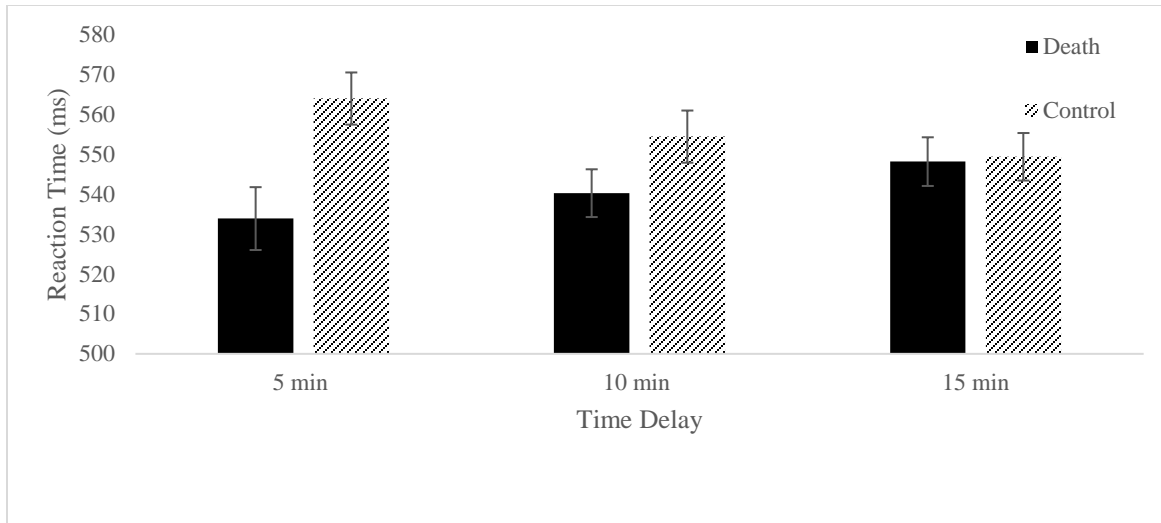


Figure 5. MS by Variable Time Delays on Death-Word Reaction Time

Indirect effects. A mediated-moderated model was performed examining the relationship between MS, timing, and their 2-way interaction on worldview defense with DTA included as a mediator. Using PROCESS, the conditional indirect effects of DTA on worldview defense following 5,000 bootstrap resamples were significant following MS and 5, $b = -.19$ ($SE = .09$), CI: $-.41, -.06$, and 10 min, $b = -.11$ ($SE = .05$), CI: $-.25, -.02$ initial delays (see Table 6).

Table 6.

Bootstrapped Indirect Effects of Condition by Time Delay through DTA on Worldview Defense

Interaction	Effect	95% CI
MS × 5 min	-.19 (.09)	-.41, -.06
MS × 10 min	-.11 (.05)	-.25, -.02
MS × 15 min	-.02 (.06)	-.16, .09

Note. Standard errors in parentheses. Bolded items indicate indirect path significance.

Overall, the model failed to replicate the results from Study 2 along the c -path, with the hypothesized difference between control and MS not occurring at all. The interaction between MS and time delay on DTA was significant, replicating the results of Study 1. However, the hypothesized difference between MS and time occurred following the shortest delay of 5 min. While in the hypothesized direction (i.e., faster response times to death words following MS

compared to control) the time difference may indicate a wider window for the optimal assessment of DTA than reported in Study 1. The results of the mini-meta analysis will help to indicate if both of these time delays can significantly predict heightened DTA using a lexical decision task. However, the results of the indirect effects seem to indicate that both 5 and 10 min delays are optimal for heightened DTA to lead to increased worldview defense.

Findings along the *b*-path were as hypothesized. DTA was found to be a significant positive predictor of worldview defense. This finding runs counter to previous research (Hayes & Schimel, 2018), which has suggested that measuring DTA subtly re-primes death, which may interfere with the hypothesized time course identified in Figure 1. While previous research only assessed this possibility with word-stem completion tasks it does seem likely that similar stimuli should produce equivalent results. However, it may be that using a lexical decision task intermixed with other non-death related stimuli is capable of distracting participants from focusing too heavily on the death terms. The mixture of stimuli combined with the faster presentation and response times, as well as the inability to censor one's responses, may indicate that a lexical decision task is a more sensitive measure of DTA. If this is the case it may be more robust than word-stem completion tasks, which have the participant consciously focus on bringing specific terms to mind. In short, through being a more sensitive measure of DTA which prevents too much focus on target stimuli, lexical decision tasks may not only be better overall for DTA assessment but may allow the hypothesized cognitive pattern of responses outlined in Figure 1 to occur as theorized.

Lastly, examining the overall indirect conditional process effects lend support to the overall TMT model. Specifically, since the interactions between MS and time were indirectly significant following 5 and 10 min initial delays on the *a*-paths, Study 3 would suggest indirect

support of Study 1. While there was non-significance in the initial analysis following a 10 min delay, the overall indirect effects would suggest partial support for the findings from Study 1. Following MS, between a 5 and 10 min delay is optimal for the assessment of DTA. This result is supported by the meta-analytic findings of Steiman and Updegraff (2015). While their results indicated that longer delays led to overall larger DTA effect sizes, their theoretical model topped out at estimating around 8 min. The current results would suggest that 10 min is the upper limit to the Steinman and Updegraff (2015) model, while 5 min is the lower threshold. Additionally, the indirect effects support the overall TMT model. Since DTA significantly accounts for worldview defense after it has been elevated outside of focal attention while DTA should be theoretically dissipating (see Figure 6).

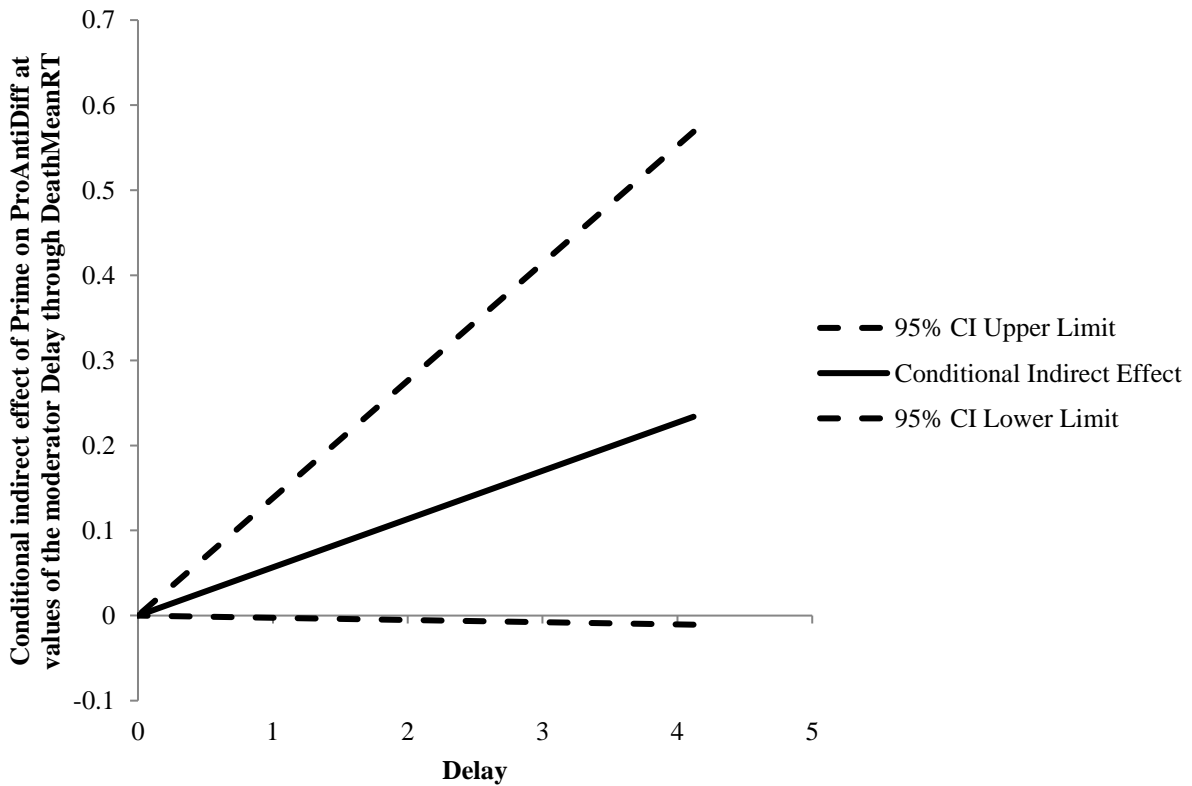


Figure 6. Conditional Process Indirect Effects

Mini-Meta Analysis

To explore the relative strength of MS and time delays on DTA and worldview defense simple main effects comparisons were submitted to a mini-meta analysis utilizing the observed effects in Studies 1 and 2 with the *a* and *c*-paths from Study 3. Effect sizes were calculated and weighted by sample size using a fixed effects mini-meta analysis calculator (Goh, Hall, & Rosenthal, 2016). This calculator allows for the simple calculation of aggregate effects and confidence intervals for significance of observed findings using Fishers transformed *z*-scores. All effects were computed as *r* scores for presentation.

First, all simple main effects comparisons for combinations of MS and time delay effects were calculated using the results from Study 1 and the *a*-paths from Study 3. The main comparisons of interest are between control and MS groups on death word reaction times following variable time delays. Results of the mini-meta found a practical effect occurring between death and control following 10 min delays, $M r = .27$, $Z = 2.71$, $p = .003$ (see Table 7). However, 5, $M r = .12$, $Z = 1.04$, $p = .14$, and 15 min, $M r = .05$, $Z = .53$, $p = .30$, delays were too short and long for activating DTA effects.

Table 7

Combined Effect Sizes of Mortality Salience on Distal Processes at Variable Times

Grouping	Combined Effects	Combined N	Combined Effect Size, <i>r</i> (with 95% Confidence Interval) of MS
Effects on DTA:			
5 min Delay	2	88	.121 [-.108, .351]
10 min Delay	2	113	.267 [.076, .472]
15 min Delay	2	112	.053 [-.146, .252]
Effects on WVD:			
5 min Delay	2	78	.311 [.075, .569]
10 min Delay	2	87	.135 [-.095, .367]
15 min Delay	2	114	.255 [.064, .458]

Note. DTA = death-thought accessibility; WVD = worldview defense. Bolded values indicate significance at $p < .05$.

Next, all combinations of time delays were pooled to examine differences between MS and control on worldview defense. Again, comparisons were between control and death primes at variable time delays. Results indicated significant effects following 5, $M r = .31$, $Z = 2.56$, $p = .005$, and 15 min delays, $M r = .26$, $Z = 2.60$, $p = .004$, and 10 min delays were non-significant $M r = .14$, $Z = 1.15$, $p = .12$. However, it should be noted that the 5 min delay indicated inverse effects on worldview defense. The typical pattern of worldview defense most strongly manifests after a long delay (i.e., 15 min).

Overall, the results of the mini-meta analysis support the combined study results, but especially the conditional indirect effects from Study 3. Just as indicated by the conditional process results, 10 min is the optimal time for assessing DTA, while 15 min is too long and 5 min is slightly too short. Additionally, in support of Study 2 and 3 findings the optimal time for assessing worldview defense occurs following a 15 min delay. The finding of 5 min delays being significant predictors of worldview defense, was again in the inverse direction. This result would suggest that when proximal defenses are still engaged, the more symbolic aspects of worldview defense are not yet in deep activation, and therefore not an unconscious concern for individuals. Why proximal defenses demonstrate a significant inverse pattern of worldview defense is an interesting finding that deserves more examination.

General Discussion

The primary goal in conducting these studies was to better understand the necessary time delays between conscious contemplation of mortality and the distal responses which occur following such delays according to TMT. Based on meta-analytic results (Burke et al., 2010; Steinman & Updegraff, 2015) it was hypothesized that longer delays (e.g., 10 & 15 min) would facilitate linearly increased DTA as well as worldview defense with a trend towards these results

emerging following a brief 5 min delay. No significance was predicted in the absence of a delay. The obtained results indicate a different picture from what was initially hypothesized, but one which is still in line with the TMT model.

Beginning with Studies 1 and 3, the first general aim was to determine how MS and time interact to predict DTA. It was originally hypothesized that there would be a linear increase in DTA as time increased, with no effect without a delay of some sort. However, neither Study 1 nor 3 supported this hypothesis. Instead simple main effect analyses indicated conflicting results between Study 1 (i.e., 10 min delay) and Study 3 (i.e., 5 min delay) in terms of optimal delay for DTA assessment. However, mini-meta analytic results supported 10 min delays as optimal times to assess DTA overall. While 5 min was not meta-analytically significant, these two time delays may represent upper and lower boundary conditions for successful assessment of death-related thoughts. These upper and lower limits are supported by previous meta-analytic findings. For example, Steinman and Updegraff (2015) calculated time delays in three separate ways: the mere presence of a delay or not, the number of intervening tasks between threat and assessment of DTA, and the additive estimated average time that all intervening delay tasks should have taken. For all three definitions of time delays, the mere presence of death threats significantly predicted increased DTA, regardless of how DTA was measured (e.g., word-stem completion, lexical decision task, free writing references). Additionally, it is important to note that following an explicit MS threat, increasing estimated delay length positively related with increased effect size; however, model time estimation did not exceed 8 min. Therefore, 10 min may logically represent the upper limit of DTA assessment, since both Studies 1 and 3 and the mini-meta-analysis indicated that 15 min was too long for distal assessment of DTA.

It should also be noted that Steinman and Updegraff (2015) found a significant non-zero value of effect size at the intercept of their model, which indicates that immediate active suppression may not be occurring. This lack of support for an original component of the dual-process theory of TMT has also been supported by other research. For example, Trafimow and Hughes (2012) demonstrated across six studies that DTA was significantly heightened in the absence of a delay (i.e., immediately) rather than following typical TMT delays which were all found to be lower than immediate assessment. While the intercept does contain a meaningful effect above 0 for Steinman and Updegraff it should be noted that it is significantly weaker compared to longer delay times. It should also be stated that the current results from Study 1 challenge both of these previous findings since the complete absence of a delay did not result in heightened DTA, but rather followed the pattern typically hypothesized by TMT. However, Steinman and Updegraff's findings may help to explain the overall findings of Trafimow and Hughes as all of their experiments utilized typical brief delays and no task switching. Steinman and Updegraff (2015) found that following MS the mere presence of a delay was only marginally significant and that it was really multiple tasks (i.e., longer delays) that facilitated greater effect sizes. Additionally, their effect sizes for no delay were comparable to Trafimow and Hughes findings. Therefore, the current results would suggest that both were utilizing delays which were too short to show significant rebound effects of DTA. In other words, their delays, or lack thereof, were below the lower threshold for optimal DTA assessment.

The second primary aim of the current studies was to examine how MS and time interact to influence worldview defense. Again, based on meta-analytic findings (Burke et al., 2010) it was hypothesized that following MS longer delays (e.g., 10-15 min) would result in greater defense of one's worldview. Meta-analytic results from Studies 2 and 3 found converging

support that worldview defense was most pronounced following a 15 min delay across multiple dependent measures, even though this was not explicitly found in Study 3. These results are partially supported by Burke et al.'s (2010) findings, which indicated that studies that employed more delay tasks had significantly larger effect sizes than those that employed either a single, or no delay task. Burke and colleagues also estimated the time length of using multiple tasks. Although their method of estimation was not specified, they concluded that longer delays between 7-20 min produced larger effects than shorter delays (i.e., 3-6 min). However, a difference between the current results and Burke and colleagues is that they found distal effects with shorter delays, or even in the absence of a delay.

These differences in result patterns are important for a few reasons. First, while Burke and colleagues (2010) report typical patterns of MS effects resulting from shorter delays with weaker overall effects, Study 2 demonstrated the inverse of typical MS responses when short delays were used. The mini-meta-analytic findings of the current studies demonstrate that with shorter delays MS leads to less derogation and defensiveness, and that this effect is relatively strong. Additionally, results of Studies 2 and 3 do not demonstrate differences between MS and control following a 10 min delay. As previously noted this is the upper limit of when DTA is supposed to be in deep activation, and theoretically should be when distal defenses should be kicking in. Additionally, the indirect effects from Study 3 do demonstrate the typical pattern of MS response occurring at 5 and 10 min, with DTA facilitating increased worldview defense. However, this result does not specifically sync with when worldview defense should be most heightened (i.e., 15 min). It could be that DTA is becoming activated strongly around the 10 min mark and peaking defensiveness at 15 min. Regardless the incongruities between the current findings and Burke et al.'s meta-analysis, it is important because it highlights potential problems

with the current methodology. For example, the time pattern of responses to MS may vary from person to person, which is something that the current study cannot examine as the interest was in the best average time delays. Additionally, it is unclear why the results from Study 2 and 3 found the inverse of typical MS defensive patterns. It may be that when proximal defenses are engaged that people become more accepting of differing others in an attempt to further distract themselves from the existential problems associated with thinking about their mortality. Further research is needed to examine the validity of the current results to help to figure out whether the observed patterns are of theoretical interest, or anomalous.

The third primary goal of the current studies was to test the overall theoretical architecture of TMT in a Study 3 using conditional process methods. Results are the first to demonstrate a direct MS prime operating indirectly through DTA to predict increased worldview defense. Following MS, DTA becomes heightened following 5 and 10 min delays. Heightened DTA in turn positively predicts increased worldview defense. While previous research has found that measuring DTA is capable of re-priming death with word completion tasks (Hayes & Schimel, 2018), Study 3 demonstrated that these issues are not present when using a lexical decision task. It could be that since lexical decision tasks are reaction time tasks intermixed with negative, neutral, and non-words there is enough speed and diversity of material to avoid subtly re-priming MS. The presentation of words should also not subliminally re-prime participants since they are able to read all the words before making a decision. Although previous meta-analytic work (Steinman & Updegraff, 2015) has found no statistical differences between assessment of DTA following death threats, the current research would suggest that there are some conceptual differences between tasks that should be taken into consideration when designing certain studies.

While Study 3 failed to demonstrate an indirect path following a 15 min initial delay, this could have occurred for a few reasons. First, research has demonstrated that 15 min is when distal defenses are peaking, and therefore DTA should theoretically be lowering in response to unconscious defenses. Additionally, 15 min is beyond where the current research has allocated the upper limit for DTA assessment, which may also be supported by the meta-analytic work of Steinman and Updegraff (2015). There may be relevant caps on distal defense responses, which would also indicate that 15 min is simply too long of a delay to demonstrate indirect effects on worldview defense.

The last aim of the current research was to meta-analyze all the present study findings to examine their overall strength. This is especially important because while elements of all the current studies appeared to have conflicting, or marginal results, the meta-analysis of their effects indicates their overall theoretical importance. Mainly, the mini-meta demonstrated upper limits of significance (i.e., 10 min) for the successful activation of DTA, which are in line with previous results from Steinman and Updegraff (2015). The meta results for DTA effects also lend support to the findings of Study 3 whereby the indirect effects of these two times produced significance on worldview defense through DTA supporting TMT theory. The mini-meta-analysis also indicates that a long delay of 15 min is the optimal time for assessing distal defenses. As previously mentioned, this result is partially in line with meta-analytic findings from Burke and colleagues (2010). However, the mini-meta does present an unexpected and interesting finding, namely that following a brief delay (i.e., 5 min) MS demonstrates a significant inverse effect on worldview defense. Participants became less defensive and actually became significantly more open to worldview challenging others. This increased openness may be a by-product of proximal defenses being activated by allowing concern for others to distract

from mortality concerns. However, more research is necessary to support why proximal defenses lead to less general defense of one's worldview.

The current study had multiple limitations which are worth mentioning. First, the time delays for all studies were programmed to automatically advance participants to keep control of the overall time regimented. While the average length of task completion was given for each task, some participants may not have been able to finish in time or may have finished too quickly. In either case this may have increased general frustration with the study overall. In the future, researchers should program multiple tasks that participants work through at their own pace with an overall eventual time cutoff if they wish to eliminate the possibility of task frustration.

Second, while it has been supported by previous research that defending one's worldview lowers DTA, the current study is unable to claim that DTA was lowered after defense as it was not assessed after worldview defense. This is somewhat problematic since the goal was a complete test of the TMT architecture within a single study; however, the study itself was already very time consuming for participants assigned to the longer delay groups. In the future, another shorter lexical decision, or word-stem completion task, could be implemented to insure that DTA had successfully dissipated after worldview defense.

Thirdly, the samples that were collected were somewhat problematic as they were primarily comprised of white women, which makes generalization a bit harder. Ideally, samples would have been representative of both genders and ethnicities; however, due to convenience sampling methods this was not possible. Even though it was attempted to diversify samples with the use of MTurk, the obtained group of individuals was very similar to the college population

except maybe in age range. Additionally, the first two studies were somewhat under powered, which may account for the marginal significance of certain results.

Lastly, the current work was focused on explicit death threats when utilizing an MS prime. However, often researchers are looking at different existential threats to one's worldview (e.g., political differences, different religions, etc.), which may be more subtle than explicit contemplation of one's mortality. It is unclear whether these recommended delays would operate similarly with different types of threats (e.g., threats to meaning, Heine, Proulx, & Vohs, 2006; uncertainty, Van den Bos, 2001). Additionally, these studies are incapable of extending timing guidelines to subtle, or subliminally presented death primes. Future research is necessary to allocate the optimal timing guidelines for various types of existential threat exposure.

Despite these limitations, the current research is important for a number of reasons. The research was able to support previous meta-analytic findings and to more thoroughly establish limits for delay lengths. Additionally, Study 3 was the first to explicitly examine MS effects on worldview defense operating through DTA at variable time delays, demonstrating significant conditional processes that ultimately support the TMT model. These studies are also the first to explicitly control delay length between MS and the assessment of distal processes, something which should perhaps become more commonplace. Overall, these studies will help to establish stricter guidelines to produce more consistent findings when conducting terror management research. The current results will hopefully inform future researchers about general guidelines for conducting terror management research. They may also help to explain why some studies have had problems finding or replicating distal responses to various existential threats. In short, the delays were simply no long enough.

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Appendix A

Premeasures: Personal Need for Structure, Experiences in Close Relationships, and Rosenberg Self-Esteem

Personal Need for Structure (PNS)

Instructions

Please read each of the following statements and decide how much you agree with each according to your attitudes, beliefs, and experiences. It is important for you to realize that there are no “right” or “wrong” answers to these questions. People are different, and we are interested in how you feel. Please respond according to the following 6-point scale.

1 = <i>strongly disagree</i>	4 = <i>slightly agree</i>
2 = <i>moderately disagree</i>	5 = <i>moderately agree</i>
3 = <i>slightly disagree</i>	6 = <i>strongly agree</i>

1. It upsets me to go into a situation without knowing what I can expect from it.
2. I'm not bothered by things that interrupt my daily routine. (R)
3. I enjoy having a clear and structured mode of life.
4. I like to have a place for everything and everything in its place.
5. I enjoy being spontaneous. (R)
6. I find that a well-ordered life with regular hours makes my life tedious. (R)
7. I don't like situations that are uncertain.
8. I hate to change my plans at the last minute.
9. I hate to be with people who are unpredictable.
10. I find that a consistent routine enables me to enjoy life more.
11. I enjoy the exhilaration of being in unpredictable situations. (R)
12. I become uncomfortable when the rules in a situation are not clear.

Experiences in Close Relationships Inventory (ECR)

Instructions

The following statements concern how you generally feel in close relationships (e.g., with romantic partners, close friends, or family members). Respond to each statement by indicating how much you agree or disagree with it. Write the number in the space provided, using the following rating scale:

- | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--|-----------------|---|---|---------------------------|---|---|-----------------|
| | Disagree | | | Neutral/
Mixed | | | Agree |
| | Strongly | | | | | | Strongly |
- ___ 1. I prefer not to show others how I feel deep down.
- ___ 2. I worry about being rejected or abandoned.
- ___ 3. I am very comfortable being close to other people.
- ___ 4. I worry a lot about my relationships.
- ___ 5. Just when someone starts to get close to me I find myself pulling away.
- ___ 6. I worry that others won't care about me as much as I care about them.
- ___ 7. I get uncomfortable when someone wants to be very close to me.
- ___ 8. I worry a fair amount about losing my close relationship partners.
- ___ 9. I don't feel comfortable opening up to others.
- ___ 10. I often wish that close relationship partners' feelings for me were as strong as my feelings for them.
- ___ 11. I want to get close to others, but I keep pulling back.
- ___ 12. I want to get very close to others, and this sometimes scares them away.
- ___ 13. I am nervous when another person gets too close to me.
- ___ 14. I worry about being alone.
- ___ 15. I feel comfortable sharing my private thoughts and feelings with others.
- ___ 16. My desire to be very close sometimes scares people away.
- ___ 17. I try to avoid getting too close to others.
- ___ 18. I need a lot of reassurance that close relationship partners really care about me.
- ___ 19. I find it relatively easy to get close to others.
- ___ 20. Sometimes I feel that I try to force others to show more feeling, more commitment to our relationship than they otherwise would.
- ___ 21. I find it difficult to allow myself to depend on close relationship partners.
- ___ 22. I do not often worry about being abandoned.
- ___ 23. I prefer not to be too close to others.
- ___ 24. If I can't get a relationship partner to show interest in me, I get upset or angry.
- ___ 25. I tell my close relationship partners just about everything.
- ___ 26. I find that my partners don't want to get as close as I would like.
- ___ 27. I usually discuss my problems and concerns with close others.
- ___ 28. When I don't have close others around, I feel somewhat anxious and insecure.
- ___ 29. I feel comfortable depending on others.
- ___ 30. I get frustrated when my close relationship partners are not around as much as I would like.
- ___ 31. I don't mind asking close others for comfort, advice, or help.
- ___ 32. I get frustrated if relationship partners are not available when I need them.

- ___ 33. It helps to turn to close others in times of need.
- ___ 34. When other people disapprove of me, I feel really bad about myself.
- ___ 35. I turn to close relationship partners for many things, including comfort and reassurance.
- ___ 36. I resent it when my relationship partners spend time away from me.

Rosenberg Self-Esteem Scale (RSE)

Instructions

Personal Assessment Questionnaire

This questionnaire is designed to give a better picture of you as an individual. Enter the number in the space provided that most accurately describes how you feel about yourself in general. Please answer as truthfully as possible taking into account what is generally true about the way you would describe yourself.

1 = Strongly Disagree

2 = Disagree

3 = Agree

4 = Strongly Agree

_____ I feel that I am a person of worth, at least on an equal basis with others.

_____ I feel that I have a number of good qualities.

_____ All in all, I am inclined to feel that I am a failure.

_____ I am able to do things as well as most other people.

_____ I feel I do not have much to be proud of.

_____ I take a positive attitude toward myself.

_____ On the whole, I am satisfied with myself.

_____ I wish I could have more respect for myself.

_____ I certainly feel useless at times.

_____ At times I think I am no good at all.

Appendix B

Delay Tasks: PANAS-X, Big-5, Growing Stone, Word Search Puzzles, Fake Science Article

PANAS-X

Instructions

This scale consists of a number of words and phrases 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 right now. Use the following scale to record your answers:

1	2	3	4	5
Very slightly or Not at all	a little	moderately	quite a bit	extremely
_____ cheerful	_____ sad	_____ active	_____ angry at self	
_____ disgusted	_____ calm	_____ guilty	_____ enthusiastic	
_____ attentive	_____ afraid	_____ joyful	_____ downhearted	
_____ bashful	_____ tired	_____ nervous	_____ sheepish	
_____ sluggish	_____ amazed	_____ lonely	_____ distressed	
_____ daring	_____ shaky	_____ sleepy	_____ blameworthy	
_____ surprised	_____ happy	_____ excited	_____ determined	
_____ strong	_____ timid	_____ hostile	_____ frightened	
_____ scornful	_____ alone	_____ proud	_____ astonished	
_____ relaxed	_____ alert	_____ jittery	_____ interested	
_____ irritable	_____ upset	_____ lively	_____ loathing	
_____ delighted	_____ angry	_____ ashamed	_____ confident	
_____ inspired	_____ bold	_____ at ease	_____ energetic	
_____ fearless	_____ blue	_____ scared	_____ concentrating	
_____ disgusted	_____ shy	_____ drowsy	_____ dissatisfied	
with self			with self	

Big-5

Instructions

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? On the answer sheet, fill in a number (1 to 5) from the scale below that indicates the extent to which you agree or disagree with that statement.

Disagree Strongly	Disagree A Little	Neither Agree Nor Disagree	Agree A Little	Agree Strongly
1	2	3	4	5

I SEE MYSELF AS SOMEONE WHO...

- | | |
|--|---|
| 01. ___ Is talkative | 23. ___ Tends to be lazy |
| 02. ___ Tends to find fault with others | 24. ___ Is emotionally stable, not easily upset |
| 03. ___ Does a thorough job | 25. ___ Is inventive |
| 04. ___ Is depressed, blue | 26. ___ Has an assertive personality |
| 05. ___ Is original, comes up with new ideas | 27. ___ Can be cold and aloof |
| 06. ___ Is reserved | 28. ___ Perseveres until the task is finished |
| 07. ___ Is helpful and unselfish with others | 29. ___ Can be moody |
| 08. ___ Can be somewhat careless | 30. ___ Values artistic, aesthetic experiences |
| 09. ___ Is relaxed, handles stress well | 31. ___ Is sometimes shy, inhibited |
| 10. ___ Is curious about many different things | 32. ___ Is considerate and kind to almost everyone |
| 11. ___ Is full of energy | 33. ___ Does things efficiently |
| 12. ___ Starts quarrels with others | 34. ___ Remains calm in tense situations |
| 13. ___ Is a reliable worker | 35. ___ Prefers work that is routine |
| 14. ___ Can be tense | 36. ___ Is outgoing, sociable |
| 15. ___ Is ingenious, a deep thinker | 37. ___ Is sometimes rude to others |
| 16. ___ Generates a lot of enthusiasm | 38. ___ Makes plans and follows through with them |
| 17. ___ Has a forgiving nature | 39. ___ Gets nervous easily |
| 18. ___ Tends to be disorganized | 40. ___ Likes to reflect, play with ideas |
| 19. ___ Worries a lot | 41. ___ Has few artistic interests |
| 20. ___ Has an active imagination | 42. ___ Likes to cooperate with others |
| 21. ___ Tends to be quiet | 43. ___ Is easily distracted |
| 22. ___ Is generally trusting | 44. ___ Is sophisticated in art, music, or literature |

The Growing Stone

Instructions

The personality portion of the survey is over. Now, we would like you to complete a few different attitude tasks. As was stated earlier, research suggests that attitudes and perceptions about even very common everyday items may be related to basic personality characteristics. To further examine this idea, we would like you to complete the opinion questionnaires on the following pages with your most natural response. Please follow the instructions provided and complete the questionnaires in the order they are presented. That is, do not skip around.

Opinion Questionnaire 1: Literature

Please read the following short passage from a novel and answer the questions below it.

The automobile swung clumsily around the curve in the red sandstone trail, now a mass of mud. The headlights suddenly picked out in the night—first on one side of the road, then on the other—two wooden huts with sheet metal roofs. On the right near the second one, a tower of course beams could be made out in the light fog. From the top of the tower a metal cable, invisible at its starting-point, shone as it sloped down into the light from the car before disappearing behind the embankment that blocked the road. The car slowed down and stopped a few yards from the huts.

The man who emerged from the seat to the right of the driver labored to extricate himself from the car. As he stood up, his huge, broad frame lurched a little. In the shadow beside the car, solidly planted on the ground and weighed down by fatigue, he seemed to be listening to the idling motor. Then he walked in the direction of the embankment and entered the cone of light from the headlights. He stopped at the top of the slope, his broad back outlined against the darkness. After a moment he turned around. In the light from the dashboard he could see the chauffeur's black face, smiling. The man signaled and the chauffeur turned off the motor. At once a vast cool silence fell over the trail and the forest. Then the sound of the water could be heard.

The man looked at the river below him, visible soley as a broad dark motion flecked with occasional shimmers. A denser motionless darkness, far beyond, must be the other bank. By looking fixedly, however, one could see on that still bank a yellowish light like an oil lamp in the distance. The big man turned back toward the car and nodded. The chauffeur switched off the lights, turned them on again, then blinked them regularly. On the embankment the man appeared and disappeared, taller and more massive each time he came back to life. Suddenly, on the other bank of the river, a lantern held up by an invisible arm back and forth several times. At a final signal from the lookout, the man disappeared into the night. With the lights out, the river was shining intermittently. On each side of the road, the dark masses of forest foliage stood out against the sky and seemed very near. The fine rain that had soaked the trail an hour earlier was still hovering in the warm air, intensifying the silence and immobility of this broad clearing in the virgin forest. In the black sky misty stars flickered.

How do you feel about the overall descriptive qualities of the story?

1	2	3	4	5	6	7	8	9
not at all			somewhat				very	
descriptive			descriptive				descriptive	

Do you think the author of this story is male or female?

_____ male _____ female

Word Search Puzzle 1

Instructions

In the boxes below, please write as many words as you can find in the puzzle below. Please work on the puzzle until you are automatically advanced to the next slide.

APPLE	DOCUMENT	PENCIL	SOAP
BOOK	FLOWER	MUSIC	TELEVISION
CHAIR	GRASS	PIZZA	TREE
CLOUDS	HOMEWORK	REFRIGERATOR	WATER
COMPUTER	LAMP	SINK	WINDOW
DESK	MUSIC	SKY	

O M U B M S S G R K P H Y Q R T P S S R T H K M Z
 V Z O O W B S V N R V A O U Y S O V E E N F X C L
 M C F O Z P A R U Q V T N T X O B F J L E Y I G E
 I U Q K L M R P M A L U N K Y J R Z X F M S U H B
 M W Q O R K G W U K E U N E J I J S V R U P Q O J
 F C R Y X B A N R F N K E N G P K T P M C J T J S
 P I Z Z A Z M S L R L A L E P E T O E T O W K N J
 X Y B M P C A K W L L O R T E Y M F N S D I U C Y
 J R Q Y R W R D R A L A W R I J P R C W J B E K D
 B N K G I O O R P I T O T E S M G P I S D S F Y J
 O J Y N W J Z D E O A E R E R Q F A L K H T P N J
 I P D E H V W N R T G H R C X E F O W E Y H R W Z
 L O M E L P P A T Z U O C B E J X S T Z M D Q Z V
 W O I Q L J E D G I L P X D F G F J D X G M F P S
 H M I D D T A K H R Z B M B B D T B K K H F M P Q
 W Z B E Q Y O E N G Q C L O U D S G Z I B I D D G
 C W S V O G P J Z I D L L D C R C Z D C B R U I Y
 Q K J I C U B V R Y S I J O K W G V Z F H M U Q K
 E X B M N O F Q I J J U J C Y D F C P I J Y N M P
 F T U V O G C Q Z R A S O S K Y S X E C R N B I D
 P M G C X N Q A J S U Q M S V M E E X Z Q X S W N
 F K J K M S G Q H C U A I O Y H W H W I L V V A R
 I C G K G E W F A L K W J U R K H U P C Z U R Y L
 N O I S I V E L E T N F I R X B W X Z T M H E K A
 P X K O K H B P L B N B Y C Y R V P A P N F S N H

Word Search Puzzle 2

Instructions

In the boxes below, please write as many words as you can find in the puzzle below. Please work on the puzzle until you are automatically advanced to the next slide.



Fake Journal Article

Instructions

For this task, you are being asked to read a recent article from a science journal. Once you have read the entire article, you will be asked to answer a few questions about it.

Could a Life-Sized TV Control Your Dog's Brain?

This question was not proposed by a mad scientist bent on world doggie domination. The idea to see whether dogs follow life-sized videos is actually entirely sensible.

Researchers studying non-human animals want to know whether their species of interest will attend to artificial stimuli—like photographs, slides or films—because if a species realistically attends to artificial stimuli, you can have more control over stimulus presentation, and you can even manipulate and ask questions about the stimulus itself.

For example, a few years back, Lever and Reimchen from the University of Victoria investigated the effect of tail-docking on dog-dog interactions. Their artificial model of choice: a robot dog who looked somewhat like a Labrador Retriever. Over the course of the study, the only part of the robot dog to change was its tail, which was presented as either long or short, wagging or straight. The researchers explored whether real dogs would approach the robot dog and under which conditions. Their main finding: when it comes to social communication, dogs prefer that other dogs have tails. What's notable about the robot dog study is that it plays entirely on visual cues, not olfactory cues. This can throw people for a loop because aren't dogs driven by their noses? Sure, dogs are big into their noses, but dogs, and other species, don't always need all sensory channels to get a sense of something. For example, you can hear a person's voice over the phone and know it's a person. You could even know that it's a specific person, like your mother. You don't need to also see a picture of a person, or more specifically your mom, to know what's going on. The same applies to other species. When a dog sees the outline of a dog, although no olfactory cues are available, the outline could still contain something meaningful and 'dog-like.'

Which brings us back to dogs watching television. In 2003, Pongrácz and colleagues from the Family Dog Project in Budapest set out to investigate whether dogs attend to a two-dimensional image (a person on a screen) the same way they would a three-dimensional image (a real person in front of them). No olfactory cues; just visual cues. The specific test was whether dogs would follow a person's 'pointing gesture' in both the 2D and 3D conditions.

The 'pointing gesture' has to be one of the most investigated areas in canine science because it's intimately tied to sociality and interspecific communication (communication between members of different species). I tease that every day, somewhere in the world, a canine researcher is pointing for a dog. Many studies report that dogs, particularly companion dogs, are champions at following human pointing gestures to food, even when controlling for odor cues. In the typical pointing gesture set-up, an experimenter gets a dog's attention and then points to one of two bowls (or pots) to their right or left. The dog is then released by the owner to see if the dog goes to the bowl that was just pointed at, or does any number of other things from not moving to approaching the other bowl to taking a jaunt around the room to scratching (let's just say that companion dogs in studies have a sense of humor). Companion dogs overwhelmingly approach the pot that was pointed at.

What do dogs do when they see a 2D image of a person on a screen pointing to a pot? "[Dogs] responded similarly to the projected image of the experimenter pointing to the pots as if he were present in the room," write the researchers. Yes. Your dog could listen to a life-sized TV.

But there's more. In that initial study, dogs saw a live-feed video, which allowed for feedback between the dog and the human projection. Would dogs respond the same way to a pre-recorded, non-interactive, life-sized video? In a subsequent study from the same group, Péter and colleagues

changed the set-up to a visible displacement task where dogs watched a recording of a person hiding an object behind one of three locations. The dog could then choose to approach one of three hiding locations positioned directly in front of the screen (see above image).

As in the earlier study, dogs played along with the life-sized image on the screen, following the pre-recorded video to find the hidden object. Dogs in this study could locate the hidden object only if the location referenced in the video was close to the screen. If the dogs had to walk into another room to find the hidden object, their performance was worse.

The researchers suggest that when it comes to picture processing, dogs generally fall in the category of ‘confusion mode’—meaning that dogs "react the same way to the picture as to the real object." On the other hand, if dogs’ picture processing falls in the category of ‘equivalence mode,’ as in humans and chimpanzees, they would "understand that the picture is a representation of the depicted object... as standing for another entity in the world." If a 2D image refers to something that is not immediately recognizable, then in confusion mode, the dog will not get what’s going on, but an animal in equivalence mode might recognize that the image refers to something else.

It’s possible that with more training, dogs could respond to 2D images in an equivalence mode. The referential nature of picture processing remains a topic of continued interest for canine researchers. We need more mad scientists to investigate.

Reference

Hecht, J. (29 Sep., 2014). Could a life-sized TV control your dog’s brain? Scientific American. Retrieved from <http://blogs.scientificamerican.com/dogspies/2014/09/29/could-a-life-sized-tv-control-your-dogs-brain/>

Please answer the following questions about the article you just read, entitled "Could a Life-Sized TV Control Your Dog's Brain?"

	1 (Not at All)	2	3	4 (Somewhat)	5	6	7 (Completely)
How interesting did you think the article was?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How likely would you be to recommend this article to a friend?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How useful do you think the information presented in the article was?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix C
Mortality Salience Manipulation

Instructions

The Projective Life Attitudes Assessment (Morality Salience)

This assessment is a recently developed, innovative personality assessment. Recent research suggests that feelings and attitudes about significant aspects of life tell us a considerable amount about the individual's personality. Your responses to this survey will be content-analyzed in order to assess certain dimensions of your personality. Your honest responses to the following questions will be appreciated.

1. PLEASE BRIEFLY DESCRIBE THE EMOTIONS THAT THE THOUGHT OF YOUR OWN DEATH AROUSES IN YOU.

2. JOT DOWN, AS SPECIFICALLY AS YOU CAN, WHAT YOU THINK HAPPENS TO YOU AS YOU PHYSICALLY DIE AND ONCE YOU ARE PHYSICALLY DEAD.

The Projective Life Attitudes Assessment (Control)

This assessment is a recently developed, innovative personality assessment. Recent research suggests that feelings and attitudes about significant aspects of life tell us a considerable amount about the individual's personality. Your responses to this survey will be content-analyzed in order to assess certain dimensions of your personality. Your honest responses to the following questions will be appreciated.

1. PLEASE BRIEFLY DESCRIBE THE EMOTIONS THAT THE THOUGHT OF WATCHING TV AROUSES IN YOU.

2. PLEASE WRITE DOWN, AS SPECIFICALLY AS YOU CAN, WHAT YOU THINK PHYSICALLY WILL HAPPEN TO YOU THE NEXT TIME YOU WATCH TV.

Appendix D

Worldview Defense Measures: Brief Moral Transgressions Scale and Pro-Anti American Essays

Brief Moral Transgressions

Instructions

Please read the following scenarios and answer the questions with the number that best describes how you feel.

- The head executive of a scholarship fund for low-income students fled overseas with the grant money. "He ran away with our future," said a representative of the students. "We have nothing. How are we supposed to stay in school? Our education was supposed to get us out of our situations but now our dreams are pushed far away, maybe forever."

	1 (Not Severe at all/Very light punishment)	2	3	4	5	6	7 (Very Severe/Very heavy punishment)
How severe was this wrongdoing?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How heavily should the perpetrator of this wrongdoing be punished?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- A group of college students staged a public demonstration against the United States government and their policies. As part of their protest, several people began burning the American flag. "Americans are greedy, conceited, sinful people who consume way too much and think the world is our playground," shouted one of the protesters. "In every way, we are the worst nation of people in the world."

	1 (Not Severe at all/ Very light punishment)	2	3	4	5	6	7 (Very Severe/Very heavy punishment)
How severe was this wrongdoing?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How heavily should the perpetrator of this wrongdoing be punished?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- A frustrated burglar destroyed the life masterpiece of a renowned sculptor, one week before the sculpture's completion and public unveiling. The burglar, who was disappointed by the small amount of money he was able to find during the robbery, tied up the sculptor and forced him to watch as he smashed the ceramic sculpture with a sledge hammer. The stunned sculptor: "Nineteen years of work, the best of my talent, turned into a pile of rubble."

	1 (Not Severe at all/ Very light punishment)	2	3	4	5	6	7 (Very Severe/Very heavy punishment)
How severe was this wrongdoing?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How heavily should the perpetrator of this wrongdoing be punished?							

4. An immigrant farm worker became extremely agitated with his employer and destroyed a day's worth of crops. "When I first came to America I thought this was the land of opportunity, but I soon realized this was only true for the rich," shouted the worker, "Americans are spoiled and lazy and want everything handed to them. America is a cold country that is insensitive to the needs and problems of foreigners. I thought it was a great country but it's not."

	1 (Not Severe at all/ Very light punishment)	2	3	4	5	6	7 (Very Severe/Very heavy punishment)
How severe was this wrongdoing?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How heavily should the perpetrator of this wrongdoing be punished?							

VITA

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ABSTRACT

DIE AT THE RIGHT TIME: OPTIMAL TIME DELAYS IN TERROR MANAGEMENT THEORY

by Alexander P. Darrell

Thesis Advisor: Cathy R. Cox, Associate Professor of Psychology

Over 30 years, and across hundreds of studies, terror management theory (TMT) has established and supported a complex cognitive model demonstrating how people consciously and unconsciously deal with the knowledge of their inevitable death. A central component of TMT is that movement of mortality-related thoughts from conscious awareness to unconsciousness requires a delay period. However, this delay is rarely, if ever, manipulated. The current studies were designed to test the optimal time delays between the induction of mortality salience and the detection of distal (i.e., unconscious) effects. The current studies revealed ideal time delays as 5-10 min for the detection of death-related thoughts (Studies 1 & 3) and 10-15 min delays for assessment of distal defenses (Studies 2 & 3). Additionally, a conditional process analysis was conducted to combine the observed results of the previous experiments to directly test the theoretical structure of TMT (Study 3). Finally, a mini-meta analysis was conducted on all findings. By identifying optimal time delays, the current studies aim to establish stronger guidelines for conducting TMT research.