Personality and Social Psychology Review
XX(X) 1–41

DOI: 10.1177/1088868309352321
http://pspr.sagepub.com
SAGE

Two Decades of Terror Management Theory: A Meta-Analysis of Mortality Salience Research

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Abstract

A meta-analysis was conducted on empirical trials investigating the mortality salience (MS) hypothesis of terror management theory (TMT). TMT postulates that investment in cultural worldviews and self-esteem serves to buffer the potential for death anxiety; the MS hypothesis states that, as a consequence, accessibility of death-related thought (MS) should instigate increased worldview and self-esteem defense and striving. Overall, 164 articles with 277 experiments were included. MS yielded moderate effects (r = .35) on a range of worldview- and self-esteem-related dependent variables (DVs), with effects increased for experiments using (a) American participants, (b) college students, (c) a longer delay between MS and the DV, and (d) people-related attitudes as the DV. Gender and self-esteem may moderate MS effects differently than previously thought. Results are compared to other reviews and examined with regard to alternative explanations of TMT. Finally, suggestions for future research are offered.

Keywords

terror management, mortality salience, meta-analysis, death anxiety, worldviews

> The idea of death, the fear of it, haunts the human animal like nothing else; it is a mainspring of human activity—activity designed largely to avoid the fatality of death, to overcome it by denying in some way that it is the final destiny for man.
>
> Ernest Becker (1973, p. ix)

Terror management theory (TMT; e.g., Greenberg, Pyszczynski, & Solomon, 1986) was developed more than 20 years ago to help explain the ubiquitous need for meaning and self-esteem—that they may arise in part in an effort to secure oneself psychologically from concerns stemming from the awareness of mortality. Mortality salience (MS) manipulations, which involve priming people with the idea of death as compared to a control topic, have been by far the most common way to examine the impact of death awareness as delineated by the theory. We conducted a meta-analysis to examine the strength of these MS effects as well as whether they are moderated by variations in the characteristics of TMT experiments.

TMT: Empirical Approach

TMT was inspired from the writings of Ernest Becker (1962, 1973, 1975), who worked to integrate a broad array of social scientific theory and research. The theory proposes that a potential for anxiety results from the juxtaposition of death awareness—presumably a uniquely human capacity made possible by cognitive abilities such as self-awareness and abstract thought—and the instinct for self-preservation, which is common to all animals. To defend against this potential death anxiety, people must believe that some valued aspect of themselves will continue, either literally or symbolically, after cessation of their biological body. Literal immortality takes the form of an afterlife (e.g., heaven), whereas symbolic immortality takes the form of extensions of the self (e.g., children, achievements) continuing to exist after the person's biological death (Martin, 1999). Whether literal or symbolic, this cultural anxiety buffer consists of two components: (a) belief in the validity of a cultural worldview and the standards and values associated with that worldview and (b) belief that one is meeting or exceeding those standards and values, that is, self-esteem (Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989). Thus, as Becker (1973)

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described it, a cultural worldview "is more than merely an outlook on life: it is an immortality formula" (p. 255).

Part of the value of TMT is its examination of a process that is outside of conscious awareness and thereby not particularly obvious to people employing the proposed defenses. According to the theory, the problem of death resides beneath consciousness and, from there, triggers distal death defenses—the maintenance of worldviews and self-esteem. The conscious contemplation of death is defended against differently according to TMT; it is dealt with more rationally by denying vulnerability to physical death or pushing it into the distant future using proximal death defenses such as a conscious thought about one's excellent state of physical health or one's family trend toward longevity (Pyszczynski, Greenberg, & Solomon, 1999).

By providing an explanation for why people invest so heavily in their belief systems and why people need to feel valued, TMT offers insight into a broad array of human behaviors. Of particular import has been using TMT to examine the omnipresent nature of intergroup conflict. Given a fundamental human motive to secure oneself from death, TMT postulates that problems will typically arise when differences between people are perceived as challenges to one's beliefs and sense of value—the distal death defenses. Recently, two different reviews of TMT have highlighted its relevance for peace processes (Niesta, Fritsche, & Jonas, 2008) and its implications for understanding prejudice, intergroup conflict, and political attitudes (Greenberg & Kosloff, 2008). TMT can help explain why peace work is hampered particularly in the context of war and life-threatening violence as it suggests that our most vile attitudes and actions toward other groups stem from a fear of death that we cannot fully cope with or comprehend.

Though different aspects of the theory have been tested in various ways, by far the most common approach to examining the theory has been via the MS hypothesis. Of the 238 empirical TMT journal articles, 83% directly test this hypothesis. The MS hypothesis states that if people defend against the problem of death with the distal defenses described above, then increasing the accessibility of death-related thoughts should increase concern for maintaining the psychological structures underlying these defenses—that is, people's cultural worldviews and self-esteem.

In the typical MS study, participants complete a packet of questionnaires ostensibly for the purpose of assessing personality. However, embedded within this packet, participants are asked to briefly write either about their own death or about a non-death-related (often negative) control topic. Participants then typically complete one or two distraction questionnaires before finally completing a dependent measure that taps their distal death defenses. This delay and distraction between the death prime and the dependent measure is included to allow for death to fade from consciousness, in keeping with the theory's contention that the distal death defenses occur only when death is beneath consciousness (Pyszczynski et al., 1999). Indeed, removal of this delay or distraction has been shown to eliminate the effects of MS on the dependent measures (e.g., Greenberg, Arndt, Simon, Pyszczynski, & Solomon, 2000). The MS hypothesis has led to hundreds of experiments to date examining whether priming people with their own mortality increases adherence to their cultural worldviews and/or self-esteem.

Summarizing the MS Experiments: Previous Reviews

Given that MS manipulations have become a vital and widely used tool for investigating TMT, statistically summarizing the method in a way that allows for comparisons between variations on these experiments would be of interest for both practical and theoretical reasons. Other summaries or reviews of the TMT literature have been conducted (e.g., Greenberg, Solomon, & Pyszczynski, 1997; Pyszczynski, Solomon, & Greenberg, 2003; Solomon, Greenberg, & Pyszczynski, 2004), and they provide a qualitative description of the variety of MS experiments. One important outcome of these summaries has been to show that different methods for priming thoughts of mortality elicit similar distal effects predicted by TMT and that these effects occur across a variety of populations and cultures. These summaries provide convergent validity for TMT and the psychological importance of death. A second main outcome of these summaries has been to show that priming people with thoughts of their own death elicits different effects than priming people with nondeath topics that share similar characteristics—for example, negative thoughts such as pain or social rejection. Thus, the varied control topics have provided discriminant validity for the MS hypothesis. In addition, these reviews underscore the wide array of behaviors that have been influenced by MS, covering such disparate domains as prejudice, tanning, sexual practices, having children, donating to charities, voting, and driving.

One small previous meta-analysis (Jost, Glaser, Kruglanski, & Sulloway, 2003) has examined a subset of MS studies focusing on seven studies in two different articles (Florian et al., 2001a; Rosenblatt et al., 1989) that employed a dependent measure related to political conservatism. In this subset of studies, the combined effect size (ES) for MS on severity of punishment to criminals—a component of political conservatism—was significant and large, $r(7) = .50$, $p = .00$.

Summarizing the MS Experiments: The Current Meta-Analysis

A meta-analysis would add to these past summaries of the research because, to our knowledge, no broad quantitative synthesis of this TMT research has been conducted to date. A meta-analytic review allows for statistical examination of both the overall strength of MS effects and the variations in MS experiments; this latter process enables testing for

potential moderators of the MS effects that have not been systematically compared or manipulated in previous experiments, such as study region, type of MS induction, control group, and length of delay between the MS induction and the dependent measure.

Our review is multidimensional (Westen & Morrison, 2001), providing a range of statistics for TMT studies in addition to the usual ESs with four main objectives. First, we summarize the *basic characteristics* of the MS studies of TMT, such as sample sizes, settings, MS manipulations, control groups, delay tasks, and dependent variables (DVs). Second, we evaluate the individual and combined ESs for the *MS hypothesis* of TMT—that is, the magnitude of the effects of MS on distal death defenses—and compare them to other studies and theories in social psychology and beyond to get a palpable glimpse of the magnitude of these effects. Third, we examine potential *moderator variables*, both between- and within-study factors that may be associated with variations in the outcome of MS experiments (Rosenthal & DiMatteo, 2001). Fourth, we hope that our moderator analyses will provide data relevant to practical and theoretical issues that can guide and generate *future TMT research*. For example, as we delve into below, these moderator analyses allow us to examine questions about the duration of MS effects by examining variations in the delays between MS and dependent measures, the uniqueness of MS effects by examining variations in control conditions, and the impact of cultural climates on MS effects by examining the effects in different countries.

Method

Study Selection

For this review, we searched through the reference sections of prior reviews and the TMT Web site (www.tmt.missouri.edu) maintained by Dr. Jamie Arndt at the University of Missouri, which lists all known TMT studies. We also conducted a database search (PsycINFO) using *terror management* or *mortality salience* as a key phrase. Finally, we sent out an electronic message to several prolific TMT researchers asking for any in-press or other unpublished studies relevant to our purposes.

As stated above, in conducting the present meta-analysis, we were primarily interested in evaluating the effects of the MS hypothesis, the key tenet of TMT. For this reason, to be included in this review, studies had to (a) directly test the MS hypothesis of TMT, (b) describe a true experiment with random assignment to groups and double-blind procedures, (c) be printed in the English language, and (d) report data that allowed for calculation of an effect size (ES) for MS effects.

Our literature searches yielded 238 unique journal articles empirically testing TMT, and 198 (83.0%) of them tested the *MS hypothesis*. Of these, 2 articles (< 1.0%) did not describe a true experiment with random assignment to groups and double-blind procedures, 3 (1.5%) were not available in the English language, and 29 (14.6%) did not allow for calculation of an ES for MS (e.g., several three-way factorial designs were excluded when sufficient data were not provided to compute ES for MS vs. a control group). A total of 164 journal articles met the inclusion criteria for this meta-analysis, which yielded 277 ESs for MS because many articles described more than one experiment. These are summarized in Tables 1a and 1b and shown individually in Table 2.

Table 1a. Summary of Terror Management Study Characteristics for Continuous Variables

Characteristic	Valid *k*	*M*	Range	*SD*
Sample size	277	87.3	17 to 343	50.8
Number of males	257	34.4	0 to 329	32.0
Number of females	257	52.9	0 to 203	34.7
Participant age	113	22.2	7 to 84	4.7
Effect size (*r*)	277	.36	–.48 to .99	.19

Note: Valid *k* refers to the number of experiments from the 164 studies that reported on each particular participant characteristic.

Statistical Analyses

Our data analytic approach for this review follows from the two questions below (regarding mean ES and moderators) with the specific procedures discussed in detail.

What Is the Mean ES for MS Manipulations? For each study reporting sufficient information, ESs for the MS manipulations were calculated as a unit-free ES, *r*, by subtracting the control group mean from the experimental (MS) group mean and dividing the result by the pooled standard deviation according to the following formula (Lipsey & Wilson, 2001, pp. 173, 201),

$$\text{Effect size} = r = g / [\sqrt{(g^2 + 4)}]$$
$$\text{and } g = (Y^E - Y^C)$$
$$\sqrt{[(n^E - 1)(s^E)^2 + (n^C - 1)(s^C)^2]} / [n^E + n^C - 2]$$

where Y^E and Y^C are the experimental (MS) and control group means postexperiment, s is the pooled standard deviation, s^E and s^C are the experimental and control group standard deviations, and n^E and n^C are the experimental and control group sample sizes. When means were not available, the ES, *r*, was directly estimated from significance tests (*t*, *F*, or χ^2) according to the requisite procedures (for more details, see Lipsey & Wilson, 2001, pp. 172-206; Rosenthal, 1991, pp. 18-20). Note that we chose to use *r* as our ES measure in this meta-analysis rather than Fisher's normally transformed *r* (Z_r) because *r* produces more conservative and less inflated ES estimates (Hunter & Schmidt, 1990, p. 217).

For studies using multiple dependent measures, the ES associated with the primary distal dependent measure was selected a priori based on the study authors' report (e.g., the

Table 1b. Summary of Terror Management Study Characteristics for Categorical Variables

Characteristic	Valid *k*	Mode	Percentage Breakdown				
College (Y/N)	263	Yes	Y: 89.7	N:10.3			
Region[a]	236	US	1: 52.1	2: 36.9	3: 4.2	4: 6.8	
MS manipulation[b]	277	Death essay	1: 79.8	2: 4.0	3: 7.2	4: 9.0	
Control group topic[c]	277	Threatening	1: 62.1	2: 37.9			
Second IV (Y/N)	277	Yes	Y: 59.9	N: 40.1			
DV type[d]	277	Other attitude	1: 25.3	2: 47.3	3: 10.1	4: 13.7	5: 3.6
Delay[e]	263	Single task	0: 7.2	1: 67.7	2: 22.4	3: 2.7	

Note: MS = mortality salience; IV = independent variable; DV = dependent variable. Valid *k* refers to the number of experiments from the 164 studies that reported on each particular participant characteristic.
a. Region: 1 = *United States*, 2 = *Europe or Israel*, 3 = *Asia*, 4 = *Other* (Canada, Australia, Costa Rica).
b. MS manipulation: 1 = *standard essay questions*, 2 = *subliminal prime*, 3 = *survey questions*, 4 = *other* (video, film, slide show, etc.).
c. Control group topic: 1 = *threatening/aversive*, 2 = *neutral or positive or none*.
d. DV type: 1 = *attitude toward a person*, 2 = *other attitude*, 3 = *behavior*, 4 = *cognition*, 5 = *affect*.
e. Delay: 0 = *none*, 1 = *single delay task*, 2 = *two delay tasks*, 3 = *three delay tasks between MS manipulation and measurement of the dependent variable* (for non-subliminal studies only).

first distal DV was employed if there was more than one in a given experiment). When two or more comparison groups were employed in the same study, the most conservative control group—the one that should be more threatening to people—was used for computation of ES. For example, the aversive pain group rather than the neutral or TV group was selected as the control group if both were present in the same experiment.

For all ESs, 95% confidence intervals were derived from the variance of *r*, which was estimated according to the following formula (Hunter & Schmidt, 1990, p. 208),

$$\sigma_r^2 = (1 - \rho^2)^2/(N - 1) \text{ and } N = n^E + n^C$$

where ρ is the population ES (obtained by computing a combined ES for all studies) and n^E and n^C are the experimental (MS) and control group sample sizes, respectively.

The majority of experiments (59.9%) included a second independent variable (IV) other than MS that served as a potential moderator. Most of these divided participants into two groups created based on levels of a preexisting individual difference (often gender or a personality characteristic such as self-esteem) or by way of an experimental manipulation (e.g., positive vs. neutral personality feedback). These within-study moderator variables were usually included by researchers in the service of varying whether the DV would be worldview and/or self-esteem relevant. For example, participants with self-esteem partly contingent on their driving (Taubman-Ben-Ari, Florian, & Mikulincer, 1999) would be expected to drive differently following MS, but those with self-esteem less contingent on their driving would not be expected to alter their driving in response to MS because doing so would not bolster their self-esteem. In other words, MS ESs with domain-relevant moderator levels—that is, at levels of the moderator variable that make the dependent measures relevant for self-esteem or worldview—should in fact mirror MS effects sizes in studies without moderators for which the dependent measures have been geared to target the worldview or self-esteem of all participants in the sample. Thus, there were two categories of hypothesized positive MS effects in these experiments (and one category for which no positive MS effects were predicted) as follows:

1. Direct MS effects, from experiments (without moderators) designed to tap into worldviews or self-esteem bases of the particular sample of participants, such as attitudes toward the participants' country, religion, ethnicity, out-group members, or potential mates.
2. Domain-relevant moderator effects, using levels of the moderator variable that would render the dependent measure relevant for those participants' worldview and/or self-esteem. For example, domain-relevant moderator effects include MS effects on strength, but only among participants who weight lift, that is, whose worldview includes strength as an important avenue toward self-esteem (Peters, Greenberg, Williams, & Schneider, 2005).
3. Predicted null effects, where researchers predicted a zero ES for MS (i.e., conditions in which MS was not expected to have any significant effect) for one of two reasons, either (a) a distal defense opportunity (e.g., raising the participants' state self-esteem by giving them positive personality feedback) was provided prior to the DV or (b) the specific DV was not worldview or esteem relevant to participants with those particular characteristics as delineated above (e.g., a driving test should not be relevant to someone with low driving-contingent esteem). In either case, no significant death defense was expected in response to MS for that subset of participants.

Table 2. Individual Terror Management Study Characteristics and Mortality Salience (MS) Effect Sizes

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
1	37	20.0	Y	AZ	SUB	Pain	None	None	ANTI(a) US	**.29 (.01, .57)**
2	83	20.0	Y	MO	Cancer essay	Asthma essay	Cognitive load: High	1	Breast self-exam intention	**.33 (.06, .60)**
							Low			.30 (–.01, .61)
3	93		Y		MAPS	DP	Personality profile given: Neutral	1	ANTI(a) US	**.65 (.40, .90)**
							Positive			.08 (–.21, .37)
4a–exp1	46		Y	MO	MAPS	DP	Male	2	Nationalistic word accessibility	**.62 (.15, 1.09)**
							Female			.09 (–.26, .44)
4b–exp2	55		Y	MO	MAPS	DP	Male	2	Relationship word accessibility	.26 (–.07, .59)
							Female			**.52 (.14, .90)**
4c–exp3	29		Y	MO	SUB	Pain	None	None	Nationalistic word accessibility	**.44 (.10, .78)**
4d–exp4	24		Y	MO	SUB	Fail	None	None	Reaction time to relationship words	.34 (–.02, .70)
4e–exp5	48		Y	MO	SUB	Supraliminal "dead"	Immediate DV	Varied	Relationship word accessibility	**.39 (.03, .75)**
							Delayed DV			–.24 (–.67, .19)
5a–exp1	40				SUB	Field	None	None	ANTI(a) US	**.68 (.32, 1.04)**
5b–exp2	25				SUB	Pain	None	None	ANTI(a) US	**.49 (.14, .84)**
5c–exp3	37				SUB	Pain	None	None	ANTI(a) US	**.39 (.04, .74)**
6	47		Y	MO	MAPS	DP	Stereotype threat: High	1	Social projection	**.50 (.13, .87)**
							Low			**.50 (.09, .91)**
7a–exp1	50		Y	AZ	MAPS	Exam	Self-awareness: High	0	Time writing essay (inverse)	.24 (–.11, .59)
							Low			**–.46 (–.86, –.06)**
7b–exp2	45		Y	MD	DAS	Worries	Attention: Internal	0	Length of essay (inverse)	**.47 (.10, .84)**
							External			–.14 (–.56, .28)
8a–exp1	47		Y	AZ	MAPS	DP	Creative pretask: High	3	State guilt (Jones & Kugler, 1993)	**.50 (.14, .86)**
							Low			–.24 (–.66, .18)
8b–exp2	85		Y	AZ	MAPS	DP	Creative pretask: High	3	State guilt (Jones & Kugler, 1993)	**.46 (.20, .72)**
							Low			.06 (–.25, .37)
8c–exp3	83		Y	AZ	MAPS	Paralysis	Creative pretask: High	3	State guilt (Jones & Kugler, 1993)	**.27 (.02, .52)**
							Low			–.12 (–.41, .17)
9	22		Y	AZ	MAPS	Exam	None	2	ANTI(a) US	**.52 (.15, .89)**
10–exp2	84		Y	MO	MAPS	DP	Other-goal essay	1	Engagement in creative task	**.39 (.12, .66)**
							Self-goal essay			–.17 (–.47, .13)
11a–exp1	45		Y	MO	MAPS	DP	Fitness esteem: High	1	Fitness intentions	.18 (–.17, .53)
							Low			**.47 (.02, .92)**

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
11b–exp2	96		Y	AZ	MAPS	DP	Fitness esteem: High Low	1	Fitness intentions	.23 (–.12, .58) **.43 (.01, .85)**
12–exp1	162		N	NY	MAPS	DP	Neuroticism via EPI: High Low	1	Desire for control (Burger & Cooper, 1979)	**.20 (.01, .39)** –.20 (–.42, .02)
13	47		N	U.S.	FDS	Uncertainty	Patient: Christian Muslim	2	Perceived risk of cardiac disease	**.51 (.15, .87)** –.39 (–.81, .03)
14	25	21.2	Y	Canada	Reading death essay	No task	Self-esteem: High Low	1	Negative evaluation of target	**.49 (.06, .92)** .15 (–.25, .55)
15	77	21.0	Y	Australia	MAPS	Pain	Creatureliness: High Low	1	Animal attitudes (Negative)	.17 (–.11, .45) .00 (–.32, .32)
16	97	25.1		Australia	MAPS	Public speech	Creatureliness: High Low	2	Animal attitudes (Negative)	**.87 (.62, 1.12)** **–.71 (–.99, –.42)**
17	29	21.0	Y	Scotland	SUB	Field	None	None	Evaluation of out-group member (British)	**.36 (.03, .69)**
18	48	23.0	Y	Italy	MAPS	Reading	None	0	In-group bias	**.28 (.03, .53)**
19	184	21.0	Y	NJ	MAPS	TV	None	2	Voting for G. W. Bush	**.51 (.33, .69)**
20	190	21.8	Y	NY	MAPS	Exam	None	2	Voting for charismatic leader	**.34 (.18, .50)**
21–exp1	127		Y		MAPS	DP	Nullification Proneness (NP): High Low	0	Guilty verdict in mock trial (inverse)	**.37 (.00, .74)** .00 (–.43, .43)
22	155	19.6	Y	PA	Accident video	Neutral video	Agency via BSRI: High Low	1	Idealness of secure romantic attachment (Hazan & Shaver, 1987) (inverse)	**.24 (.01, .47)** –.16 (–.45, .13)
23a–exp1	54	20.0	Y	MO	MAPS	DP	Situation with mom primed: Positive Negative	2	Recall of mother evaluation	**.32 (.09, .55)** **.27 (.00, .54)**
23b–exp2	75	18.7	Y	MO	MAPS	DP	Target and parent: Similar	2	Evaluation of target	**.39 (.09, .69)** .00 (–.32, .32)
24a–exp1	62	18.6	Y		MAPS	Public speaking	Different None	2	Negative reaction to public breast-feeding scenario	**. 32 (.10, .54)**

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
24b–exp2	129	20.5	Y		MAPS	DP	Partner: Breast-feeding Bottle-feeding	2	Negative rating of partner	**.32 (.11, .53)** .00 (–.25, .25)
25	58	38.0	N	GA	MAPS	DP	None	1	Support for President G.W. Bush	.15 (–.08, .38)
26	101	21.0	Y	AZ	MAPS	DP	None	1	Moral relativity (inverse)	**.27 (.10, .44)**
27	158	20.0	Y	U.S.	MAPS	DP	National security values: High Low	1	Support for press access (inverse)	**.21 (.02, .40)** –.19 (–.41, .03)
28a–exp1	53		N	Holland	MAPS	TV	None	1	Prediction of Holland soccer goals	**.33 (.09, .57)**
28b–exp2	50		Y	AZ	MAPS	TV	Football team loss: Before After	2	Prediction of football team wins	**.36 (.00, .72)** –.03 (–.51, .45)
29a–exp1	106	21.2	Y	Holland	SUB	XXXX	Need for closure: High Low	None	University affiliation	–.11 (–.36, .14) **–.48 (–.77, –.19)**
29b–exp2	79		Y	Holland	SUB	XXXX	Permeability: High Low	None	University affiliation	.13 (–.15, .41) **–.43 (–.76, –.10)**
29b–DV2							Permeability: High Low	2	ANTI (e) university	**.35 (.07, .63)** –.08 (–.41, .25)
30a–exp1	54		Y	Holland	MAPS-1Q	TV	Article's support of afterlife: Low High	3	Perceived accuracy of positive personality profile	**.66 (.33, .99)** .17 (–.21, .55)
30b–exp2	83		Y	Holland	MAPS-1Q	DP	Article's support of afterlife: Low Neutral article	3	Perceived accuracy of positive personality profile	**.60 (.27, .93)** **.46 (.08, .84)**
31a–exp1	205		Y		MAPS	DP	None	1	Preference for positive emotion words	**.30 (.18, .42)**
31b–exp2	71		Y		MAPS	DP	None	1	Preference for happy word pairs	**.27 (.06, .48)**
32	115				MAPS	DP	Virtue-related esteem: High Low	1	Donation to charity	**.29 (.06, .52)** .00 (–.26, .26)
33–exp2	120	24.0	Y	Israel	MAPS	End of semester	Symbolic immortality (SIS): Low High	1	Bond set for prostitute	**.36 (.14, .58)** .02 (–.23, .27)
34a–exp1	52	7.0	N	Israel	DCQ	No task	Child target: In-group Out-group	1	Acceptance of target child	**–.29 (–.53, –.05)** **–.31 (–.58, –.04)**

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
34b–exp2	52	11.0	N	Israel	DCQ	No task	Child target: In-group Out-group	1	Acceptance of target child	**.40 (.16, .64)** –.08 (–.35, .19)
35–exp1	120	23.0	Y	Israel	MAPS	TV	Hardiness: Low High	1	MSTS	**.34 (.12, .56)** .00 (–.26, .26)
36a–exp1	169	17.0	N	Israel	FPDS	Neutral scale	Sex type (BSRI): Same Crossed	1	Willingness to interact with different typed boy (inverse)	**.39 (.18, .60)** .41 (–.02, .84)
36b–exp2	203	17.0	N	Israel	FPDS	Neutral scale	Sex type (BSRI): Same Crossed	1	Willingness to interact with different typed girl (inverse)	**.35 (.16, .54)** .04 (–.35, .43)
37a–exp1	61	25.0	Y	Israel	MAPS	Pain	None	1	Commitment to partner (DCI)	**.33 (.11, .55)**
37b–exp2	60	23.0	Y	Israel	MAPS	Pain	Commitment essay: Salient Non	2	MSTS	**.53 (.22, .84)** .01 (–.36, .38)
38	122		Y	TX	MAPS	DP	RFS: Low High	3	ANTI(a) traditions	**.32 (.10, .54)** .00 (–.26, .26)
39a–exp1	69	23.0		Switzerland	MAPS	DP	None	2	Rating of foreign soft drink (inverse)	**.47 (.26, .68)**
39b–exp2	49	21.7		Switzerland	MAPS	DP	None	2	Rating of foreign chocolate (inverse)	.18 (–.09, .45)
40	62	19.0	Y	Germany	MAPS	DP	Female Male	1	Rating of prowomen courses	**.32 (.01, .63)** –.34 (–.73, .05)
41a–exp1	88	19.0	N	Germany	MAPS	Self-determined death	None	2	Perceived consensus on psychology topics	**.30 (.05, .55)**
41b–exp2	140	26.7	N	Germany	MAPS	Self-determined death	None	2	In-group bias	**.24 (.06, .42)**
41c–exp3	80	23.2	Y	Germany	MAPS	Self-determined death	None	2	Identification with soccer team	**.88 (.65, 1.11)**
42–exp1	94	24.0	Y	Germany	MAPS	DP	Male Female	1	Desire for children	.27 (–.19, .73) **.48 (.26, .70)**
43a–exp5	88		Y		MAPS	No task	Self-control: Low High	2	Voting for G.W. Bush	**.63 (.37, .89)** –.12 (–.42, .18)
43b–exp6	52		Y		MAPS	DP	None	2	Stroop Task (inverse)	**.28 (.04, .52)**
43c–exp8	46		Y		MAPS	DP	None	2	Solving anagrams (inverse)	**.62 (.37, .87)**
43d–exp9	55		Y		MAPS	DP	None	2	ANTI (e) US	.23 (–.01, .47)
44–exp2	30		Y	FL	MAPS	DP	Self-control: Low High	2	ANTI(a) US	**.48 (.01, .95)** .00 (–.54, .54)

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
45a–exp1	46		Y	U.S.	MAPS	DP	Prime: Egalitarianism	0	Prejudice toward Blacks (inverse)	**.47 (.07, .87)**
							None			0.00 (–.42, .42)
45b–exp2	64		Y	U.S.	MAPS	DP	Prime: Helping	0	Reported willingness to help	**.35 (.05, .66)**
							None			0.00 (–.35, .35)
45c–exp3	108			U.S.	Near cemetery	Parking lot	Prime: Helping	0	Actual help	**.44 (.20, .68)**
							None			0.00 (–.28, .28)
45d–exp4	113			U.S.	Near cemetery	Parking lot	Person: In wheelchair	0	Actual help	**.22 (.02, .42)**
							Standing			0.00 (–.25, .25)
46–exp1	93	20.6	Y	ID	MAPS	DP	Creatureliness: High	1	Breast self-exam intention (inverse)	.24 (–.01, .49)
							Low			–.17 (–.46, .12)
47a–exp1	121		Y	CO	MAPS	Failing	Neuroticism via EPI: High	1	Cold pressor immersion time (inverse)	**.48 (.09, .87)**
							Low			–.27 (–.72, .18)
47b–exp2	80		Y	ID	MAPS	DP	Neuroticism via EPI: High	1	Foot massaging time (inverse)	**.52 (.05, .99)**
							Low			–.22 (–.76, .32)
47c–exp3	99		Y	CA	MAPS	Future worry	Neuroticism via EPI: High	1	Foot massaging time (inverse)	**.44 (.00, .88)**
							Low			–.19 (–.70, .32)
48	106	20.5	Y	FL	MAPS	DP	None	1	Body awareness (inverse)	**.28 (.04, .52)**
49–exp2	112	22.7	Y		MAPS	DP	Female	1	Choosing gender-typical jealousy	**.25 (.04, .46)**
							Male			**.29 (.00, .58)**
50a–exp1	99	19.6	Y		MAPS	TV	Body esteem: High	1	Body identification	**.33 (.08, .58)**
							Low			–.08 (–.36, .20)
50b–exp2	86	24.0	Y		Death survey	TV	Body esteem: High	1	Appeal of physical sex	**.35 (.08, .62)**
							Low			–.15 (–.45, .15)
51–exp2	41		Y	CO	MAPS	DP	Essay on humans as: Special	1	Rating of essay	**.49 (.21, .77)**
							Animals			–.14 (–.46, .18)
52	117	18.0	Y	MO	MAPS	DP	Female	1	Self-objectification (SOQ)	.22 (–.01, .45)
							Male			–.12 (–.39, .15)
53	64		Y		MAPS	TV	Opportunity to use proximal defenses first: Yes	1	ANTI (e) US	**.58 (.24, .92)**
							No			**.49 (.10, .88)**
54a–exp1	269		Y	NJ	MAPS	Pain	None	2	Desire for fame	**.13 (.02, .24)**
54b–exp2	55		Y	AZ	MAPS	Uncertainty	None	2	Interest in naming star after self	**.41 (.12, .70)**

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
54c–exp3	63		Y	AZ	MAPS	Meaningless	Artist: Famous Unknown	3	Rating of painting	**.65 (.34, .96)** .00 (–.35, .35)
55	117		Y	MO	MAPS	DP	Thought pill was: Memory enhancer Anxiety blocker	1	ANTI (e) US	.29 (–.05, .63) .12 (–.27, .51)
56–exp1	58		Y		MAPS	TV	None	1	ANTI(a) US	**.56 (.32, .80)**
57a–exp2	43		Y	AZ	MAPS	DP	Pride essay: Black White	1	Bias in perception of essayist's racism	.29 (–.07, .65) **.49 (.04, .94)**
57b–exp3	44		Y	AZ	MAPS	DP	Pride essay: Black White	2	Bias in perception of essayist's racism	.31 (–.06, .68) .32 (–.11, .75)
58a–exp1	62		Y		MAPS	Basic values	None	1	Bond set for prostitute	**.35 (.08, .62)**
58b–exp2	31		Y		MAPS	TV	None	1	Bond set for prostitute	**.72 (.33, 1.11)**
58c–exp3	51		Y	KS	DAS	Future worry scale	None	1	ANTI (a&e) US	**.45 (.14, .76)**
59	53		Y		MAPS	TV	None	1	Time to solve problem via misuse of cultural icon	**.65 (.32, .98)**
60	57	24.2	Y	Australia	MAPS	Failing exam	Opportunity to first donate to charity: Yes No	1	Hot sauce allocated to worldview-threatening target	–.17 (–.50, .16) **–.63 (–1.01, –.25)**
61–exp2	119	22.7	Y	Australia	MAPS	TV	None	1	Egalitarianism (Feather, 1994) with Australian identity primed	**.49 (.21, .77)**
62a–exp1	49		Y	AZ	MAPS	TV	Personality profile given: Neutral Positive	1	ANTI(a) US	**.60 (.25, .95)** .00 (–.40, .40)
62b–exp2	50		Y	AZ	MAPS	TV	Self-esteem: Moderate High	1	ANTI(a) US	**.52 (.18, .86)** –.15 (–.54, .24)
63	61		Y	Japan	MAPS	Exam	None	1	ANTI (e) Japan	**.27 (.05, .49)**
64a–exp1	78		Y	PA	FDS	Meaning of life survey	None	1	ANTI(a) US	.09 (–.15, .33)
64b–exp2	130		Y	Canada	MAPS	Meaningless	None	1	Bond set for prostitute	–.07 (–.31, .17)
65a–exp1	142	23.0	Y	Israel	MAPS	DP	None	1	Assignment of blame to victim of serious accident	**.49 (.34, .64)**
65b–exp2	87	21.0	Y	CA	Unscrambling death words	Unscrambling pain words	None	0	Assignment of blame to victim of serious accident	**.32 (.13, .51)**
66	149	24.0	Y	Israel	MAPS	Failing	Food: None Sweet	2	MSTS	**.54 (.27, .81)** **–.49 (–.80, –.18)**

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
67–exp1	63	23.0	Y	Israel	MAPS	Pain	Denial: High Low	1	Support of violent resistance to disengagement plan	**.35 (.03, .67)** –.14 (–.50, .22)
68a–exp1	80	24.0	Y	Israel	MAPS	DP	Donation: Poor Organ	1	Reported willingness to donate	**.37 (.09, .65)** **–.66 (–.98, –.34)**
68b–exp2	343	25.0		Israel	Death fliers	Pain fliers	Donation: Poor Organ	1	Actual donation	**.21 (.04, .38)** **–.19 (–.32, –.06)**
68c–exp3	74	23.0		Israel	Death fliers	Pain fliers	Person: In wheelchair Standing	1	Actual helping	**.33 (.05, .61)** **–.34 (–.67, –.01)**
69	168	23.7	Y	Israel	MAPS	Pain	Self-esteem: High Low	1	Physical attractiveness requirements of mate (inverse)	**.56 (.24, .88)** .05 (–.33, .43)
70	174	23.0	Y	Israel	MAPS	TV	Romantic partner in scenario: Critical Praising	1	Striving for intimacy (Sharabany, 1994)	**.51 (.28, .74)** .18 (–.08, .44)
71–exp1	116	23.0	Y	Israel	MAPS	Failing	Female Male	1	Compassion for disabled people	.15 (–.11, .41) –.28 (–.62, .06)
72–exp1	101	21.9	Y	U.S.	MAPS	TV	Male Female	1	Appeal of risk	**.82 (.55, 1.09)** **–.51 (–.77, –.25)**
73a–exp1	80	24.0	Y	Israel	MAPS	Pain	Iranian leaders: Violence Not	1	Support for Israeli violence against Iran	**.46 (.18, .74)** **–.35 (–.67, –.03)**
73b–exp2	308	24.0	Y	Israel	MAPS	Pain	Personal vulnerability: Low High	1	Support for Israeli violence against Iran	**.18 (.04, .32)** –.16 (–.32, .00)
74	143	21.0	Y	Hong Kong	Slide show, war narrative	Slide show, neutral narrative	None	1	Chinese identity	**.22 (.08, .36)**
75–exp1	68		Y	U.S.	MAPS	Exam	Female Male	2	Voting for female candidate	**.37 (.07, .67)** –.10 (–.45, .25)
76	53	17.0	N	Holland	MAPS	TV	None	1	Rating of proyouth essay	**.27 (.03, .51)**
77	225		Y	FL	MAPS	Music	Hypomanic (HPS): High Low	1	Materialism (Kasser & Sheldon, 2000)	**.32 (.16, .48)** **–.21 (–.40, –.02)**
78–exp1	180	19.0	Y		MAPS	DP	Orientation: Proself Prosocial	1	Self-transcendent values (Schwartz, 1992)	**.37 (.13, .61)** –.03 (–.22, .16)

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
79–set1	198	19.0	Y		MAPS	DP	Self-transcendent values: Low	1	Evaluation of people-oriented charities	**.48 (.23, .73)**
							High			–.13 (–.41, .15)
80–exp2	95	27.4	Y	Germany	MAPS	DP	Opportunity to affirm religion first: No	1	ANTI (e) Munich	**.32 (.06, .58)**
							Yes			.00 (–.30, .30)
81a–exp1	60	23.0	Y	Germany	MAPS	DP	None	2	Preference for the German mark over Euro currency	**.24 (.02, .46)**
81b–exp2	100	44.0	N	Germany	In front of funeral home	3 blocks away	None	0	Preference for the German mark over Euro currency	**.21 (.04, .38)**
82	86	22.8	Y	Germany	MAPS	DP	Decision related to worldview: No	2	Confirmation bias	**.27 (.00, .54)**
							Yes			–.14 (–.45, .17)
83a–exp1	77		Y	Germany	MAPS	DP	Prime: Prosocial	1	Reported willingness to help children	**.37 (.08, .66)**
							Proself			–.32 (–.64, .00)
83b–exp2	66		Y	Germany	MAPS	Word search	Prime: Pacifism	1	Pacifist attitude	.27 (–.01, .55)
							Neutral			**–.63 (–1.02, –.24)**
83c–exp3	76		Y	Austria	MAPS	DP	Prime: Security	1	Bond set for prostitute	**.54 (.26, .82)**
							Benevolence			.18 (–.14, .50)
83d–exp4	72		Y	Austria	MAPS	DP	Prime: Helping	1	Reported willingness to help	**.33 (.03, .63)**
							Not			–.13 (–.48, .22)
84a–exp1	31		N	CO	In front of funeral home	3 blocks away	None	1	Ratings of charities	**.35 (.04, .66)**
84b–exp2	27		Y	AZ	MAPS	DP	None	2	Donation to U.S. vs. foreign charities	**.52 (.15, .89)**
85a–sample1	74		Y	Australia	MAPS	Collective death	None	1	Autonomous self via HIS (inverse)	**.30 (.06, .54)**
85b–sample2	92		Y	Japan	MAPS	Collective death	None	1	Autonomous self via HIS (inverse)	–.03 (–.26, .20)
86a–exp1	60		Y	IL	MAPS	Music	None	2	Prediction of future financial worth	.24 (–.01, .49)
86b–exp2	73		Y	MO	MAPS	Music	None	0	Greed in forest management game	**.29 (.09, .49)**
87a–exp1	36	30.0		Germany	MAPS	TV	None	1	National pride	.08 (–.21, .37)
87b–exp2	62	24.1	Y	Germany	MAPS	TV	None	1	National pride	.12 (–.10, .34)

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
88a–exp2	48	22.0	Y	Holland	FPDS	No task	None	2	Rating of wilderness (inverse)	.22 (–.04, .48)
88b–exp5	115	23.0	Y	Holland	SUB	Pain	Orientation via AOT: Action	None	Rating of wilderness (inverse)	**.52 (.23, .81)**
							State			–.30 (–.63, .03)
89a–exp1	64		Y	AZ	MAPS	Pain	Delay	1	Importance of extrinsic goals	.17 (–.14, .48)
							No delay			–.35 (–.70, .00)
89b–exp2	119		Y	AZ	MAPS	Exam	Delay	1	Importance of high-priority extrinsic goal	**.35 (.13, .57)**
							No delay			–.20 (–.46, .06)
90	146		Y	U.S.	MAPS	Pain	Conservative	2	Rating of like charismatic politician	**.24 (.03, .45)**
							Liberal			**–.26 (–.49, –.03)**
91–exp1	177		Y	NY	MAPS	Exam	None	2	Dissociation from 9/11 events	**.45 (.32, .58)**
92a–exp1	64		Y	AZ	SUB	Pain	Male	None	Attractiveness of sexy women (inverse)	**.60 (.19, 1.01)**
							Female			–.13 (–.42, .16)
92b–exp2	17		Y	AZ	MAPS	DP	None	1	Sexual intent toward sexy women (inverse)	**.55 (.12, .98)**
92c–exp3	55		Y	AZ	MAPS	DP	None	1	Attractiveness of seductive women (inverse)	**.70 (.36, 1.04)**
92d–exp4	80		Y	AZ	MAPS	Uncertainty	Male	1	Attractiveness of seductive opposite sex target (inverse)	**.45 (.09, .81)**
							Female			–.15 (–.53, .23)
93–exp1	114		Y	AZ	MAPS	DP	Self-esteem: High	2	Risky decision making	**.54 (.10, .98)**
							Low			.00 (–.51, .51)
94–exp1	88		Y	U.S.	MAPS	Exam	Test item: affirms stereotype	1	Test score	**.32 (.06, .57)**
							Not			
95a–exp1	25		Y		MAPS	DP	None	1	Ratings of modern art (inverse)	**.49 (.13, .85)**
95b–exp2	62		Y		MAPS	DP	Need for structure (PNS): High	1	Ratings of modern art (inverse)	**.40 (.18, .62)**
							Low			.19 (–.41, .03)
96–exp1	125		Y	U.S.	MAPS	Social exclusion	Life events organized: Alpha	1	Perception of past significance	**.50 (.23, .77)**
							Thematic			–.03 (–.34, .28)
97a–exp1a	36		Y	U.S.	MAPS	Uncertainty	None	1	Perceived invalidity of test after receiving Positive feedback	**.38 (.09, .67)**

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Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
97b–exp1b	61		Y	U.S.	MAPS	Uncertainty	None	1	Perceived validity of test after receiving Negative feedback	**.34 (.11, .57)**
98a–exp1	70		Y	U.S.	MAPS	Pain	Need for structure (PNS): High Low	1	Identity concerns in autobiographical essay	.28 (–.02, .58) –.28 (–.62, .06)
98b–exp3	84		Y	U.S.	MAPS	Pain	Need for structure (PNS): High Low	1	Simplicity of self-concept	**.35 (.08, .62)** –.17 (–.48, .14)
98c–exp4	41		Y	U.S.	MAPS	Uncertainty	Need for structure (PNS): High Low	1	Causal coherence in writing about day	**.56 (.15, .97)** –.17 (–.65, .31)
98d–exp5	121		Y	U.S.	MAPS	Uncertainty	Need for structure (PNS): High Low	1	Connections from past life events to current self	**.38 (.10, .66)** –.06 (–.38, .26)
99a–exp1	43		Y	CO	MAPS	DP	First target: Extrovert Introvert	1	Extroversion rating of target (EPI)	**.42 (.03, .81)** –.34 (–.79, .11)
99b–exp2	77		Y		MAPS	DP	Information: Representative Base rate	1	Use of Representativeness heuristic in judgment task	**.62 (.26, .98)** .21 (–.20, .62)
99c–exp4	55		Y	CO	MAPS	DP	Need for structure (PNS): High Low	2	Preference for balanced interpersonal scenario	**.51 (.17, .85)** –.10 (–.49, .29)
99d–exp5	49		Y		MAPS	DP	Need for structure (PNS): High Low	2	Request for more disparaging info about victim	.43 (–.01, .87) **–.66 (–1.20, –.15)**
99e–exp7	59		Y		MAPS-1Q	DP	Need for structure (PNS): High Low	1	Preference for causally dependent story	**.39 (.06, .72)** –.18 (–.56, .20)
100a–exp1	30		Y	U.S.	Death word search	Neutral word search	None		Identification with meaningful actions	**.43 (.10, .76)**
100b–exp2	58		Y	U.S.	MAPS	Social exclusion	None	1	Perception of actions as linked to goals	**.31 (.08, .54)**
101a–exp1	97		Y	NJ	MAPS	TV	None	2	Support for President Bush	**.99 (.81, 1.17)**
101b–exp3	74		Y	NJ	9/11 essay	Exam	None	2	Support for President Bush	**.74 (.49, .99)**
101c–exp4	157		Y	NY	MAPS	Pain	None	2	Support for President Bush	**.67 (.47, .87)**

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
102	145		Y	NY	MAPS	No task	Authoritarianism: High Low	0	ANTI (e) capital punishment	**.31 (.04, .58)** .00 (–.28, .28)
103a–exp1	43		Y	AZ	MAPS	TV	None	1	Use of illusory correlation for group membership task	**.31 (.00, .62)**
103b–exp2	50		Y	AZ	MAPS	TV	None	1	Use of illusory correlation for group membership task	**.37 (.06, .68)**
104a–exp1	23		Y	MO	MAPS	DP	None	2	Punitive attitude toward hate crimes	**.42 (.05, .79)**
104b–exp2	136		Y	NV	MAPS	DP	Crime type: Anti-Semitic Nonhate	1	Bail set for perpetrator (inverse)	**.30 (.04, .56)** –.26 (–.56, .04)
105	74		Y		FDS	Depression scale	None	1	Valuing of Rolex	**.24 (.04, .44)**
106a–exp1	55		Y	AZ	MAPS	DP	Police: Anxious Calm	1	Negative attitude toward police	**.41 (.08, .74)** –.16 (–.54, .22)
106b–exp2	114	20.8	Y	New Zealand	MAPS	Uncertainty	Similarity to target: High Low	1	Negative attitude toward student	**.33 (.04, .62)** –.20 (–.53, .13)
107a–exp2	96	19.0	Y		MAPS	DP	Target: Elderly Teenage	1	Distancing from target	**.26 (.08, .44)** –.04 (–.24, .16)
107b–exp3	65		Y		MAPS	Uncertainty	Target: Elderly Teenage	2	Distancing from target	**.24 (.03, .45)** –.11 (–.36, .14)
108–exp3	54	18.2	Y		MAPS	Social exclusion	None	2	Time perception (of 42-second interval)	.23 (–.02, .48)
109–exp1	60			CO	FDS	DP scale	Age range: Younger Older	2	MSTS	**.25 (.03, .47)** –.05 (–.31, .21)
110–exp1	74		Y	AZ	MAPS	Exam	None	1	Hot sauce allocated to worldview-threatening target	**.32 (.03, .61)**
111–exp1	32		Y	U.S.	MAPS	DP	None	2	ANTI (a&e) US	**.37 (.06, .68)**
112–exp4	39	20.0	Y	Canada	MAPS	Temporal discontinuity	None	1	Identity seeking	.16 (–.20, .52)
113a–exp1	225	23.0	Y	Israel	FPDS	Neutral scale	Attachment (AAS): Avoidant Secure	1	MSTS	**.38 (.12, .64)** –.10 (–.31, .11)
113b–exp4	120	24.0	Y	Israel	FPDS	Neutral scale	Attachment (AAS): Secure Avoidant	1	SIS (Mathews & Kling, 1988)	**.38 (.18, .58)** .10 (–.28, .48)

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
113c–exp5	110	22.0	Y	Israel	FPDS	Neutral scale	Attachment (AAS): Secure Avoidant	1	Striving for intimacy (Sharabany, 1994)	**.34 (.13, .55)** –.15 (–.56, .26)
114a–exp1	60	24.0	Y		MAPS	TV	None	1	Self-serving attributions (for positive outcomes)	**.41 (.18, .64)**
114b–exp2	72	24.0	Y	Israel	MAPS	TV	Cognitive task feedback: Failure Success	1	Self-serving attributions	**.42 (.12, .72)** **.38 (.04, .72)**
115	126	26.0	N		MAPS	Food	Self-esteem: High Low	1	Reported risky driving behaviors (mock scenarios)	.02 (–.20, .24) –.05 (–.30, .20)
116a–exp1	94	20.0	Y	NB	Death survey	TV survey	LOC: External Internal	1	Reported risky behaviors (mock scenarios)	.17 (–.07, .41) **–.32 (–.62, –.02)**
116b–exp2	65	20.0	Y	NB	Death survey	TV survey	LOC: External Internal	1	Assessment of personal risk	**.61 (.32, .90)** .00 (–.35, .35)
117a–exp1	120	29.9	N	Costa Rica	MAPS	No task	None	1	ANTI(a) Costa Rica	.16 (–.06, .38)
117b–exp2	124	20.5	Y	CA	MAPS	TV	None	1	ANTI(a) US	**.33 (.11, .55)**
118	93		Y	U.S.	Car crash video	Driver's education video	None	1	Blame assigned to victim after car accident (inverse)	**.31 (.13, .49)**
119a–exp1	28	19.0	Y	MI	MAPS	Food	None	1	Belief in God	**.40 (.07, .73)**
119b–exp2	77	19.0	Y	IL	Child's death story	Religious story	None	1	Belief in supernatural agent ("God")	**.29 (.05, .53)**
119c–exp3	41	23.0	N	IL	Child's death story	Accident drill story	None	1	Belief in supernatural agent ("Buddha")	**.36 (.06, .66)**
120–exp1	234		Y	U.S.	MAPS	Undesired self	None	2	Support for President Bush	**.16 (.01, .32)**
121	113		Y		MAPS	DP	Weight-lifting investment: High Low	1	Strength on hand dynamometer	.13 (–.12, .38) –.04 (–.31, .23)
122–exp1a	81	19.5	Y	Canada	MAPS	Meaning violation via researcher switch	None	1	Bond set for prostitute	.11 (–.13, .35)
123–exp3	124		Y	MN	MAPS	Ponder meaning of surreal art	None	2	Need for structure (PNS)	–.18 (–.42, .06)
124–exp1	40	22.0	Y	Iran	MAPS	DP	None	1	Ratings of promartyrdom target	**.83 (.58, 1.08)**

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Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
125a–exp1	66	40.6	N	Germany	In front of funeral home	100 m away	None	0	Perceived consensus with their minority view on German immigration	.53 (N/A)
125b–exp2	124	39.8	N	CO	In front of funeral home	100 m away	None	0	Perceived consensus with their minority view on Christian values in schools	.21 (N/A)
126a–exp1	62		Y		MAPS	TV	None	1	Negative stereotyping of target	**.46 (.14, .78)**
126b–exp2	82		Y		MAPS	DP	Activity promoted: Self-esteem Problem solving	1	Negative stereotyping of target	**.65 (.31, .99)** –.09 (–.48, .30)
126c–exp3	66		Y	Holland	MAPS	TV	University essay: Negative Neutral	1	Negative stereotyping of cities/regions	**.47 (.16, .78)** **.74 (.39, 1.09)**
127a–exp1	138		Y	Holland	MAPS	TV	None	1	Conformity	**.49 (.34, .64)**
127b–exp2	100		Y	Holland	MAPS	TV	None	1	Conformity	**.61 (.44, .78)**
127c–exp3	90		Y	Holland	MAPS	DP	Art opinion given by: In-group Out-group	1	Conformity	**.83 (.51, 1.15)** **–.40 (–.08, –.72)**
128a–exp1	22		N	U.S.	MAPS	No task	None	1	Bond set for prostitute	**.42 (.05, .79)**
128b–exp2	51		Y		MAPS	No task	None	1	Bond set for prostitute	**.39 (.14, .64)**
128c–exp3	32		Y		MAPS	No task	None	1	Bond set for prostitute	**.65 (.34, .96)**
128d–exp6	34		Y		FDS	STAI	None	1	Bond set for prostitute	**.56 (.25, .87)**
129	120	24.6	Y	Israel	Death video	Nature video	Sensation seeking: High Low	0	Inventory of risk taking	.02 (–.20, .24) **–.28 (–.54, –.02)**
130	105		Y	England	MAPS	DP	Group described as: Transient Immortal	1	Willingness to self-sacrifice for group (England)	**.39 (.17, .61)** .01 (–.28, .30)
131a–exp1	45		Y	MO	MAPS	DP	Delay: None Puzzle	.	Interest in high SPF sunscreen	.34 (–.02, .70) **–.45 (–.88, –.02)**
131b–exp2	75		Y	MO	MAPS	Uncertainty	Ad featured: Suntanned woman Beach ball	1	Interest in suntan products	**.36 (.08, .64)** –.14 (–.47, .19)
132	111		Y	U.S.	MAPS	DP	Shirt design instructions: Conformist Creative	1	ANTI (e) US	**.30 (.02, .58)** –.29 (–.62, .04)

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
133	49		Y	U.S.	MAPS	DP	Benefit: Self Community	2	Creativity (inverse)	**.38 (.02, .74)** –.19 (–.60, .22)
134–exp1	33	20.5	Y	Holland	MAPS	DP	None	2	Disagree with anti–human progress essay	**.47 (.16, .77)**
135	88	21.2	Y	Spain	MAPS	Exam	None	1	Perceived collective continuity	**.29 (.10, .48)**
136a–exp1	41		Y	CO	MAPS	TV	None	1	Stereotyped rating of Germans	.36 (–.03, .75)
136b–exp2	61		Y	AZ	MAPS	DP	None	0	Explanation quantity for stereotype-inconsistent behaviors	.10 (–.12, .32)
136c–exp4	76		Y	AZ	MAPS	Social exclusion	None	1	Rating of stereotype inconsistent job applicant (inverse)	.14 (–.14, .42)
137–exp1	120		Y	Canada	MAPS	DP	Player on: Same team Other team	1	Forgiveness for mistakes	**.42 (.19, .65)** –.17 (–.42, .08)
138a–exp1	157		Y	U.S.	MAPS	DP	Self-esteem (ISE): Low High	2	ANTI (a&e) US	**.43 (.19, .67)** –.16 (–.44, .12)
138b–exp2	92		Y	U.S.	MAPS	DP	Implicit self-esteem prime: No boost Boost	1	ANTI (a&e) US	.22 (–.05, .49) –.29 (–.60, .02)
139–exp1	65		Y	FL	MAPS	DP	Opportunity to: Self-affirm None	1	ANTI (e) US	.29 (–.02, .60) –.30 (–.65, .05)
140	93		Y	AZ	MAPS	TV	BDI: Depression None	0	ANTI (e) US	**.59 (.23, .95)** **.70 (.31, 1.09)**
140–DV2							BDI: Depression None	0	Meaning in life	**.47 (.21, .73)** **.59 (.31, .87)**
141	74		Y	MD	MAPS	Exam	Feedback: Conformist Deviant	1	Social projection (inverse)	**.80 (.44, 1.16)** **–.58 (–.99, –.17)**
142	116		Y	Poland	MAPS	TV	Relationship style: Nonavoidant Avoidant	1	Attractiveness of potential partners	.28 (–.05, .61) –.15 (–.53, .23)
143a–exp1	62		N	CO	MAPS	TV	Spider phobia: High Low	2	Time looking at spider pictures (inverse)	**.78 (.47, 1.09)** **–.46 (–.82, –.10)**

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
143b–exp2	46		Y	AZ	MAPS	Social exclusion	Obsessions and compulsions: High Low	1	Hand-washing time	**.51 (.15, .87)** .04 (–.39, .47)
143c–exp3	66		Y	Canada	MAPS	DP	Social anxiety: High Low	0	Time spent interacting socially (inverse)	**.42 (.12, .72)** –.13 (–.48, .22)
144	266	19.8	Y	CA	MAPS	DP	Writing about partner worldview: Differences Similarities	1	Commitment to partner (inverse)	**.81 (.66, .96)** **–.48 (–.65, –.31)**
145a–exp1	42		Y	Hong Kong	MAPS	TV	None	1	ANTI (interview) Hong Kong	**.40 (.13, .67)**
145b–exp2	39		Y	Hong Kong	MAPS	TV	None	1	Allocation of ping pong tournament slots to Hong Kong	**.40 (.12, .68)**
145c–exp3	31		Y	Hong Kong	MAPS	TV	None	1	Allocation of economic grant to Hong Kong	**.42 (.11, .73)**
145d–exp4	94		Y	Hong Kong	MAPS	TV	None	1	Allocation of economic grant to Hong Kong	**.28 (.10, .46)**
146–exp1	73	24.0	Y	Israel	MAPS	TV	None	1	Willingness to engage in risky sexual behaviors	**.21 (.01, .41)**
147–exp1	164			Israel	MAPS	TV	Age range: Younger Older	0	Intention to engage in health-promoting behavior	**.24 (.05, .43)** –.31 (–.62, .00)
148	156	17.6	N	Israel	MAPS	Food	Self-esteem: High Low	1	Motivation to serve in military	**.22 (.02, .42)** –.17 (–.39, .05)
149a–exp1	110		N	Israel	MAPS	Food	Driving esteem: High Low Driving esteem: High	1	Reported risky driving behaviors (mock scenarios)	**.26 (.03, .49)** –.26 (–.52, .00)
149b–exp2	329		N	Israel	FPDS	Food scale	Low Driving esteem: High Low	1	Reported risky driving behaviors (mock scenarios)	**.25 (.09, .41)** –.15 (–.34, .04)
149c–exp3	56		N	Israel	MAPS	Food	Driving esteem: High Low	1	Driving speed in video game simulator	.15 (–.18, .48) –.04 (–.41, .33)
150a–exp1	54	19.5	N	Israel	Car crash ad	Food ad		1	Reported risky driving behaviors (mock scenarios)	**–.48 (–.81, –.15)** –.04 (–.42, .34)

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
150b–exp2	55	19.5	N	Israel	Car crash ad	Food ad	Driving esteem: High	1	Driving speed in video game simulator	**.36 (.03, .69)**
							Low			–.10 (–.48, .28)
							None			
151a–exp1	104	23.0	Y	Israel	MAPS	TV		1	Willingness to initiate social interactions	**.25 (.08, .42)**
151b–exp2	100	23.0	Y	Israel	MAPS	TV	Male	1	Interpersonal competence	**.34 (.07, .61)**
							Female			**.27 (.01, .53)**
							None			
151c–exp3	108	23.0	Y	Israel	MAPS	TV		1	Rejection sensitivity (inverse)	**.19 (.03, .35)**
							None			
152–exp2	100	28.5	N	Israel	MAPS	TV		1	Maternal separation anxiety	**.22 (.05, .39)**
							None			
153	48		Y	Japan	Holocaust film	No task		0	Aggression via unpleasant noise to mean target	.24 (–.01, .49)
154–exp1	116		Y	Holland	MAPS	TV	Feedback regarding performance: Low	1	Negative affect	.16 (–.07, .39)
										–.23 (–.49, .03)
155a–exp1	88		Y	Holland	MAPS	No task	Same as others	1	Positive affect	**.39 (.13, .65)**
							Voice in lottery ticket allocation: Yes			–.04 (–.34, .26)
							No			
155b–exp2	61		Y	Holland	MAPS	DP	Voice in lottery ticket allocation: No	1	Negative affect	**.34 (.02, .66)**
							Yes			–.20 (–.56, .16)
155c–exp3	80		Y	Holland	MAPS	DP	Job selection vignette: Unfair	1	Negative affect	**.38 (.11, .65)**
							Fair			–.16 (–.47, .15)
156a–exp1	100		Y	Holland	MAPS	Uncertainty	Job selection vignette: Unfair	1	Anger	**–.37 (–.61, –.13)**
							Fair			.04 (–.24, .32)
156b–exp2	126		Y	Holland	MAPS	TV	Voice in lottery ticket allocation: No	1	Anger	.08 (–.19, .35)
							Yes			–.16 (–.47, .15)
156c–exp4	104		Y	Holland	MAPS	Uncertainty	University article: Positive	1	Anger	.21 (–.03, .45)
							Negative			–.19 (–.46, .08)

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
156d–exp5	180		Y	Holland	MAPS	TV	Job selection vignette: Unfair Fair	1	Anger	**.33 (.11, .55)** .05 (–.21, .31)
157	60		Y	U.S.	MAPS	Pain	ECSW: High Low	2	Environmental concern	**.65 (.01, 1.30)** –.65 (–1.39, .09)
158a–exp1	67	18.8	Y	MO	MAPS	Social exclusion	RFS: High Low	2	Endorsement of prayer as substitute for medicine	.75 (–.24, 1.74) –.75 (–1.88, .38)
158b–exp2	50	19.4	Y	MO	MAPS	Pain	RFS: High Low	2	Endorsement of prayer as substitute for medicine	.71 (–.28, 1.70) –.75 (–1.88, .38)
158c–exp3	88	18.5	Y	MO	MAPS	Failing exam	RFS: High Low	2	Endorsement of prayer as substitute for medicine	.77 (–.22, 1.76) –.75 (–1.88, .38)
159–exp1	98		Y	Japan	Death survey	Leisure survey	None	1	Fear of success scale	**.21 (.03, .39)**
160–exp1	109	19.7	Y	OH	MAPS	exam	Primed with: Gender Self	1	Gender identification	**.30 (.06, .54)** –.06 (–.33, .21)
161a–exp1	40	18.6	Y		MAPS	DP	Attachment security: High Low	2	Support for Kerry (vs. G.W. Bush)	**.39 (.00, .78)** –.32 (–.77, .13)
161b–exp2	160	22.2	Y		MAPS	DP	Relationship prime: Secure Neutral	1	Support for extreme military force (inverse)	**.30 (.08, .52)** .11 (–.15, .37)
162a–exp1	76	21.0	Y	Holland	MAPS	TV	Male Female	1	Number of children desired	**.42 (.15, .69)** –.13 (–.46, .20)
162b–exp2	76	21.0	Y	Holland	MAPS	DP	Male Female	1	Number of children desired	**.30 (.02, .58)** –.15 (–.47, .17)
162b–DV2							Female Male	1	ANTI (e) Holland	**.33 (.05, .61)** –.10 (–.42, .22)
162c–exp3	127	21.0	Y	Holland	MAPS	DP	Male Female	1	Number of children desired	**.45 (.22, .68)** –.19 (–.42, .04)
162d–exp4	80	21.0	Y	Holland	MAPS	TV	Career-family article: Compatible Non	1	Number of children desired	.25 (–.02, .52) –.24 (–.55, .07)
163a–exp1	79	22.0	Y	Holland	MAPS	TV	None	1	Seat choice	**.39 (.19, .59)**
163b–exp2	88	21.0	Y	Holland	MAPS	TV	None	1	Seat choice	**.28 (.09, .47)**

(continued)

Table 2. (continued)

Study # (see references)	Total *N*	Age *M*	College (Y/N)	Location	MS Group	Control Group	Second IV	Delay	DV	Effect Size, *r* (95% CI)
163c–exp3	60	22.0	Y	Holland	MAPS	TV	None	1	Seat choice	**.35 (.12, .58)**
164–exp1	58	19.6	Y	China	Death word completion	Neutral word completion	None	1	Disapproval of government birth control policy	**.32 (.09, .55)**

Note: Abbreviations are listed in alphabetical order under the relevant column title. Blank cells mean that the information was not available in the original study. Heading abbreviations: CI = confidence interval; DV = dependent variable; IV = independent variable; MS = mortality salience. Study # abbreviations: DV2 = second dependent variable in that same study; exp = experiment. MS group abbreviations: DAS = Death Anxiety Scale (Conte, Weiner, & Plutchik, 1982); DCQ = Death Concept Questionnaire (Smilansy, 1981); FDS = Fear of Death Scale (Boyar, 1964); FPDS = Fear of Personal Death Survey (Florian & Kravetz, 1983); MAPS = Mortality Attitudes Personality Survey (Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989); MAPS-1Q = single question version of the MAPS, which asks participants to write one sentence about what first comes to mind when they think about death (Dechesne et al., 2003); SUB = Subliminal death prime, "dead" or "death" (Arndt, Greenberg, Pyszczynski, & Solomon, 1997). Control Group abbreviations: DP = dental pain; STAI = State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970). Second IV abbreviations: AAS = Adult Attachment Scale (Hazan & Shaver, 1987); AOT = Action vs. State Orientation (Kuhl, 1994); BDI = Beck Depression Inventory (Beck, 1967); BSRI = Bem Sex Role Inventory (Bem, 1974); ECSW = Environmental Contingencies of Self-Worth scale (Brook, 2005); EPI = Eysenck Personality Inventory (Eysenck & Eysenck, 1967); ISE = Implicit Self-Esteem (Nuttin, 1985); HPS = Hypomanic Personality Scale (Eckblad & Chapman, 1986); LOC = Locus of Control (Rotter, 1966); NP = Nullification Proneness (Lieberman & Silver, 2000); PNS = Personal Need for Structure (Thompson, Naccarato, Parker, & Moskowitz, 2001); RFS = Religious Fundamentalism Scale (Altemeyer & Hunsberger, 1992); SIS = Symbolic Immortality Scale (Mathews & Kling, 1988). Delay abbreviations: 0 = none, 1 = single delay task, 2 = two delay tasks, 3 = three delay tasks between MS manipulation and measurement of the dependent variable (for non-subliminal studies only). DV abbreviations: ANTI(a) = rating of antiworldview essay author, where higher numbers represent a more negative evaluation; ANTI(e) = rating of antiworldview essay, where higher numbers represent a more negative evaluation; DCI = Dimensions of Commitment Inventory (Adams & Jones, 1997); HIS = Horizontal Individualism Scale (Singelis, Triandis, Bhawuk, & Gelfand, 1995); (inverse) = a positive effect size means that MS group participants have a lower standing on that measure than control group participants as predicted; MSTS = Multidimensional Social Transgressions Scale (Florian & Mikulincer, 1997); PANAS = Positive and Negative Affective Schedule (Watson, Clark, & Tellegen, 1988); SOQ = Self-Objectification Questionnaire (Noll & Fredrickson, 1998).
Effect sizes in bold are significant at $p < .05$.

For each of the categories above, the combined ES, r_c, was computed by weighting each individual ES according to the inverse of its variance. In this way, each study contributed to the combined estimate according to the precision of its own ES estimates (i.e., studies with larger sample sizes contributed more heavily to the combined ES). For each combined ES, 95% confidence intervals were derived from the variance of r_c (Hedges & Olkin, 1985, p. 113). In accordance with recent developments in meta-analysis (e.g., Kisamore & Brannick, 2008; Schmidt & Hunter, 2003; Schulze, 2007), we employed random effects models for all our analyses because the assumptions underlying the use of such models are better suited to behavioral science and generally produce more conservative results.

What Characteristics Account for Differences in MS ESs Between These Studies? Prior to searching for potential moderators, a homogeneity analysis was performed for the combined ES of all hypothesized MS effects (Categories 1 and 2 above), yielding a Q statistic with an asymptotic chi-square distribution (Hedges & Olkin, 1985, p. 123). A nonsignificant Q indicates that the variance in the distribution of ESs may be attributed to sampling error (Hunter, Schmidt, & Jackson, 1982). Our homogeneity analysis yielded a significant Q, $Q(276) = 612.97$, $p = .00$, revealing that there is consequential variation or heterogeneity across these MS studies meriting further exploration (Hunter et al., 1982). We then generated a list of 10 different variables in MS studies that might, on theoretical grounds, moderate the effects of MS. Summarized in Tables 1a and 1b, these variables were coded by two independent raters for all MS experiments providing sufficient information as follows.

1. Sample size. It is possible that studies with smaller samples need relatively larger ESs for the results to be statistically significant, which may have affected the likelihood of the study getting published. Thus, we included sample size in the analyses to control for the possibility of inflated ESs in smaller sample studies. Sample sizes in these 277 experiments ranged from 17 to 343 participants, with a mean of 87.3 ($SD = 50.8$).

2. Mean age of the participants. Attitudes toward death and the way people defend against death may change with age, so it seems plausible that MS effects may change with age as well. For instance, MS effects have been shown to vary between distinct age groups as a function of differing worldviews and the type of MS manipulation (Maxfield et al., 2007; Taubman-Ben-Ari & Findler, 2005). Recent work has also speculated that perhaps with aging death becomes more salient or more of a potent problem for people; yet, on the other hand, older people may come to accept death more, rendering the idea less threatening (e.g., Maxfield et al., 2007). In these 277 experiments, participant age ranged from 7 to 84, with a mean age of 22.2 ($SD = 4.7$).

3. College versus noncollege participants. Comparing MS ESs from studies that used college students to those that used other samples (e.g., high school or community participants) could indicate how well MS results generalize to populations outside of college settings. The vast majority of these studies (89.7%) employed college students as their participants.

4. Region of the study. To examine whether MS effects varied cross-culturally, we divided regions into three main categories: (a) United States, (b) Europe or Israel, and (c) Asia. There could be many possible reasons for these kinds of variations, from differences in cultural attitudes about mortality to the frequency of exposure to violence and death to differences in worldviews between cultures (e.g., Kashima, Halloran, Yuki, & Kashima, 2004). For instance, the level of patriotism in the United States may be higher than in other countries, thereby increasing MS effects on worldview defense. More than half of the experiments (52.1%) were conducted in the United States, where TMT originated, whereas 36.9% were conducted in Europe or Israel and 4.2% in Asia. (There were also five studies each done in Canada and Australia, one in New Zealand, one in Iran, and one in Costa Rica that were excluded from the specific regional moderator analyses described below because of the small number of studies in each of those regions.)

5. MS manipulation. MS has been manipulated in various ways, which may differ in their impact and in how real or anxiety provoking they render death for people as well as the degree to which they make death conscious. We coded the types of MS manipulations into four categories: (a) standard death essay questions (e.g., Rosenblatt et al., 1989), (b) subliminal death prime (e.g., Arndt, Greenberg, Pyszczynski, & Solomon, 1997), (c) survey questions (e.g., fear of death questionnaire), and (d) other (e.g., video, story, or slide show with death themes).

Most studies (79.8%) used the standard death essay questions—the Mortality Attitudes Personality Survey (Rosenblatt et al., 1989)—consisting of two open-ended short-answer questions that ask participants to write about what will happen to them as they physically die and then to jot down the emotions that the thought of their own death arouses in them. Just 4% of the experiments used a subliminal prime as the MS manipulation (e.g., Arndt, Greenberg, Pyszczynski, & Solomon, 1997), in which participants view nondeath target words on a computer screen in an attempt to determine the relationship between them. During this task, death-related words such as *death* or *dead* flash on the screen for a matter of milliseconds, too briefly for participants to consciously report seeing them.

More than 7% of experiments used specific closed-ended survey questions to manipulate MS, most commonly the Fear of Personal Death Survey (FPDS; Florian & Kravetz, 1983). The FPDS is a self-report scale consisting of three subscales (Intrapersonal, Interpersonal, and Transpersonal) that together tap 31 reasons for fear of death (e.g., "cessation of creative activities," "decomposition of the body") to which participants responded on a 7-point Likert-type scale ranging from 1

(*totally incorrect for me*) to 7 (*totally correct for me*). Other surveys included the Fear of Death Scale (Boyar, 1964), the Death Anxiety Questionnaire (Conte, Weiner, & Plutchik, 1982), and the Death Anxiety Scale (Templer, 1970). MS manipulations designated as "other" (9%) included watching a car crash or holocaust video, reading a story in which the character dies, viewing a slide show with a war narrative, reading an essay about cancer or the 9/11 World Trade Center attacks, and being interviewed in front of a funeral home or cemetery.

6. Control group topic. TMT postulates that death is a unique psychological threat that activates defense of worldviews and self-esteem. Yet it seems plausible that death is more quantitatively different from other threats rather than qualitatively different, that is, that death instigates defensiveness simply because it is more negative than the other topics often used as control groups. Thus, a relevant theoretical distinction between control topics is to divide them into two broad categories: (a) a threatening or negative control topic, such as paralysis, physical pain, dental pain, social exclusion, uncertainty, future worry, or collective death or flashing words such as *pain* in subliminal experiments and (b) a nonnegative (positive or neutral) control topic such as watching TV, food preferences, basic values, listening to music, words such as *field* in subliminal experiments, or no control topic.

Theoretically, this analysis may tell us something about the uniqueness of MS as a threat instigating distal worldview and self-esteem defenses. If threatening control topics (e.g., pain or paralysis) produce smaller MS effects than less threatening topics such as watching TV, this suggests that the uniqueness of death is primarily quantitative rather than qualitative—that is, death is an extreme version of a threatening condition. If, however, the threat level of the control topic makes no significant difference in the magnitude of MS effects, this suggests something qualitatively unique about death and its impact on human life as compared to other negative ideas or thoughts. Overall, the majority of studies (62.1%) used a threatening or negative control topic, whereas 33.6% used a neutral or positive control topic and 4.3% had no control topic.

7. DV. The nature of different DVs, regardless of the particular worldview or type of self-esteem they tap, may elicit stronger or weaker MS responses. We coded the dependent measures into five categories as follows: (a) attitude toward a person, (b) other attitude (e.g., toward an essay only, a country, or a sports team), (c) behavior (e.g., strength, aggression, or seat choice), (d) cognition (e.g., use of a cognitive heuristic), and (e) affect (e.g., anger) in response to a worldview threat (e.g., an unfair event).

Most of the DVs used in these experiments measured an attitude, either toward a person (25.3%) or another type of attitude (47.3%). The most common DV, used in 8.7% of experiments, was the participants' attitude toward the author of an essay that disagreed with their worldview (often by criticizing their country), a paradigm first used by Greenberg, Simon, Pyszczynski, Solomon, and Chatel (1992). Person-related attitudes also included attraction or commitment to one's partner or another target person, support for a particular politician or leader, and social projection (i.e., predicting how many others agree with one's position on an issue). Other general attitudes—that is, attitudes not directly assessing individuals—included hypothetical bond or bail amount set for an alleged prostitute or other criminal (3.6%), desire for children, belief in a supernatural agent, and attitude toward one's country, currency, or sports team. The Multidimensional Social Transgressions Scale (MSTS; Florian & Mikulincer, 1997) was also used as the DV to measure general attitudes in several studies (1.8%). The MSTS includes 20 vignettes, each one built as a brief newspaper report, describing the concrete cause of a particular social transgression and its most damaging consequence to the victim, asking participants to rate the severity of the transgression and deserved punishment for the perpetrator.

More than 10% of experiments used a behavioral DV such as driving speed in a video game simulator, seat choice, donation to charity, allocation of hot sauce to another participant, hand strength, and time spent either washing hands, looking at spider pictures, solving a problem, using a foot massager, socializing, or immersing one's hand in cold water. Almost 14% of studies measured worldview- and self-esteem-related cognitions via their DVs, mainly tapping into the participants' use of cognitive heuristics such as confirmation bias, representativeness, or self-serving attributions. Less than 4% of studies assessed affect in response to worldview-related inductions as the main DV, such as angry or happy mood following fair or unfair treatment.

8. Delay between administration of MS and the dependent measure. Because subliminal MS studies do not use delays, we included only non-subliminal experiments when analyzing delay. Theoretically, when death is still in focal awareness or consciousness, MS does not lead to distal defenses; rather, MS exerts its effects on these defenses after a short delay when death thoughts have exited consciousness yet remain highly accessible (e.g., Arndt, Greenberg, & Cook, 2002; Greenberg et al., 2000). Although delay is theoretically and empirically tied to obtaining MS effects, no study has manipulated delay beyond comparing the presence of a delay to having no delay. According to TMT, we might expect a curvilinear effect, wherein a delay initially increases the size of MS effects by allowing for the receding of death thoughts below consciousness but a prolonged or more complex (i.e., multitask) delay diminishes the effects of MS as death thought accessibility eventually fades. However, the parameters of this process have not yet been empirically examined.

To examine the effect of delay on MS, we divided the delays into four categories based on the number of delay tasks (i.e., questionnaires or puzzles) employed: (a) none, (b) single delay task, (c) two delay tasks, and (d) three delay tasks between MS manipulation and measurement of the DV.

The vast majority of experiments (92.8%) used a delay or distraction task between the MS manipulation and the administration of the DV, which consisted of a single task in 67.7%, two tasks in 22.4%, and three tasks in only 2.7% of experiments (7.2% had no delay). The most common delay task (47.7%) was the Positive and Negative Affective Schedule (PANAS; Watson, Clark, & Tellegen, 1988) or its expanded form (PANAS-X; Watson & Clark, 1992), which asks participants to indicate on 5-point scales their present mood across 10 to 30 positive affect items (e.g., happy, enthusiastic) and 10 to 30 negative affect items (e.g., distressed, upset). Other examples of delay tasks included innocuous filler surveys (18.0%), word search puzzles (9.3%), and other mood checklists (5.1%) such as the Multiple Affect Adjective Checklist (Zuckerman & Lubin, 1965).

9. Participant gender. Gender varied both between studies and within studies. In fact, gender was the most commonly employed within-study moderator by researchers, reported in 5.4% of experiments. As discussed above, MS operates largely outside of conscious awareness. Given the possibility that women may consciously fear death more than men do (e.g., Conte et al., 1982; Davis, Bremer, Anderson, & Tramill, 1983; Russac, Gatliff, Reece, & Spottswood, 2007), this might inversely predict distal death defenses such that men may react more strongly following MS (e.g., Greenberg, Pyszczynski, Solomon, Simon, & Breus, 1994). On average, each experiment had 34.4 males (39.4%; *SD* = 32.0) and 52.9 females (60.6%; *SD* = 34.7).

10. Participant self-esteem. We wanted to closely examine the second most commonly used within-study moderator variable (2.5% of experiments) because of its centrality to TMT. A theoretical case has been made for both sides of the self-esteem variable. To the extent that self-esteem is an anxiety buffer, high self-esteem should reduce or eliminate the need for worldview defense after MS (Pyszczynski et al., 2003); this is a component of the basic terror management formulation. Yet MS could also have a greater effect on high self-esteem participants, who would feel jolted out of their usual sense of equanimity, thus eliciting greater defense of their worldview by rejecting those who threaten it (Solomon, Greenberg, & Pyszczynski, 1991). High self-esteem may also enable these participants to invest in their culture in a higher stakes manner, such as by engaging in risky behaviors of which participants low in self-esteem would not feel capable. Thus, we expected that the moderating effects of self-esteem on MS would be mixed depending on the particular DV used in a given experiment.

Statistical Analyses for Potential Moderators. We analyzed the potential between-study moderators of all the hypothesized MS effects in two different though conceptually similar ways. First, all nine potential between-study moderator variables—sample size, age, college, region, MS type, control group, DV, delay, and gender—were analyzed via weighted multiple regression, the most powerful way to minimize the problem of multicollinearity (i.e., significant intercorrelations among the variables). An exploratory approach using forward selection followed by backward elimination was implemented using a random effects SPSS macro (Lipsey & Wilson, 2001), yielding a final predictive model for the moderators of MS effects. Second, in meta-analysis, the analogous test to the one-way ANOVA is the Q statistic that is generated using a random effects SPSS macro for categorically grouped data (Lipsey & Wilson, 2001, pp. 138, 216). This analysis can only be done for categorical variables (six out of the nine potential between-study moderators) and provides easily interpretable results, as a significant Q_B indicates that there is a significant difference between at least two of the mean ESs in the group comparison. Finally, we analyzed the potential within-study moderator variables—gender and self-esteem—by comparing combined ESs for MS across the two different levels of each of these variables (i.e., male vs. female and high vs. low self-esteem, respectively) as well as by examining those studies qualitatively.

Results and Discussion

What Is the Mean ES for MS Manipulations?

A principal goal of this review was to compute the overall ES for MS manipulations. Individual ESs for MS in these articles are shown in Table 2. In this review, ES (*r*) *is the magnitude of the correlation between the IV (MS) and the DV*. The coefficient of determination, r^2, indicates the percentage of variance of the DV that can be explained by the MS manipulation. Of the 277 hypothesized ESs (both direct and domain-relevant moderator ESs) in these 164 journal articles, 221 (80%) were both positive and statistically significant (nonzero) in favor of the MS hypothesis of TMT. ESs ranged from −.48 to .99 with a standard deviation of .19. The overall ES for all the hypothesized MS manipulations was $r(276) = .35$, $p = .00$.

Subdividing this overall effect into meaningful categories yielded the following: For direct MS effects only, where MS was the only IV and there were no moderators included in the experiment, the ES was $r(110) = .34$, $p = .00$. For domain-relevant moderators—variable levels hypothesized by researchers to produce MS effects in that particular experiment (e.g., high driving-contingent self-esteem)—the MS ES was $r(165) = .35$, $p = .00$. This identical ES for direct and moderated (domain-relevant) MS effects is in line with our reasoning and TMT. In other words, moderators were chosen in these studies to make the DV worldview relevant for participants, and studies without moderators were designed so that the dependent measures were already worldview relevant for that entire sample of participants (e.g., pro- and anti-America essay author ratings for American participants). Thus, conceptually, we expected both direct and domain-relevant or moderated MS effects to be similar as delineated above.

For predicted null moderators, where variable levels were not expected to yield nonzero effects for MS in that experiment, the mean ES was small but significantly negative at $r(163) = -.10$, $p = .00$. One possibility for this inverse effect was that the authors of some studies in the "predicted null" group had actually hypothesized reverse effects for MS; for instance, at variable levels that included people low in religious fundamentalism or when the presented target was part of the out-group (vs. the in-group), the authors predicted that participants would show significant death defenses but in the opposite direction (e.g., less support for prayer instead of medicine and less acceptance of the out-group target). We therefore reanalyzed these moderators as two distinct groups: (a) predicted null moderators, as above, and (b) predicted inverse moderators, variable levels that were expected to reverse MS effects (i.e., equal in magnitude but in the opposite or negative direction). The predicted inverse moderators did indeed have a significantly larger (more negative) ES for MS, $r(42) = -.20$, $p = .00$, than the remaining predicted null moderators, $r(120) = -.07$, $p = .00$, although this latter group still yielded a significantly negative ES for MS that defies simple explanation.

The mean hypothesized MS effect in this review is sizeable compared to three different benchmarks. First, J. Cohen's (1992) well-accepted criteria characterize a trivial ES as $r < .10$, a small ES as $r = .10$, a medium effect as $r = .24$, and a large effect as $r \geq .37$. Second, Lipsey and Wilson (1993) generated the distribution of mean ESs from more than 300 meta-analyses of psychological, behavioral, and educational interventions, reporting the mean and median ESs (converted to *r*s) to be around .24 ($SD = .14$) and the top quartile of ESs to be greater than .33. Third, Richard, Bond, and Stokes-Zoota (2003) compiled results from a century of social psychological research—more than 25,000 studies of 8 million people—and found that the mean ES was $r = .21$ ($SD = .15$). Thus, the mean ES for MS manipulations ($r = .35$, $d = .75$) approaches a large effect (J. Cohen, 1992), reaching the top quartile of effects for psychology in general and the 80th percentile (almost a full standard deviation above the mean) for theories in social psychology more specifically.

Yet another way to interpret the MS ES is to investigate the possibility of publication bias, the tendency for the availability of research to depend on the results (Vevea & Woods, 2005). We conducted two analyses commonly used to assess for the presence of publication bias: the classic fail-safe *N* and funnel plot analyses (Lipsey & Wilson, 2001). The fail-safe *N* is the number of unpublished or future studies averaging null results that would be necessary to reduce our overall ES for MS to a nonsignificant value (see Orwin, 1983; Rosenthal, 1991, p. 104), which is 4,239 for our review. This large number—more than 15 times the number of studies included herein and well exceeding the 1,395 (i.e., 5K + 10) recommended critical value (Hsu, 2002)—bolsters our confidence that our conclusions are not tainted by publication bias.

Next, we ran a funnel plot of inverse variance (a measure of study sample size) by MS ES (*r*), which also does not suggest publication bias as the distribution appears symmetric (see Figure 1). Furthermore, if the true ES is zero, the middle of the funnel would be hollow, which is clearly not the case. If the true ES differs from zero, however, then publication bias may be detected instead by a "bite" out of the lower left side of the funnel plot (Wang & Bushman, 1998), which is absent here. It is noteworthy that all of the negative and zero ESs for MS were obtained in studies with small to medium samples rather than large ones, which further boosts our confidence in a true positive effect for MS because smaller studies (i.e., studies with higher variances and lower inverse variances) are more likely than larger studies to err in their ES estimation.

What Characteristics Account for Differences in MS ESs Between These Studies?

Multiple Regression Approach. Using an exploratory approach, a multiple regression was performed for all hypothesized MS effects in the 277 experiments. Table 3 presents the final regression model for the moderator analysis. Three moderator variables—college sample ($\beta = .19$, $p = .00$), DV ($\beta = -.21$, $p = .00$), and delay ($\beta = .16$, $p = .01$)—accounted for 11% of the variance in MS ESs. Region showed a nonsignificant trend toward moderating the MS effect ($\beta = -.12$, $p = .10$), whereas the other five potential moderators—sample size, participant age, participant gender, MS manipulation, and control group—did not significantly predict MS ESs (all *p*s > .14). We examine and discuss these effects in the ANOVA analog approach presented next.

ANOVA Analog Approach. We meta-analytically examined potentially moderating characteristics of the 277 hypothesized MS effects in what is analogous to ANOVA. We included the six potential moderators that were categorical variables (which included the four variables that emerged as significant or near-significant predictors in the above regression analysis): college sample, region, MS manipulation, control group, DV, and delay. Table 4 shows the *combined ESs* (with 95% confidence intervals) of MS effects across these specific study characteristics, which are also shown graphically in Figure 2.

College versus noncollege sample. MS effects were significantly larger for college students, $r(235) = .36$, $p = .00$, than non–college students, $r(25) = .25$, $p = .00$; $Q_B(1, 261) = 8.95$, $p = .00$. However, neither gender nor age significantly moderated MS effects (*p*s = .54 and .14, respectively) in the weighted multiple regression analysis reported above, and the college samples had a similar female to male ratio ($M = 5.8$, $SD = 17.0$) and average age ($M = 21.5$, $SD = 1.9$) as the noncollege samples (female to male ratio: $M = 5.4$, $SD = 20.2$; age: $M = 24.5$, $SD = 10.6$) in these experiments. Thus, the particularly strong effect of MS on college students does

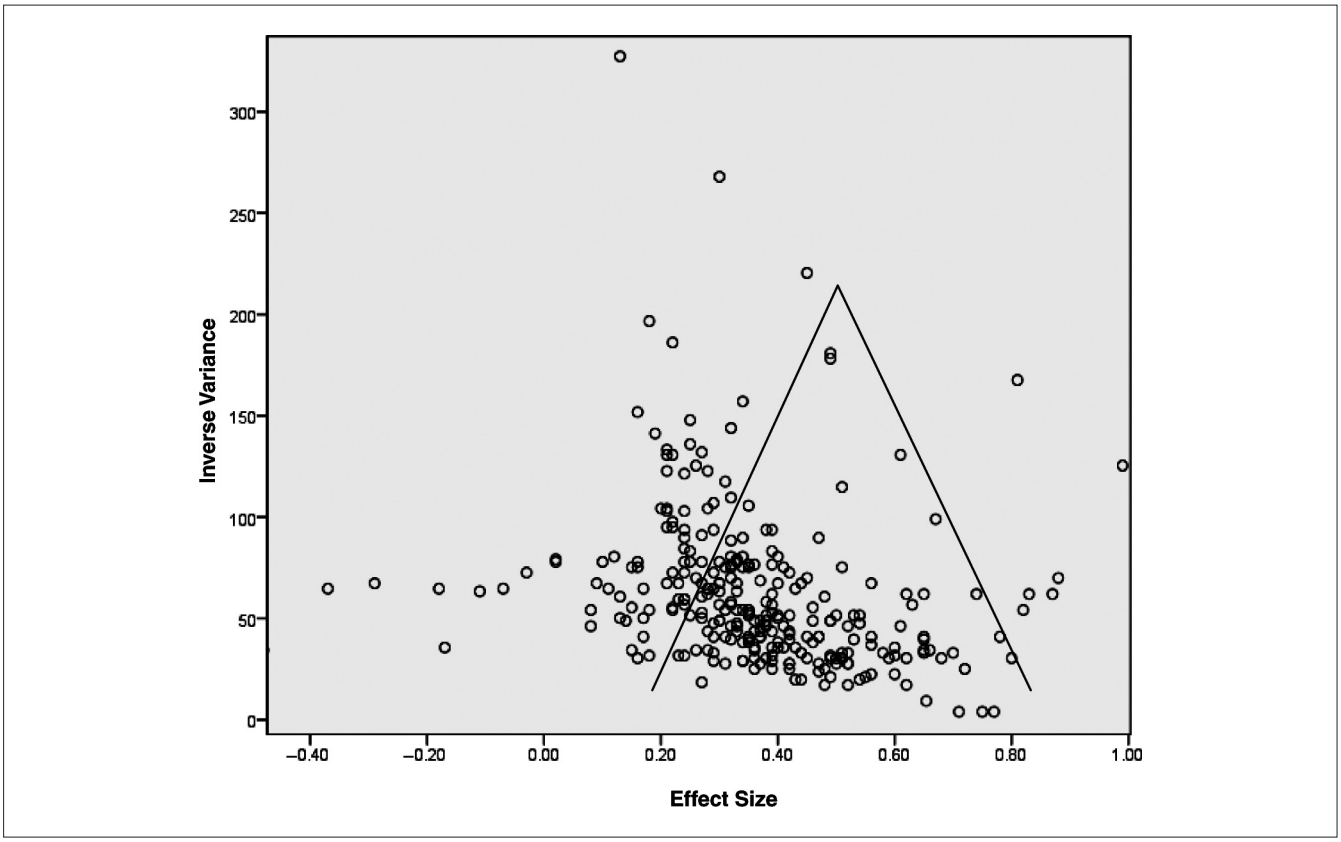

Figure 1. Funnel plot of inverse variance (sample size) by mortality salience effect sizes (*r*)

Table 3. Final Regression Model for Moderators of the Effect Size of Mortality Salience (MS)

Variable	*B*	*SE B*	β
College[a]	.11	.04	**.19**
Dependent variable[b]	−.03	.01	**−.21**
Delay[c]	.05	.02	**.16**

Note: $k = 252$. $R^2 = .11$.
a. College: 0 = *no*, 1 = *yes, based on whether the participants were college students*.
b. Dependent variable: 1 = *attitude toward a person*, 2 = *other attitude*, 3 = *behavior*, 4 = *cognition*, 5 = *affect*.
c. Delay: 0 = *none*, 1 = *single delay task*, 2 = *two delay tasks*, 3 = *three delay tasks between MS manipulation and measurement of the dependent variable* (for non-subliminal studies only).
Beta weights in bold are significant at $p < .05$.

not appear to be a mere gender or age effect; rather, it may reflect something special about college as a time of difficult life choices and the introduction of competing worldviews. In other words, if one's worldviews are not yet crystallized, they may be more amenable to modification in TMT experiments. Another possibility is that, because specific colleges tend to attract certain types of people (e.g., some colleges attract more liberal students), participant samples in colleges may be more homogeneous in terms of the range of worldviews represented compared to the population at large; this could result in higher domain relevance for the particular worldview assessed following MS manipulations and thus higher ESs. Note that this difference in MS effects between college and noncollege samples is consistent with a large-scale second-order meta-analysis ($N > 650{,}000$, $K > 7{,}000$) of studies that included either college student samples or nonstudent adult samples, which revealed that the two groups differed either directionally or in magnitude for approximately *half* of the phenomena studied (e.g., attitudes, gender perceptions, social desirability; Peterson, 2001).

Note that although age did not significantly moderate MS effects in the weighted multiple regression analysis above, the restricted age range in these studies (68% of participants were 17–27) limits any firm conclusions, and only two studies directly compared age effects. At least under some circumstances, older adults appear to respond to the problem of death quite differently than younger adults: unlike younger (17–37) participants, older adults (61–84) did not judge moral transgressions more harshly after MS (Maxfield et al., 2007), and middle-aged adults (51–65) actually decreased (whereas younger participants increased) their stated intentions to engage in health-promoting behaviors following MS (Taubman-Ben-Ari & Findler, 2005).

Table 4. Combined Effect Sizes of Mortality Salience (MS) Manipulations by Potential Moderators

Grouping	*k*	Combined Effect Size, *r* (with 95% Confidence Interval) of MS
All hypothesized effect sizes	277	**.35 (.32, .37)**
Direct effects	111	**.34 (.31, .38)**
Domain-relevant effects	166	**.35 (.32, .38)**
Predicted null effects	164	**–.10 (–.13, –.06)**
Effects on:		
College students	236	**.36 (.33, .38)**
Non-college students	27	**.25 (.18, .32)**
Effects by region:		
Unites States	123	**.37 (.34, .41)**
Europe or Israel	87	**.30 (.27, .34)**
Asia	10	**.26 (.15, .37)**
Effects on DVs:		
Attitudes toward people	70	**.42 (.37, .46)**
Other attitudes	131	**.33 (.30, .36)**
Behaviors	28	**.34 (.27, .42)**
Cognition	38	**.32 (.26, .38)**
Affect	10	**.21 (.10, .32)**
Effects with:		
No delay between MS and DV	19	**.30 (.21, .38)**
Single delay task	178	**.33 (.30, .36)**
Two delay tasks	59	**.41 (.36, .46)**
Three delay tasks	7	**.47 (.33, .62)**

Note: MS = mortality salience manipulation; DV = administration of the dependent measure.
Effect sizes in bold are significant at $p < .05$.

Study region. MS manipulations affected Americans, $r(122) = .37$, $p = .00$, significantly more than Europeans or Israelis, $r(86) = .31$, $p = .00$, or Asians, $r(9) = .26$, $p = .00$; $Q_B(2, 217) = 8.67$, $p = .01$. This finding is perhaps not surprising in light of a recent broad-scale psychology review, which concluded that there are virtually no research programs that have demonstrated that American psychological and behavioral patterns are similar to those of other Westerners (Henrich, Heine, & Norenzayan, 2009). One possible explanation is that the idea of death may be more integrated into European, Israeli, and Asian cultures than American culture (Parkes, Laungani, & Young, 1997), rendering non-American participants more conscious of their own mortality on a daily basis so that they do not show the distal defenses to the same degree as Americans who face death less openly. This regional difference finding suggests that cultural factors may significantly alter how people's insecurities about death manifest themselves, indicating the methodological importance of researchers taking cultural climate into account when constructing their dependent measures.

MS manipulation. MS type did not significantly moderate MS effects when we compared the standard death essays (the Mortality Attitudes Personality Survey; Rosenblatt et al., 1989), $r(220) = .36$, $p = .00$, to the other MS manipulations—subliminal death primes, $r(10) = .35$, $p = .00$, death surveys, $r(19) = .30$, $p = .00$, or other inductions such as watching videos or slide shows or passing a funeral home or cemetery, $r(24) = .29$, $p = .00$; overall $Q_B(3, 273) = 4.50$, $p = .21$. The fact that the difference between standard and less typical MS manipulations failed to reach statistical significance illustrates that vastly different death primes are equally capable of producing these distal symbolic defenses. This also suggests that some real-world death primes (e.g., passing a funeral home or cemetery or watching a death-related film) are likely to elicit effects similar in magnitude to the more contrived (i.e., write an essay) "lab" MS effects.

Control group. The type of control topic made no significant difference in MS ESs, as threatening or negative control topics, $r(171) = .36$, $p = .00$, yielded similar effects following MS compared to neutral control topics, $r(104) = .33$, $p = .00$; $Q_B(1, 275) = 0.93$, $p = .33$. This finding, with a nonsignificant pattern for MS to produce *larger* effects when compared to negative versus nonthreatening control topics, suggests that death primes produce similar effects whether the comparison condition is aversive or anxiety provoking or not. Thus, this piece of evidence suggests that death does not elicit its effects merely because it is more negative than other threats to self (e.g., dental pain, failing an exam, social exclusion) but rather because there is something qualitatively different about the threat of death.

Our moderator analyses may also shed light on the main critiques of TMT. The primary alternatives to the terror management account of MS effects have each postulated that threats to self other than MS—ranging from uncertainty and loss of control to social isolation and loss of meaning—could better explain the findings reported herein, that is, that death is not the essential or necessary component driving MS effects. For instance, Martin (1999) argued that a better fit for MS effects emerges from I-D compensation theory, which sees concern with death and self-defense as growing out of a failure to maintain a dynamic relationship with the environment. One of the main predictions of I-D theory is that uncertainty and lack of control should produce effects similar to MS. Furthermore, I. McGregor, Zanna, Holmes, and Spencer (2001) and van den Bos et al. (van den Bos & Miedema, 2000; van den Bos, Poortvliet, Maas, Miedema, & van den Ham, 2005) have argued that self-integrity threats that are related to personal uncertainty can motivate compensatory conviction responses that look similar to death defenses. Yet another alternative explanation for MS effects is the meaning maintenance model (MMM; Heine, Proulx, & Vohs, 2006), which proposes that human beings innately and automatically assemble mental representations of expected relations in the world (i.e., meaning). According to MMM, anything that challenges one's sense of meaning should lead to efforts to construct or affirm different frameworks of meaning (i.e., what TMT terms distal death defenses), including a range of threats that are independent of

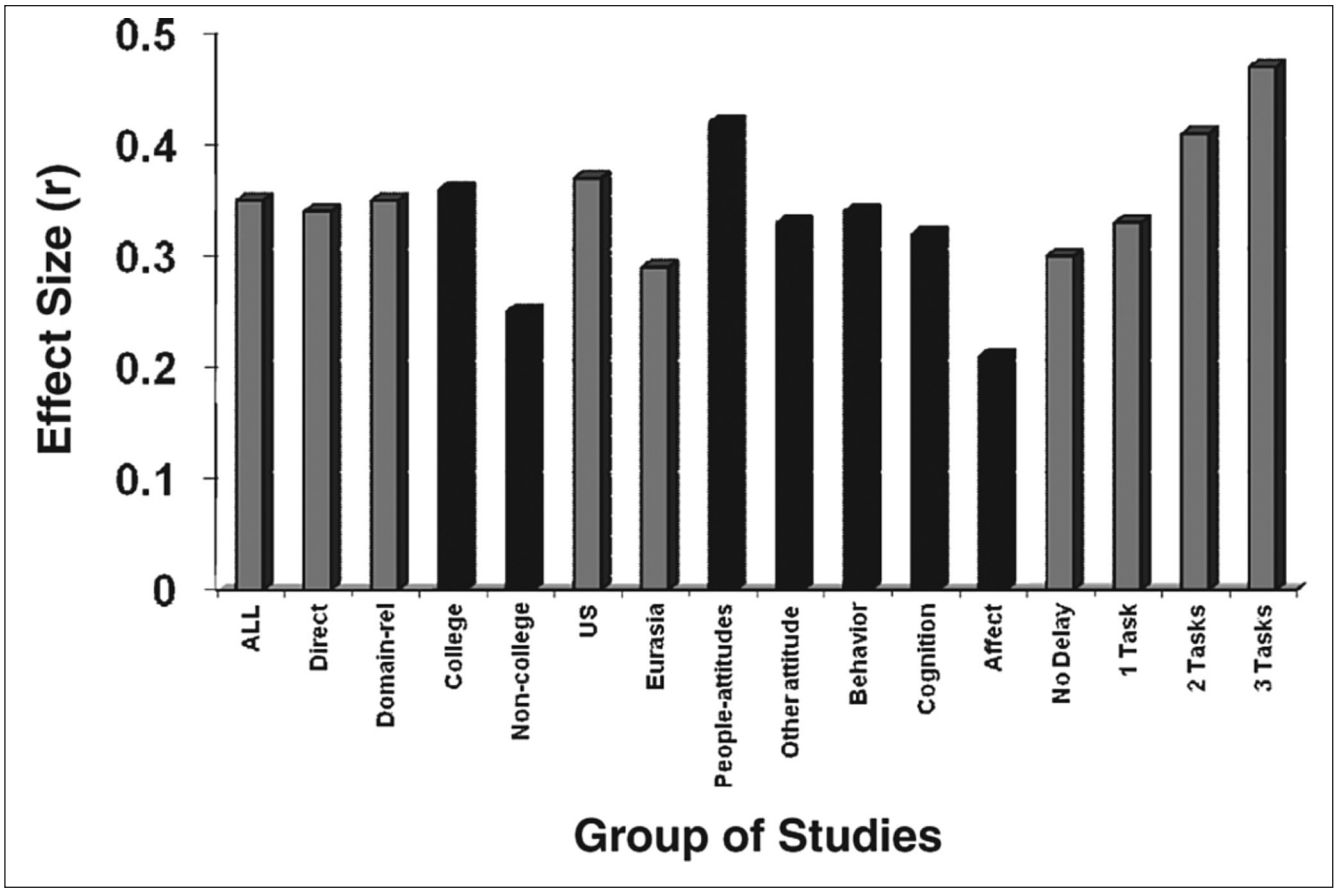

Figure 2. Combined effect sizes (*r*) of mortality salience manipulations by potential moderators
Note: Direct = effect sizes of mortality salience (MS) for experiments with no moderator variables; domain-rel(evant) = effect sizes of MS on variable levels hypothesized by researchers to produce MS effects; participant variables included college students versus non–college students and participants from the United States vs. Europe or Asia; effects on attitudes toward people, other attitudes, behavior, cognition, and affect were divided by the nature of the dependent variable; effects with no delay, one task, two tasks, and three tasks were divided based on the number of delay tasks between MS manipulation and administration of the dependent measure.

death—such as feelings of uncertainty, self-esteem threats, social rejection or alienation, and feelings of meaninglessness (Proulx & Heine, 2006, 2008).

We wanted to further examine these alternative accounts for MS effects (Martin, 1999; I. McGregor et al., 2001; Proulx & Heine, 2006; van den Bos et al., 2005) in a subsequent analysis. Though we cannot definitively settle this question here, we reasoned that if uncertainty shares some of the threatening qualities of MS with respect to distal defenses, then these control topics should at least lead to smaller MS effects than other control topics. We thus recoded control group topics into four new groups: (a) meaning threats, such as essay questions on feelings of personal alienation, a rigged questionnaire suggesting that one's life is pointless (Heine, Proulx, MacKay, & Charles, 2008), evaluating surrealist art (Proulx, Heine, & Vohs, 2009), or having the experimenter changed without noticing (Proulx & Heine, 2008); (b) uncertainty, such as essay questions on uncertainty or future worry or the "worries about the future" questionnaire; (c) social exclusion, via essay questions on what it feels like to be excluded from a group; and (d) other topics, including dental pain, watching TV, and no control group.

MS produced significantly less worldview defense with meaning threats as the comparison, $r(6) = .11$, $p = .10$, than with uncertainty or future worry, $r(14) = .32$, $p = .00$, social exclusion, $r(5) = .34$, $p = .00$, or any other comparison or control topics such as dental pain, watching TV, or no control topic, $r(248) = .36$, $p = .00$; overall $Q_B(3, 273) = 12.04$, $p = .01$. Note that the meaning threats used in these studies were designed to have participants *experience* uncertainty (e.g., by changing the experimenter), whereas the studies that directly asked participants about uncertainty merely caused them to recall how their bodies felt or the kinds of thoughts they had when they were uncertain (S. Heine, personal communication, April 11, 2009), which on average did not produce effects significantly different from other control topics. The finding that MS failed to produce significant effects over and above meaning threats bolsters the proposal that these manipulations may involve a similar mechanism. What cannot be answered in this review is whether people

seek meaning in their lives because they are disturbed about thoughts of their ultimate demise (e.g., Greenberg et al., 1997) or whether thoughts of death exert their effects by threatening people's sense of meaning (Heine et al., 2008).

Moreover, given the small number of specific meaning-threat studies, the impactful way that the meaninglessness primes were induced (compared to more subtle MS inductions), and a trend ($p = .10$) for MS to affect distal defenses significantly more than meaninglessness, there are indications that death has a unique effect on subsequent defenses. Furthermore, the fact that MS yielded similar effects when compared to uncertainty, future worry, and social isolation as when compared to dental pain and watching TV also bolsters the notion that there are elements of the relationship between the awareness of mortality and worldview defense that are independent of uncertainty and specific to death-related thought (Greenberg et al., 1997).

DV. MS affected attitudes toward people, $r(69) = .42$, $p = .00$, significantly more than other attitudes, $r(130) = .33$, $p = .00$, or affect, $r(9) = .21$, $p = .00$; $Q_B(4, 272) = 16.60$, $p = .00$, though not significantly more than behaviors, $r(27) = .34$, $p = .00$, or cognition, $r(37) = .32$, $p = .00$. Insofar as consensual agreement is particularly important for maintaining faith in one's worldviews, as TMT posits, then it follows that MS may trigger particularly potent responses to people who directly threaten or bolster one's worldview. In other words, worldview threats may emerge most powerfully from people—such as from an out-group member, a political candidate, or a romantic partner—and worldview defenses may follow most strongly in attitudes directly aimed at those people.

Delay. For experiments that measured distal death defenses non-subliminally (no subliminal MS manipulations have utilized a delay), there was a difference in MS ESs based on the delay between the MS induction and the dependent measure. Experiments with three-task delays (e.g., mood scale plus word search puzzle plus filler questionnaire) or two-task delays produced significantly larger effects, $r(6) = .47$ and $r(58) = .41$, respectively, ps $= .00$, than those with a single delay task, $r(177) = .33$, $p = .00$, or no delay, $r(18) = .30$, $p = .00$; overall $Q_B(3, 259) = 11.10$, $p = .01$. We also analyzed the delay effects by estimating length of time instead of number of tasks; similarly, experiments with longer delays (7–20 min), $r(54) = .41$, $p = .00$, yielded significantly larger effects than experiments with shorter (2–6 min), $r(188) = .33$, $p = .00$, or no delays, $r(18) = .30$, $p = .00$; overall $Q_B(2, 260) = 8.54$, $p = .01$. Finally, we analyzed the delay effects for experiments using the Mortality Attitudes Personality Survey (Rosenblatt et al., 1989) only, and, once again, experiments with three- or two-task delays, $r(6) = .47$ and $r(53) = .41$, respectively, ps $= .00$, yielded significantly larger ESs following MS than did experiments with a single delay task, $r(147) = .34$, $p = .00$, or no delay, $r(10) = .31$, $p = .00$; overall $Q_B(3, 216) = 7.80$, $p = .04$. These three analyses all converge to support the same conclusion about the time course of MS effects and reinforce the notion that these are unconscious effects that occur most strongly when death-related thoughts are outside of consciousness but accessible. Furthermore, these findings raise questions about how long MS effects actually last and suggest that they might linger for more time than previously expected.

Potential Within-Study Moderators. Participant gender. Gender did not significantly moderate MS effects between studies in our weighted multiple regression describe above ($p = .54$), and MS effects were not significantly different for males, $r(24) = .27$, $p = .00$, than for females, $r(31) = .21$, $p = .00$, in experiments that employed gender as a moderator or that used participants of only one gender. Although the overall magnitude of death defenses is not moderated by gender, the fact that gender moderated MS effects within several studies suggests that males and females may defend themselves against death differently depending on the situation (i.e., DV).

Only males increased their nationalistic word accessibility and only females increased their relationship word accessibility (Arndt, Greenberg, & Cook, 2002), only males found sexy women or other seductive opposite-sex targets less attractive (Landau, Goldenberg, et al., 2006), and males found risk more appealing whereas females found risk less appealing following MS manipulations (Hirschberger, Florian, Mikulincer, Goldenberg, & Pyszczynski, 2002). However, gender did not significantly moderate the endorsement of a gender-typical jealousy pattern (Goldenberg et al., 2003), compassion for disabled people (Hirschberger, Florian, & Mikulincer, 2005), preference for the same-sex gubernatorial candidate (Hoyt, Simon, & Reid, 2009), or interpersonal competence (Taubman-Ben-Ari, Findler, & Mikulincer, 2002) following MS.

Gender yielded mixed results on increased desire for offspring depending on the country, such that only German females (Fritsche et al., 2007) and Dutch males (Wisman & Goldenberg, 2005) showed significantly increased procreation strivings following MS. The fact that desire for children increased at all after MS is theoretically consistent with TMT: Apart from providing a direct form of literal immortality, having offspring can contribute to a sense of symbolic immortality and bolster the individual's cultural worldview (see Florian & Mikulincer, 1998b; Greenberg et al., 1997). The gender difference reversal in the two articles cited above may have emerged for two reasons—one methodological and one cultural. First, participants were asked different questions: whether they wished to have any children at all (Fritsche et al., 2007) versus how many children they wanted to have (i.e., their desire to have more or less children; Wisman & Goldenberg, 2005). Second, because of cultural differences, the German sample likely had stronger preexisting pro-offspring worldviews for women than did the Dutch sample (Fritsche et al., 2007). Accordingly, Dutch female participants did indeed show increased desire for offspring

following MS if they were led to believe that this desire was compatible with career strivings, another meaningful aspect of their worldview (Wisman & Goldenberg, 2005). This again highlights the importance of researchers taking cultural variables into account when conducting TMT experiments.

Participant self-esteem. Self-esteem, the second most commonly employed within-study moderator, presented a mixed picture, as we expected. Examining explicit self-esteem measures, the mean MS ES was significantly positive for high self-esteem groups overall, $r(5) = .22$, $p = .00$, whereas it was not significant, $r(5) = .02$, $p = .74$, for low (and one moderate) self-esteem groups (all measured by Rosenberg, 1965). Following MS, high self-esteem significantly increased participants' negative evaluation of an out-group target person (Baldwin & Wesley, 1996), physical attractiveness requirements of potential mates (Hirschberger, Florian, & Mikulincer, 2002), risky decision making (Landau & Greenberg, 2006), and the desire to join the military (Taubman-Ben-Ari & Findler, 2006), but it decreased the negative rating of an anti-American essay author (Harmon-Jones et al., 1997) and had no significant effect on risky driving behaviors (G. Miller & Taubman-Ben-Ari, 2004). This picture casts doubt on the original interpretation of Harmon-Jones et al. (1997), who argued that self-esteem reduces symbolic or distal defenses to concerns about death.

However, we can also look at self-esteem in a more detailed manner by examining the various ways in which the construct has been measured. The research above—in which high self-esteem enhanced MS effects—measured self-esteem exclusively via explicit self-report measures (Rosenberg, 1965). But in other research, self-related manipulations that likely temporarily raise self-esteem have diminished MS effects on subsequent dependent measures of distal defense. These self-esteem-boosting manipulations have included affirming one's religion (Jonas & Fischer, 2006), making a worldview-relevant decision (Jonas, Greenberg, & Frey, 2003), being creative (via shirt design in Routledge, Arndt, & Sheldon, 2004), engaging in culturally valued behavior (via a charitable donation in Halloran & Brown, 2007), or receiving positive personality feedback (Arndt & Greenberg, 1999; Harmon-Jones et al., 1997).

In addition, recent work has shown an effect of implicit self-esteem on MS effects that parallels these self-esteem-related manipulations (Schmeichel et al., 2009). In this work, higher implicit self-esteem consistently predicted diminished MS effects. Moreover, one study found increased defensiveness in response to MS among participants with the combination of high explicit and low implicit self-esteem (Schmeichel et al., 2009), which is also consistent with the tendency for self-reported or explicit self-esteem to enhance MS effects as discussed above. In sum, self-reported self-esteem appears to increase the defensive response to MS, whereas self-esteem measured in more subtle ways—via manipulations and implicit measures—appears to diminish the response to MS.

One explanation for these differing self-esteem findings is that self-reported versus other methods for assessing self-esteem may measure different facets of the construct, and explicit or self-reported self-esteem may not buffer the effects of mortality as TMT has posited. It may be the case, for example, that high self-reported self-esteem increases MS effects by enabling people to engage in riskier defensive behaviors such as seeking a highly attractive mate or joining the military (Landau & Greenberg, 2006). However, there is also mounting evidence that self-reported self-esteem can be confounded with narcissism and insecurity, and so it does not always assess true self-esteem (Swann, Chang-Schneider, & McClarty, 2007). For example, in one study, statistically controlling for narcissism eliminated the relationship between self-reported self-esteem and antisocial behavior that otherwise occurred (Paulhus, Robins, Trzesniewski, & Tracey, 2004). In two further studies, accounting for narcissistic tendencies reduced the mismatch between self-reported self-esteem and implicitly measured self-esteem (Olson, Fazio, & Hermann, 2007). Thus, from this perspective, subtler forms of self-esteem measurement may provide truer estimates of this construct, and these measurements of self-esteem tend to show that higher self-esteem diminishes MS effects, as TMT predicts.

General Discussion

The current article is the first to our knowledge to undertake a broad quantitative approach to evaluating MS research on TMT using meta-analysis. We had four goals in this review: (a) to describe the basic or prototypical characteristics of MS experiments, (b) to calculate the combined effects of MS inductions, (c) to identify moderators of MS effects, and (d) to guide future research in TMT.

Prototypical MS Experiment. There were 164 empirical studies with 277 experiments of MS effects included in this review. The prototypical experiment involved 87 participants (53 females, 34 males) who were American college students with an average age of 22 years. After one or two filler questionnaires, a task such as the Mortality Attitudes Personality Survey (Rosenblatt et al., 1989) manipulated MS by asking participants in the experimental group to answer two short essay questions about death, whereas the control group wrote instead about dental pain. A second IV such as gender or score on another measure was used to examine potential within-study moderators of MS effects. After a delay (typically a single task lasting 2–6 min) during which participants completed another filler measure such as PANAS (Watson et al., 1988) or solved a puzzle, the main DV measured participants' attitudes toward an essay or author who disagreed with their worldview.

MS ES. The ES for MS manipulations in our review was robust. The magnitude of the effect was $r = .35$, which attained the top quartile of effects for psychology in general and the 80th percentile for theories in personality and social psychology. Furthermore, we did not find evidence of publication

bias, with a high fail-safe *N*, a symmetrical funnel plot, and no moderation of MS effects by sample size.

Between-Study Moderator Analyses.

Delay. Several between-study moderator findings of particular note emerged. First, we found that the length of the delay between the MS induction and the DV mattered such that longer delays produced larger MS ESs. This underscores the unconscious and insidious nature of death concerns on defensiveness, as the MS effects were stronger when death had even more time to recede from consciousness. In addition, it raises questions about how long MS effects last, which may be longer than previously hypothesized. Future research could productively examine this question and perhaps attach specific durations to the cognitive processes involved in the response to MS. By directly comparing several different lengths or types of delay between MS and the dependent measure—rather than just some versus no delay—studies can answer questions regarding whether even longer delays (e.g., a delay of greater than 15 min or more than three different delay tasks) would increase MS effects even further. Likewise, it would be valuable to determine how long behavioral or attitudinal changes last—that is, whether they persist for minutes or hours or even days following MS primes.

Control condition. Second, we examined the different control conditions used in these experiments. If MS had produced larger effects for neutral control conditions (e.g., watching TV) than for negative ones (e.g., pain or paralysis), this would have bolstered the argument that death is merely quantitatively different from other threats. However, in general we found no evidence that MS effects depended on whether the control condition was neutral or more threatening. Thus, the available evidence supports the notion that death is in essence a qualitatively unique threat—that is, different not just by degree but also by dimension.

However, there were signs that impactful meaning threats produced effects more similar to MS than other control topics. Further research can continue to unpack exactly what it is about death that is producing the MS effects reported in this review as well as what characteristics other threats share and do not share with death. Irvin Yalom (2008), a psychiatrist, recommended dissecting the fear of death clinically into its fundamental components, such as missing out on life, unfinished tasks, stories without closure, the end of personal consciousness and the concomitant unknown void beyond, and how loved ones would fare without you. Other recent work has been examining aspects of the threat of death such as lack of control over death (Fritsche, Jonas, & Fankhanel, 2008) and dying alone versus with others (Kashima et al., 2004). In this vein, future research can continue to empirically delineate the basic elements of death anxiety that are responsible for MS effects.

DV. Third, MS affected attitudes toward people more than other attitudes or affect. This may be because, given theorizing that faith in one's worldview is bolstered particularly well by consensual validation, people evoke worldview threats and support most strongly and directly. However, the social nature of our worldviews—the reliance on each other for faith in our belief systems—has not been a topic directly examined in the TMT literature. Our results suggest that such empirical investigation could be productive. These results may also have implications for situations in which people have some choice in the avenues they can pursue to symbolically defend against death. Although the experiments reviewed herein give participants only one or two choices for worldview defense and self-esteem boosting, in the real world there are many such options, ranging from suppressing dissent and intensifying prejudice, materialism, or patriotism to increasing charitable donations and other altruistic behaviors (Pyszczynski et al., 2003). Future research could help predict which specific worldview defense someone will choose when multiple options exist at once. For instance, behaviors may be more powerful social statements as they are harder to undo than changing of attitudes (e.g., Joule & Azdia, 2003). In a situation where participants are given both options—for instance, a behavior such as donating to charity and an attitude such as being patriotic—to bolster their worldview, researchers could examine whether people choose avenues that are more or less permanent or revocable.

Further Implications.

How can the effects of MS be attenuated or reversed? Predicted null effects were indeed close to zero ($r = -.07$), but the significant (albeit small) negative ES for MS—along with the subgroup of predicted inverse effects ($r = -.20$)—leads to a question of whether these effects can not only be attenuated but also even reversed. In this regard, TMT research can expand the ongoing examination of "state" or priming variables that reduce MS effects and thereby bolster the prosocial implications of the theory. We already know that "trait" or preexisting variables such as liberalism or tolerance (Greenberg et al., 1992), a confident belief in symbolic immortality (Florian & Mikulincer, 1998a), and a secure attachment style (Mikulincer & Florian, 2000) result in potentially less destructive worldview defense strategies following MS. Research on prosocial "state" primes following MS could prove valuable as well, such as an expanding circle of morality (Templeton, 2007), which led MS participants to more lenient judgments of people compared to a control topic (J. Templeton, personal communication, May 7, 2008). Other recent work suggests that expanding the inclusiveness of in-groups to encompass all of humanity—such as by having participants view photos of international families or ponder global climate change—may actually reduce intergroup conflict, especially under MS (Motyl, 2009).

Are there different ways to think about death? All of the different MS manipulations included in this review were relatively homogeneous, such that they were designed to have participants think about death but not explicitly reflect on their life. These manipulations may be different from other real-life confrontations with mortality such as near-death experiences (Ring & Elsaesser Valarino, 1998) or being diagnosed with a

terminal illness, which individuals often react to with liberation and growth rather than defensiveness (e.g., Martin, Campbell, & Henry, 2004). For instance, Cozzolino, Staples, Meyers, and Samboceti (2004) employed a "death reflection" condition, in which participants read a graphic paragraph asking them to imagine they were experiencing an imminent death in a burning building. Although the typical MS manipulation led participants high in extrinsic values to become greedier, the death reflection manipulation led participants high in extrinsic values to become less greedy as well as to focus more on intrinsic values such as interpersonal relationships (Cozzolino et al., 2004). Research could continue to investigate whether more immediate and reflective real-world death reminders lead to growth-oriented behaviors as a means of worldview defense (e.g., Pyszczynski, Greenberg, Solomon, & Maxfield, 2006), perhaps by examining specific death-exposed samples such as firefighters, morticians, hospice workers, and terminal patients.

Conclusion

This meta-analysis reveals that the MS hypothesis of TMT—that death affects us without our conscious realization—is robust and produces moderate to large effects across a wide variety of MS manipulations as well as attitudinal, behavioral, and cognitive DVs. We hope that this examination will inform and facilitate further research aimed at understanding how the knowledge of death affects human life. As Yalom (1989) put it, "Though the fact, the physicality, of death destroys us, the idea of death may save us" (p. 7).

Acknowledgments

Special thanks to Jonesy for playing independently while his dad worked on this project, to Leslie Goldstein for her ideas and support, to Joseph Hayes for coding studies, and to Sharon Sears for her editorial comments on an earlier draft of this article.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

Financial Disclosure/Funding

The author(s) received no financial support for the research and/or authorship of this article.

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