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Fast track report

Same but different: meta-analytically examining the uniqueness of mortality salience effects

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Abstract

One line of theorizing suggests considering death reminders—i.e., mortality salience (MS) inductions—unique in their effect on worldview defenses (e.g., Pyszczynski et al., 2006). Other theorizing suggests that meaning and certainty threats produce effects similar to MS and thus that these threats be considered theoretically equivalent (e.g., Proulx & Heine, 2006; McGregor, 2006). To help reconcile these discrepant perspectives, we meta-analytically examined MS effects as a function of the control condition utilized (meaning/certainty threats vs. other topics) and the length of delay between threat induction and subsequent defense. Results showed that MS and meaning/certainty threats both increased defensiveness after a short delay. But with a longer delay, MS produced even higher levels of defensiveness while meaning/certainty threats produced lower levels of defensiveness. Thus, the evidence supports a similarity between MS and meaning/certainty threat effects, but also a difference in time course that warrants their study as unique psychological threats. Copyright © 2010 John Wiley & Sons, Ltd.

A large body of work examines the effects of psychological threats on worldview defenses—efforts to maintain and bolster one's systems of meaning and value. However, theoretical and empirical work has differed with respect to the uniqueness of the impact of death-thoughts on these defenses. Several lines of research find that death-thoughts produce effects similar to meaning and certainty threats and so should be considered as functionally and theoretically equivalent (e.g., Proulx & Heine, 2006; McGregor, 2006). Yet other work finds that death-thoughts produce effects that are different from meaning and certainty threats and so should be considered as related but theoretically unique (e.g., Pyszczynski, Solomon, Greenberg, & Maxfield, 2006). To help reconcile these discrepant research findings, we meta-analytically tested whether the degree to which death-thoughts and meaning/certainty threats exert a similar effect on worldview defense may depend on another variable: the length of delay between the threat induction and subsequent worldview defense. It may be that death-thoughts and meaning/certainty threats indeed both impact worldview defenses similarly, but that their effects differ in time course, as delineated further below.

A large body of terror management theory research (TMT; e.g., Greenberg, Solomon, & Pyszczynski, 1997; Pyszczynski et al., 2006) shows that making mortality salient (i.e., mortality salience) increases worldview-related defenses. Theoretically, this occurs because investment in worldviews—meaning systems that provide the world with the appearance of stability and permanence—serves to defend people against thoughts about their own mortality. However, recent work examining the meaning maintenance model (e.g., Proulx & Heine, 2006), compensatory zeal (e.g., McGregor, Zanna, Holmes, & Spencer, 2001), and procedural fairness (e.g., van den Bos, Poortvliet, Maas, Miedema, & van den Ham, 2005) has suggested that mortality salience (MS) may not be unique in its impact on worldview defenses. The research shows that non-death-related threats to personal meaning and certainty also activate and increase worldview defenses. From these theoretical perspectives, any thoughts that undermine meaning and certainty—death-related or otherwise—result in compensatory efforts to restore meaning and certainty, such as maintaining and defending one's worldview. Thus, this work suggests that, because meaning/certainty threats have a similar effect as MS on worldview defenses, death-thoughts need not be considered as theoretically separate or independent from these other threats to self.

The two discrepant accounts discussed above may, in part, both be correct. Perhaps MS and meaning/certainty threats behave similarly under some conditions but differently under others. This possibility emerges from a key component of terror management theorizing—that non-conscious but accessible death-thoughts (as opposed to conscious thoughts of death) produce worldview defenses. According to TMT, when people are reminded of their eventual death they engage in proximal and distal defenses (Pyszczynski, Greenberg, & Solomon, 1999). Proximal defenses occur immediately after the death reminder and include strategies such as suppression, distraction, or rationalization aimed at getting these distressing thoughts out of consciousness. Once proximal defenses subside, death thoughts are absent from awareness but still remain highly accessible. It is at this point that distal defences—i.e., worldview defences—function to push

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thoughts of death even further away from consciousness by affirming important death-transcending beliefs and values that make one's life feel meaningful and worthwhile.

The dual defense model proposed within TMT therefore suggests that the effect of MS on worldview defense has a signature time course. Specifically, when people are exposed to a conscious reminder of death, worldview defense occurs most prominently when there is a delay between the MS induction and the measure of defense because a delay facilitates the receding of death-thoughts from focal awareness (Greenberg, Pyszczynski, Solomon, Simon, & Breus, 1994). Further, MS effects appear to strengthen as the delay lengthens (Burke, Martens, & Faucher, 2010).

Theorizing about meaning and certainty threats, on the other hand, does not suggest that the impact of these threats should emerge only after a delay, when they are outside consciousness. Further, it is conceivable that effects of meaning/certainty threats follow a time course that is opposite to those of MS. There is growing evidence that a variety of meaning and uncertainty threats can elicit death-thought accessibility (DTA; for a review see Hayes, Schimel, Arndt, & Faucher, in press), and that DTA then fades after a delay (Schimel, Hayes, Williams, & Jahrig, 2007). This research is based on the following logic: if symbolic meaning structures (e.g., cultural worldviews) provide protection from death-related fear, then temporarily weakening these structures should allow thoughts of death to leak through the protective shield and become temporarily more accessible to awareness. Given the TMT theorizing that worldview defense arises when death thoughts are highly accessible but not in awareness, meaning/certainty threats may increase worldview defense after a short delay and be less apt to do so after a long delay (Pyszczynski et al., 2006). If this analysis is correct and MS and meaning/certainty threats trigger their effects on worldview defense on a different time course, this may help reconcile the conflicting research and theorizing about the uniqueness of MS effects. It may be that MS and meaning/certainty threats act similarly with short delays, but that MS effects grow stronger with longer delays while the effects of certainty/meaning threats weaken with longer delays.

To test this possibility, we conducted a meta-analytic investigation that drew on and extended a recent meta-analysis of MS experiments (Burke et al., 2010). Using this recent meta-analytic data set, we examined two variables. First, we categorized the comparison/control conditions used in MS studies into those that threatened meaning or certainty and those that did not. Given that the effect of the MS induction should be essentially the same across studies, any observed differences in MS effect sizes between studies with different control conditions can be attributed to the control/comparison conditions used. Thus, by examining the strength of the MS effects using meaning/certainty threats as a control condition compared to the strength of MS effects using other control topics, it is possible to gauge the degree of similarity in function between MS and meaning/certainty threats. Second, we divided the studies into those that used shorter and longer delays between the MS manipulation and the worldview defense dependent measures in order to gauge the differences in timing of MS and meaning/certainty threats.

We had three interrelated hypotheses for the current study. First, we predicted that when a shorter delay was utilized, MS would produce smaller effects with meaning/certainty threats as control topics than with other controls topics. This would indicate that meaning/certainty threats act similarly to MS under those conditions. Second, we predicted that when a longer delay was utilized, the magnitude of MS effects would not differ based on the control topic (whether meaning/certainty or other). This would indicate that certainty/meaning threats are acting just like other non-meaning/non-certainty control topics after a longer delay. Further, given that non-certainty/non-meaning control topics do not differ in their effects as a function of delay, if certainty/meaning threats act just like other control topics after a longer delay, then meaning/certainty threats decrease in their effects from shorter to longer delays. Third, we predicted that when compared with non-meaning/non-certainty control topics, MS would increase its effect on worldview defense from shorter to longer delays. If supported, these hypotheses would suggest that MS and meaning/certainty threats impact worldview defense on a qualitatively different time course—that MS effects are not merely stronger (i.e., more potent) than meaning/certainty threats after a delay, but rather that meaning/certainty threats are weakening from shorter to longer delays as MS effects are strengthening from shorter to longer delays. Figure 1 depicts the conceptual model based on these predictions.

METHOD

For a list of the specific studies included in this meta-analysis and a more detailed explanation of the selection/inclusion

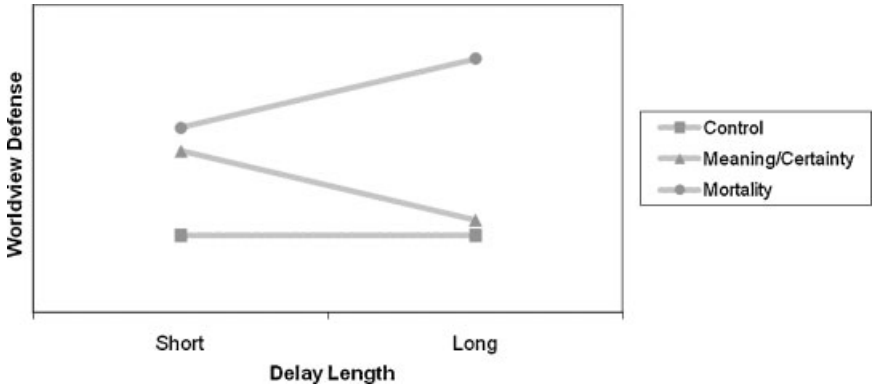

Figure 1. Hypothesized conceptual model of the effects of non-meaning/non-certainty topics, meaning/certainty threats, and mortality salience, on worldview defense as a function of delay length.

criteria as well as effect size calculation formulas, see Burke et al. (2010). There were 277 experiments of MS effects included in this prior meta-analytic review. However, for the present study, we excluded any experiment that did not use at least one delay between the MS induction and the dependent measure (7% of the sample of studies used in the prior Burke et al. meta-analysis), because TMT only predicts an effect of MS on worldview defense under conditions of at least some delay.[1] We also excluded all experiments that used a subliminal prime (4% of the sample of studies used in the prior meta-analysis) as the MS manipulation (e.g., Arndt, Greenberg, Pyszczynski, & Solomon, 1997). Subliminal studies have never utilized any delay and TMT predicts a different time course of subliminal death primes as compared with supraliminal death primes—unlike supraliminal MS induction, subliminal death primes produce increased worldview defensives immediately, presumably because death-thoughts are, at the outset, outside of focal awareness yet highly accessible. Lastly, we excluded any studies that used atypical control group topics that defied categorization such as ''self-determined death'' or ''collective death'' (2% of the sample of studies used in the prior meta-analysis). This left 240 experiments (87% of the 277 studies used in the prior meta-analysis) to be submitted for analysis as described below.

The prototypical experiment involved 89 participants (54 females, 35 males) with an average age of 21.60 years (SD = 3.53). After one or two initial filler questionnaires, participants received the MS manipulation, in which they were led in some way to either think about death or in a parallel manner to think about a non-death topic. After a delay during which participants completed a filler measure(s), worldview defense was measured, most commonly operationalized as attitudes toward an essay/author that disagreed with participants' worldview.

To induce MS, the vast majority of studies (84.1%) used the ''Mortality Attitudes Personality Survey'' (Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 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. Less commonly (7.9%), experiments used specific closed-ended survey questions to manipulate MS. These included the Fear of Personal Death Survey (Florian & Kravetz, 1983), the Fear of Death Scale (Boyar, 1964), the Death Anxiety Questionnaire (Conte, Weiner, & Plutchik, 1982), and the Death Anxiety Scale (Templer, 1970). Other MS manipulations (8%) 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, or being interviewed in front of a funeral home or cemetery.

To examine the hypothesized interaction between delay and control group on MS effect size, we divided the delays and control topics into two categories each as follows:

1. Delay was coded into two groups based on the number of delay tasks (e.g., questionnaires or word puzzles) employed: (a) short delays were defined as experiments using a single delay task, and (b) long delays were defined as experiments using two or three delay tasks between the MS manipulation and measurement of the dependent variable. Seventy-four per cent of experiments used a single delay or distraction task between the MS manipulation and the administration of the DV, whereas the remaining 26% of experiments used a longer two- (23%) or three-task delay.
2. Control group topic was coded into two groups based on the nature of the topic made salient: (a) a meaning- or certainty-threatening control topic, such as answering two essay questions about social exclusion, uncertainty, future worry, or taking or failing an important exam; responding to a rigged questionnaire suggesting that one's life is pointless; evaluating surrealist art; or having the experimenter changed without noticing, and (b) other control topics such as answering two essay questions about dental or physical pain, watching TV, food preferences, basic values, or listening to music. Twenty per cent of the experiments used a meaning or certainty related control topic, whereas the remaining 80% used other control topics. An independent judge unfamiliar with the TMT literature largely corroborated the coding of control topics (inter-rater reliability was excellent, Cohen's Kappa = .99, $p < .001$).[2]

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

In meta-analysis, the analogous test to the one-way ANOVA is the Q statistic that can be generated using a random effects SPSS macro for categorically grouped data (Lipsey & Wilson, 2001, pp. 138, 216). This analysis provides easily interpretable results, as a significant Q_B indicates that there is a significant difference between the mean effect sizes in the group comparison. Our main goal in this review was to compare MS effects as a function of control group topic (meaning/certainty threats vs. other) and length of delay (shorter vs. longer), which we accomplished by conducting Q analyses as described further below.

RESULTS

As shown in Figure 2, for experiments that used a short delay between MS and the administration of the worldview defense measure, MS yielded significantly weaker effects when compared to meaning/certainty threatening topics [$r(30) = .27$, $p = .00$] than when compared to other control topics [$r(147) = .35$, $p = .00$; $Q_B(1, 175) = 4.71$, $p = .02$]. Although

[1]Including these experiments that used no delay at all (coded as short delays) does not alter the results reported here.

[2]The independent rater disagreed in only 2 out of 240 cases. Further, these disagreements had no bearing on the findings. The analyses produced the same results using either set of categorizations and produced the same results with these two topics excluded from the analyses.

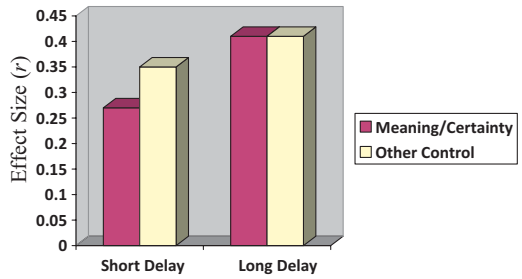

Figure 2. MS Effect Size (r) by Control Group and Delay.

MS is exerting an effect on worldview defense above and beyond meaning/certainty threats,[3] the observation that this MS effect is smaller than MS effects with other control topics suggests meaning/certainty threats look more similar to MS than other control topics in their effect on worldview defense after a short delay. For experiments that used a long delay between MS and the measurement of worldview defense, there was no significant difference in MS effects based on whether the control topic was meaning/certainty threatening [$r(18) = .41$, $p = .00$] or not [$r(45) = .41$, $p = .00$; $Q_B(1, 61) = .02$, $p = .90$]. This suggests that after a long delay, meaning/certainty threats behaved just like other control topics. This suggests too, given a constant effect of other control topics by length of delay, that the effects of meaning/certainty threats on worldview defense weakened from a shorter delay to a longer delay. In opposite fashion, however, with non-meaning/non-certainty control topics, MS effects were significantly stronger after a long delay [$r(45) = .41$, $p = .00$] than after a short delay [$r(147) = .35$, $p = .00$, $Q_B(1, 190) = 4.30$, $p = .04$]. (Similarly, with meaning/certainty threats as the control topics, MS effects were significantly larger after a long delay [$r(18) = .41$, $p = .00$] than after a short delay [$r(30) = .27$, $p = .00$, $Q_B(1, 46) = 4.09$, $p = .04$]). Thus, from short to long delays, the effects of meaning/certainty threats diminished or disappeared while MS effects grew stronger. This supports the hypothesis that MS and meaning/certainty threats exhibit different time courses in their effects on worldview defense: while MS effects are weakest with shorter delays and strongest with longer delays, meaning/certainty threats are strongest with shorter delays and weakest with longer delays.[4]

[3]Consistent with this effect, in a majority (73%) of the studies using one delay that compared MS with meaning/certainty threats, MS had a significant effect ($p < .05$) on worldview defense.

[4]We reanalyzed the interaction between control condition and delay length in weighted multiple regression while taking into account all the potential between-study moderators of MS effects from our original meta-analysis (Burke, Martens, & Faucher, 2010). We included all nine original potential between-study moderator variables—sample size, gender, average age of the participants, whether the participants were college students or not, the region (US, Europe, Asia) wherein the study was conducted, the type of MS induction used (essay, questionnaire, or other), the dependent variable (attitude, behavior, cognition, or affect), the type of control group topic, and the number of delay tasks between the MS induction and the dependent variable. We then added 1 additional variable—a control topic X delay interaction term. These 10 variables were analyzed via weighted multiple regression using a random effects SPSS macro (Lipsey & Wilson, 2001), yielding a final predictive model for the moderators of MS effects. Three moderator variables—control X delay ($\beta = .18$, $p = .01$), college sample ($\beta = .20$, $p = .00$), and dependent variable ($\beta = -.19$, $p = .00$)—accounted for 11% of the variance in MS effect sizes. None of the other seven potential moderators significantly predicted MS effect sizes (all ps > .16). This analysis reveals that the effect of delay reported in our previous meta-analysis (Burke et al., 2010) is qualified by an interaction between delay and control group topic as delineated in the current paper.

DISCUSSION

The current pattern of results provides some evidence for both of the discrepant theoretical perspectives discussed above. Meaning/certainty threats showed effects similar to MS on worldview defense after a short delay. Thus, MS did not appear unique in its ability to impact worldview defense. However, the time course of MS effects did appear unique: MS had an even stronger effect on worldview defense after a longer delay whereas meaning/certainty threats had a weaker effect after a longer delay. In fact, after longer delays meaning/certainty threats had no effect on worldview defense over and above that observed on the more benign control topics that have typically been used in MS studies such as watching television or experiencing dental pain.

It is important to point out that the observed effects run counter to the suggestion that MS effects are merely due to the potency of MS relative to other types of meaning/certainty threats. If this were the case we would have observed a pattern of two main effects such that both MS and meaning/certainty threats would have led to higher defense after short delays and lower defense after longer delays, with MS producing slightly higher defense at both levels of delay. In other words, if the impact of death and meaning/certainty threats on worldview defense occurs by precisely the same process, then we would have expected the same time course for both effects. This pattern was not observed. Instead, MS led to increased worldview defense over time, whereas meaning/certainty threats led to decreased worldview defense over time. These diverging patterns in the time course of MS vs. meaning/certainty threats suggest that death reminders have unique characteristics with respect to worldview defenses, and thus warrant study as such.

The different time course observed for the effects of MS vs. meaning/certainty threats on worldview defense can be explained using TMT's dual defense model (Pyszczynski et al., 1999). According to this model, DTA and worldview defense should be low for a brief time following MS because individuals employ proximal defenses to remove thoughts and concerns about death from consciousness. However, with the passage of time these defenses relax, which allows death thoughts to rebound and then linger just outside consciousness. Accessible death thoughts then trigger distal defenses to push such thoughts farther from awareness, reducing their potential to become conscious. Worldview defense is therefore most pronounced when death-thoughts are outside current focal awareness, yet highly accessible. If accessible but non-conscious death thoughts trigger worldview defenses, then perhaps the reason why meaning/certainty threats only increase worldview defense after a brief delay is because these threats increase DTA without making thoughts of human mortality conscious. Indeed, numerous studies have recently shown that various kinds of threats to people's symbolic meaning structures can increase DTA in the absence of any explicit reminders of death (Hayes et al., 2010). Interestingly, one study (Schimel et al. 2007, Study 1) showed that after exposing participants to a worldview threat, DTA was higher immediately after the threat than it was after a delay. This pattern of higher DTA immediately after the worldview threat, which then decreased after a delay, mirrors the time course observed for meaning/certainty threats in our meta-analysis, wherein meaning/certainty threats led to higher levels of worldview defense after a short delay which then faded over

time. The full pattern of results revealed in this meta-analysis—that MS shows its strongest effects after longer delays while meaning/certainty threats show their strongest effects with shorter delays—is therefore consistent with the process account provided by TMT, that worldview defenses are most pronounced under conditions in which thoughts of death are highly accessible but just outside of awareness.

This theoretical account notwithstanding, some meaning threats may arouse defenses without necessarily increasing DTA (e.g., Proulx & Heine, 2008). Perhaps some meaning threats are potent enough to trigger automatic defenses in response to the threat, but not potent enough to increase DTA. It is also reasonable to suspect that as the impact of a meaning threat subsides over time, so do the defenses that are triggered directly by the threat. In other words, it is not necessary to implicate death-thoughts lingering in the unconscious as the sole mechanism that triggers all defenses in response to all threats. Certainly, future work is necessary to assess the precise nature of the different processes that emerge from MS and various meaning/certainty threats.

CONCLUSION

Our results lend credence to the meaning maintenance and compensatory zeal theorizing that meaning and certainty threats share characteristics with MS in their effect on worldview defense. Indeed, MS does not appear unique in its ability to trigger worldview defense. This view has led to the supposition that meaning/certainty threats may encompass death threats—that with respect to impact on worldview defense, death may be best understood as a threat to meaning and certainty and should therefore be considered as part of a larger group of threats that elicit worldview defenses. The results of the current meta-analysis are incompatible with this view, however. The effect of MS on worldview defense followed a different time course than the effect of meaning/certainty threats on worldview defense. Although death reminders and meaning/certainty threats both lead to increases in worldview defense after a short delay, after a longer delay death reminders lead to higher levels of worldview defense, whereas meaning/certainty threats lead to lower levels of worldview defense. This evidence lends support to the view that death salience is not exactly like other threats to self in its impact on worldview defense, and suggests that death-thoughts warrant study as a distinct and unique psychological threat.

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*NOTE: See Burke, Martens, & Faucher (in press) for a list of studies included in the meta-analysis.

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