

Psychological Trauma: Theory, Research, Practice, and Policy

Anxiety Buffer Disruption: Worldview Threat, Death Thought Accessibility, and Worldview Defense Among Low and High Posttraumatic Stress Symptom Samples

Kenneth E. Vail, III, Elizabeth A. Goncy, and Donald Edmondson

Online First Publication, February 28, 2019. <http://dx.doi.org/10.1037/tra0000441>

CITATION

Vail, K. E., III, Goncy, E. A., & Edmondson, D. (2019, February 28). Anxiety Buffer Disruption: Worldview Threat, Death Thought Accessibility, and Worldview Defense Among Low and High Posttraumatic Stress Symptom Samples. *Psychological Trauma: Theory, Research, Practice, and Policy*. Advance online publication. <http://dx.doi.org/10.1037/tra0000441>

Anxiety Buffer Disruption: Worldview Threat, Death Thought Accessibility, and Worldview Defense Among Low and High Posttraumatic Stress Symptom Samples

Kenneth E. Vail III and Elizabeth A. Goncy
Cleveland State University

Donald Edmondson
Columbia University

Objective: Decades of research suggest that people are able to function effectively in the world and maintain mental health and well-being, at least in part, by relying on effective sociocultural anxiety buffer systems to shield against the awareness of death. However, according to anxiety buffer disruption theory, posttraumatic stress reflects anxiety buffer disruption, signaling that sociocultural belief systems have been rendered unable to buffer the individual against death awareness. As such, we would not expect to see the normal responses to death awareness meant to bolster and defend those belief systems in participants with posttraumatic stress. **Method:** To test these hypotheses, we screened for posttraumatic stress in U.S. participants ($n = 4,150$) and recruited individuals with low ($n = 193$) and high ($n = 205$) posttraumatic stress symptoms. Each group was randomly assigned to a worldview-threat or -support condition, followed by a standardized measure of death-thought accessibility (DTA) and worldview defense. **Results:** In the nonthreat (worldview-support) condition, individuals with high (vs. low) posttraumatic stress had elevated DTA. Further, among individuals with low posttraumatic stress, worldview threat (vs. -support) increased DTA, which in turn mediated an increase in worldview defense; however, among those with high posttraumatic stress, worldview threat did not increase DTA and its effect on worldview defense was substantially reduced. **Conclusion:** These findings supported the present hypotheses derived from anxiety buffer disruption theory, are important for understanding the existential dimension of posttraumatic stress, and may have implications for mental health.

Clinical Impact Statement

This study suggests that people with low posttraumatic stress are normally able to function effectively in the world, in part, by relying on sociocultural anxiety-buffer systems to protect against death thought. In contrast, this study also finds that people with high posttraumatic stress had elevated death thought and did not appear to use extant sociocultural buffers to protect against death thought. In light of this and prior research, implications are that traumatic anxiety buffer disruption might contribute to PTSD symptoms by undermining one's otherwise functional sociocultural anxiety buffers.

Keywords: trauma, anxiety buffer disruption, terror management theory, death thought accessibility, worldview defense

Supplemental materials: <http://dx.doi.org/10.1037/tra0000441.supp>

Decades of research based on terror management theory (TMT, Greenberg, Vail, & Pyszczynski, 2014; Vail, Juhl et al., 2012) suggest that people are able to function effectively in the world and maintain well-being, at least in part, by relying on effective socio-

cultural anxiety buffer systems to protect them from the awareness of death. Yet, according to anxiety buffer disruption theory (ABDT; Pyszczynski & Kesebir, 2011; Pyszczynski & Taylor, 2016), traumatic experiences potentially disrupt those buffer systems, leaving people unprotected from death awareness. As a result, people may become prone to increased anxiety, views of the world as dangerous and chaotic, intrusive thoughts about the event, and avoidance of reminders of it—major symptoms of posttraumatic stress disorder (PTSD). The present study tested the ABDT hypothesis that posttraumatic stress reflects anxiety buffer disruption, (a) rendering people's sociocultural belief systems less protective against increased death awareness, and (b) reducing people's ability to rely on those belief systems, as evidenced by less

Kenneth E. Vail, III and Elizabeth A. Goncy, Department of Psychology, Cleveland State University; Donald Edmondson, Department of Medicine, Columbia University.

Correspondence concerning this article should be addressed to Kenneth E. Vail, III, Department of Psychology, Union Building 257, Cleveland State University, Cleveland, OH 44115. E-mail: vail.kenneth@gmail.com

worldview defensive reactions. To do so, participants with low and high posttraumatic stress were recruited and, in each group, we investigated the degree to which worldview-threat (vs. -support) stimuli would increase death-related cognitions and worldview defense reactions.

TMT: Death-Thought Accessibility, Worldview Defense, Mental Health

From the TMT perspective (Greenberg et al., 2014), people manage the awareness of their mortal impermanence through tripartite systems that offer a sense of symbolic permanence. The first component, sociocultural worldviews, are socially validated systems of cultural beliefs and identities that offer a sense of permanence, perhaps via secular legacies (raising families, teaching students, contributing to government, science, technology, art, etc.) or via religious and/or spiritual ideas about eternal souls and/or afterlives. The second component, self-esteem, functions as an indicator of how well an individual feels they are living up to the standards for immortality laid out by those belief systems. The third component, interpersonal attachment and close relationships, can provide a sense of security and a platform for sociocultural validation and self-esteem. Thus, TMT proposes that people can manage death awareness by maintaining faith in their permanence-promising worldviews and abiding by cultural standards and values.

One hypothesis derived from TMT is the *death-thought accessibility hypothesis* (Hayes, Schimel, Arndt, & Faucher, 2010), which holds that if people's worldviews effectively buffer against death awareness, then threatening or undermining those worldviews will increase the accessibility of death-related cognitions. This hypothesis has been tested and supported in a variety of domains, in that challenges to nationalistic belief and identity (Schimel, Hayes, Williams, & Jahrig, 2007), religious beliefs (Friedman & Rholes, 2007), relationships and love (Florian, Mikulincer, & Hirschberger, 2002), and self-esteem (Hayes, Schimel, Faucher, & Williams, 2008) increase death-thought accessibility (DTA). In one study (Schimel et al., 2007), Canadian participants who were exposed to material criticizing Canada increased DTA compared to those who were not exposed to such a worldview threat.

A related hypothesis is the *mortality salience hypothesis* (Greenberg et al., 1990), which holds that if sociocultural worldviews function to buffer against death awareness, then increased death awareness should motivate people to affirm and defend those worldviews. For example, increased death awareness has been shown to motivate American participants to increase liking for people with pro-American attitudes and denigrate those who criticize America (Gailliot, 2012; Greenberg et al., 1990, 2003). Hundreds of other studies have found similar effects on other worldview-based identities and beliefs ranging from sports team affiliations to creationism (Burke, Martens, & Faucher, 2010).

Together, research has found (a) conditions that increase DTA also elicit worldview defense (Hayes, Schimel, & Williams, 2008; Schimel et al., 2007; Simon et al., 1997), (b) increased DTA mediates the impact of death-related stimuli on worldview defense (Fransen, Fennis, Pruyn, & Das, 2008; Vail, Arndt, Motyl, & Pyszczynski, 2012), and (c) activating sociocultural anxiety buffers (e.g., worldview defense, self-affirmation) subsequently alle-

viates DTA (Greenberg, Arndt, Schimel, Pyszczynski, & Solomon, 2001; Vail, Morgan, & Kahle, 2018). Further, effectively managing death awareness appears to serve a mental health function, as failure to effectively manage DTA can lead to increased anxiety and impaired well-being (Edmondson, Park, Chaudoir, & Wortmann, 2008; Juhl & Routledge, 2016) and the exacerbation of anxiety-related symptoms (Iverach, Menzies, & Menzies, 2014; Strachan et al., 2007).

Anxiety Buffer Disruption

The present research builds on this prior work and explores the possibility that these otherwise normative and adaptive processes might be disrupted among people with posttraumatic stress. ABDT (Pyszczynski & Kesebir, 2011; Pyszczynski & Taylor, 2016) posits that experiencing traumatic events—serious accidents, natural disasters, violence and assaults, the loss of a loved one, and so on—may overwhelm one's anxiety-buffering systems. To some, traumatic experiences may be perceived as a high magnitude discrepancy with their global meaning system (Park, Mills, & Edmondson, 2012; Park et al., 2016), which can “shatter assumptions” about how the world works and undermine belief that it conforms to one's notions of moral justice (Janoff-Bulman, 1992; Lerner, 1980; Yetzer & Pyszczynski, 2019). Such experiences may demonstrate that the world remains a dangerous place in which our symbolic secular and/or religious sociocultural beliefs do little or nothing to shield against the reality of our inevitable mortality. Thus, if posttraumatic stress reflects anxiety buffer disruption, it would leave individuals vulnerable to existential anxieties and a variety of related symptoms and disorders (Iverach et al., 2014). If posttraumatic stress reflects anxiety buffer disruption, it would help to explain why death reminders (vs. control topic) exacerbated PTSD symptoms among people living in (but not distant from) areas marked by widespread trauma such as Cote d'Ivoire's civil war combat zones (Chatard et al., 2012).

Prior research indeed suggests that PTSD reflects disrupted protective function of worldviews. For example, college students with high PTSD symptoms had higher DTA after a mortality reminder than did those with low PTSD symptoms (Edmondson et al., 2011). Further, death reminders do not lead to increased worldview defense among people with PTSD symptoms or prediagnostic vulnerabilities (e.g., peritraumatic dissociation, Ozer, Best, Lipsey, & Weiss, 2003). For example, in one study conducted in Iran after an earthquake there killed 1,500 people, both death reminders and earthquake reminders (vs. control topic) caused participants with low, but not high, peritraumatic dissociation to increase worldview defense; and in a follow-up 2 years later, death reminders again failed to increase worldview defense among those with greater PTSD symptom severity (Abdollahi, Pyszczynski, Maxfield, & Luszczynska, 2011). A study among female victims of domestic violence in Poland found that death reminders motivated worldview defense among those with low, but not high, levels of PTSD symptoms (Kesebir, Luszczynska, Pyszczynski, & Benight, 2011). Other work has found that when individuals were reminded of death (vs. control topic), engaging in self-affirmation of their personal value and sociocultural worldview beliefs (vs. control task) attenuated DTA among those with low, but not high, posttraumatic stress symptoms (Vail et al., 2018).

Together, this research suggests that, among people with high posttraumatic stress, extant sociocultural anxiety buffers cease to protect against existential concerns; that is, increased death awareness does not lead to increased worldview defense, and activating typically effective sociocultural anxiety buffers (e.g., self-affirmation) does not subsequently alleviate DTA. However, no research has yet explored the related idea that, if high posttraumatic stress means that one's extant sociocultural anxiety buffers no longer effectively manage existential concerns, then worldview threat would no longer increase DTA and worldview defense.

The Present Research

Although the prior work has been consistent with ABDT, no research has yet directly tested the underlying idea that those with high (vs. low) posttraumatic stress (a) are relying less on their sociocultural worldviews to protect against death awareness, and the poor worldview protection corresponds to (b) less worldview defense. To test the hypothesized model, the present research first recruited participants with low and high posttraumatic stress symptoms. Then, participants in each group were asked to read a customs form comment ostensibly written by a foreign tourist; in one condition, the comment expressed anti-United States attitudes (worldview-threat condition) and in the other condition it expressed pro-United States attitudes (worldview-support condition). Participants then completed the dependent measures: a standard measure of DTA, and a measure of worldview defense in which they rated how much they liked/disliked the tourist's commentary. Based on the present analysis, we expected the following:

1. Among the low posttraumatic stress group, worldview threat (vs. -support) would increase DTA, which would then mediate an increase on worldview defense in the form of negative reactions to the tourist's commentary.
2. Among the high posttraumatic stress group, worldview threat (vs. -support) would not increase DTA nor worldview defense against the tourist's commentary.

Method

Participants and Procedure

Sample size planning. The present research adopted the strategy of selecting a minimally important effect size threshold. Using an a priori power analysis for F-family tests for ANOVA (fixed effects, special, main effects, and interactions; G*Power), we selected a minimum effect size threshold of $f = .15$ ($\eta_p^2 = .02$, a small effect size), and set power to .80 for detecting effects at $p = .05$, with 1 numerator df and four groups. This analysis recommended a target sample size of 351 participants.

General procedure. Due to the difficulty of locating and recruiting sufficient numbers of local participants who meet or exceed the PTSD threshold, a research panel company was hired to recruit participants throughout the United States. From March 23 to April 3, 2017, the Posttraumatic Stress Disorder Checklist–Civilian version (PCL-C; Weathers, Litz, Herman, Huska, & Keane, 1993) was administered via online survey (Qualtrics, Provo, UT). Then, on April 6, the primary study materials were

administered to two groups of panel members: one group scoring above the PCL-C screening threshold, and one group with low PCL-C scores. IRB approval was obtained and all relevant protocol materials (see online supplemental materials), as well as anonymized open data and code, are available at <https://osf.io/ydz6x/>.

Posttraumatic stress assessment and participant selection.

The PCL-C is a 17-item self-report measure adapted from the three *DSM-IV* PTSD symptom clusters listed in the *DSM-IV* (American Psychiatric Association, 2000). Participants were asked to rate on a scale of 1 (*not at all*) to 5 (*extremely*) the degree to which they were bothered in the past month by each symptom. PCL-C item responses are summed and range from 17 to 85. The PCL-C has strong psychometric properties, including good internal consistency, test–retest reliability, and diagnostic efficiency using a cutoff/threshold score of 44 for PTSD “caseness” (e.g., Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Norris & Hamblen, 2004, for review).

In the present study, the PCL-C was administered to an initial pool of 4,150 respondents, in exchange for US\$0.20, establishing the initial pool of possible participants; 4,065 respondents provided data. An attentiveness-check item (“For this item, please select the *Quite a Bit* response.”) was also included to ensure respondents were attending to the item content; 3,928 respondents provided accurate responses and were retained as valid panel members. The PCL-C demonstrated good internal consistency ($\alpha = .94$), with a slightly positively skewed distribution of scores [*Skew* (*SE*) = .67 (.04); *Kurtosis* (*SE*) = $-.28$ (.08)] with mostly lower PCL-C scores (Median = 34; $M = 36.10$, $SD = 13.77$) gradually tapering off up to 83.

Panel members with PCL-C scores of 44 (the PTSD “caseness” score) or above were designated as eligible for the “high posttraumatic stress” group. This “caseness” score was approximately equal to the upper quartile score of 45. The lower quartile, PCL-C scores of 25 or below, was used to designate the eligible “low posttraumatic stress” group. Eligible “low posttraumatic stress” ($n = 1,075$) and “high posttraumatic stress” ($n = 1,124$) panel members were then invited to participate in the primary study for an additional US\$1.40.

Participant characteristics. An invitation containing the link to the study was emailed to eligible respondents in the initial pool, and set up to allow roughly 200 from each group (plus some overflow cushion to compensate for anticipated exclusions, as follows). A total of 439 participants accepted the invitation (and the incentive) and at least began the materials (signed the informed consent). Four did not respond further than the informed consent. An attentiveness-check item was embedded in the primary study materials (“For this item, please select the *Somewhat agree* response option.”) to ensure respondents were attending to the item content; 419 respondents provided accurate responses. Among that group, 21 discontinued the study during the primary manipulation, DTA measure, or worldview defense measure, and were excluded list-wise due to incomplete data.

Thus, the final sample consisted of 398 participants. Of those, 193 were recruited from the “low traumatic stress” group (PCL-C: Median = 22; $M = 21.19$, $SD = 2.59$) and 205 were recruited from the “high traumatic stress” group (PCL-C: Median = 52; $M = 54.26$, $SD = 8.43$).

Measures and Manipulations

In all cases, the study link was distributed using a neutral title and description (e.g., “Social attitudes survey”) to conceal its true purpose and associated hypotheses. Upon obtaining informed consent, participants completed a brief set of filler items (e.g., a personality measure) including the above-mentioned attention check item, and then the target materials as follows:

Worldview threat manipulation. Following prior research (Schimel et al., 2007), participants were randomly assigned to either a worldview threat or a worldview support condition. Schimel and colleagues’ research was conducted in Canada, and so their worldview-threat manipulation was designed to criticize (vs. not) Canadian culture (e.g., food, sport, health care, manners). The present research took that same approach and simply adapted the method to an American sample, based on prior validated research materials (Gailliot, 2012; Greenberg et al., 1990, 2003), by presenting information that either criticized American culture (e.g., materialism, moral corruption, religion, racism, arrogance) in the worldview-threat condition ($n = 194$), or praised it (e.g., economic opportunity, ideological freedom) in the worldview-support condition ($n = 204$). See online supplemental materials for details.

Death thought accessibility. Immediately following the worldview-threat manipulation, the accessibility of death-related cognition was assessed using a word-stem completion task (Greenberg, Pyszczynski, Solomon, Simon, & Breus, 1994; Schimel et al., 2007). This task presented 36 incomplete word stems, of which 12 could be completed with either a neutral or a death-related word (*killed, murder, skull, death, corpse, dead, coffin, grave, buried, lethal, fatal, mortal*). For example, GRA__ could be completed as GRANT or GRAVE. Word fragments were presented 12 per page; participants used the keyboard to type the letters necessary to complete the word. Nondeath-related word completions were scored as 0; death-related completions were scored as 1 and summed [$M = 3.12$, $SE = 1.33$, Skew (SE) = .23 (.12), Kurtosis (SE) = .16 (.24)] such that higher scores indicated greater DTA.

Worldview defense. Next, as in previous research (Gailliot, 2012; Greenberg et al., 1990, 2003), worldview defense was assessed using a five-item measure ($\alpha = .95$). Participants used a 6-point Likert-type scale to indicate how much they liked the author, thought s/he was intelligent, thought s/he was knowledgeable, agreed with the author, and thought the author’s opinion of the United States was accurate. Mean scores were computed [$M = 3.22$, $SE = 1.45$, Skew (SE) = .27 (.12), Kurtosis (SE) = -1.05 (.24)] such that lower scores indicated a more positive reaction to the tourist/author’s essay, whereas higher scores indicated stronger worldview defense in the form of negative reactions to the tourist/author’s essay (derogation of the author/essay).

Demographics. At the end of the survey, participants reported their age, sex, ethnicity, race, and education level, religion, and political orientation. Participants were middle-aged ($M = 36.41$, $SD = 11.16$) and college-educated (years education $M = 15.38$, $SD = 2.18$), included 217 females and 180 males (1 did not report), and modal responses indicated participants were largely non-Hispanic White Christians. Detailed descriptive information and cell-count frequencies for each can be seen in the online supplemental materials, Table S1.

The distribution of these various indicators across posttraumatic stress groups was evaluated using independent samples t tests on

the continuous measures, and χ^2 tests of cross-tabulated categorical data. Compared to the low posttraumatic stress group, the high posttraumatic stress group did not statistically differ in sex ($\chi^2[1] = 1.43$, $p = .23$), race ($\chi^2[4] = 4.45$, $p = .35$), or ethnicity ($\chi^2[1] = .49$, $p = .48$), but were about 5 years older, $t(395) = 4.56$, $p < .001$ with about 1 year less education, $t(396) = 5.11$, $p < .001$. Compared to the low posttraumatic stress group, the high posttraumatic stress group did not differ on political orientation, $t(393) = .69$, $p = .49$ but did differ in religious status ($\chi^2[7] = 15.65$, $p = .03$) with proportionally fewer religious believers and agnostics and proportionally more “other”, “spiritual but not religious,” and atheists.

Data Analyses

SPSS was used to conduct the various ANOVAs, pairwise comparisons, and PROCESS models described below. Participants who provided partial data or discontinued the study were excluded list-wise, as described in detail above.

Results

Death Thought Accessibility

A 2 (group: low vs. high posttraumatic stress) \times 2 (essay: worldview threat vs. support) ANOVA revealed that there was no main effect of group ($F(1, 394) < .01$, $p = .99$, $\eta_p^2 < .01$), nor of worldview threat ($F(1, 394) = 3.37$, $p = .17$, $\eta_p^2 = .01$). But the interaction emerged, $F(1, 394) = 6.16$, $p = .01$, $\eta_p^2 = .02$ (Figure 1, Panel A), explored below using pairwise comparisons.

Among the low posttraumatic stress group, DTA was higher in the worldview-threat condition ($M = 3.38$, $SD = 1.45$) than in the worldview-support condition ($M = 2.87$, $SD = 1.25$) ($t(191) = 2.69$, $d = .38$ [95%CI: .09, .66], $p < .01$). In contrast, among the high posttraumatic stress group, DTA was not statistically different between the worldview-threat condition ($M = 3.05$, $SD = 1.20$) and the worldview-support condition ($M = 3.20$, $SD = 1.39$) ($t(203) = -.78$, $d = -.11$ [95%CI: -.39, .16], $p = .43$).

Analyzed another way, in the worldview-support condition, DTA was not significantly higher among high posttraumatic stress group than the low posttraumatic stress group ($t(192) = 1.74$, $d = .25$ [95%CI: -.03, .53], $p = .08$). In contrast, in the worldview-threat condition, DTA was not significantly higher among low posttraumatic stress group than the high posttraumatic stress group ($t(202) = 1.76$, $d = .25$ [95%CI: .52, -.03], $p = .08$).

Worldview Defense

A 2 (group: low vs. high posttraumatic stress) \times 2 (essay: worldview threat vs. support) ANOVA revealed that there was no main effect of posttraumatic stress group ($F(1, 394) = .03$, $p = .86$, $\eta_p^2 < .01$), but there was a main effect of worldview threat ($F(1, 394) = 285.85$, $p < .001$, $\eta_p^2 = .42$), such that derogation of the tourist/author was greater in the worldview-threat condition ($M = 4.13$, $SD = 1.22$) than in the worldview-support condition ($M = 2.27$, $SD = .99$). There also emerged an interaction, $F(1, 394) = 9.48$, $p = .002$, $\eta_p^2 = .02$ (Figure 1, Panel B), explored below using pairwise comparisons.

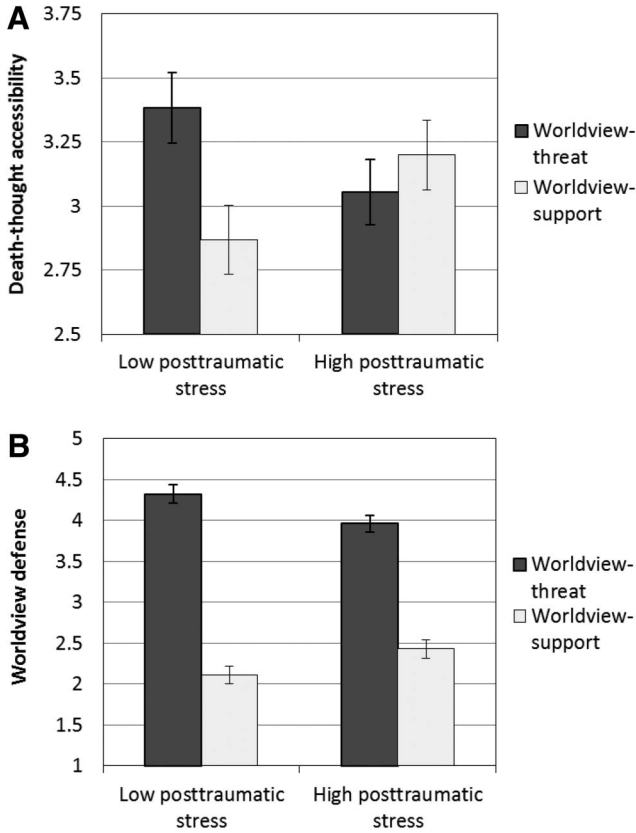


Figure 1. In Panel A, worldview threat (vs. -support) increased DTA among those in the low (but not high) posttraumatic stress group. In Panel B, worldview threat increased worldview defense among those in the low and high posttraumatic stress group, but less so in the high group.

Among the low posttraumatic stress group, derogation of the tourist/author was higher in the worldview-threat condition ($M = 4.32, SD = 1.09$) than in the worldview-support condition ($M = 2.11, SD = .84$) ($t(191) = 13.92, d = 2.28$ [95%CI: 1.91, 2.63], $p < .001$). In contrast, among the high posttraumatic stress group, derogation of the tourist/author was still greater in the worldview-threat condition ($M = 3.96, SD = 1.30$) and the worldview-support condition ($M = 2.43, SD = 1.10$) ($t(203) = 9.95, d = 1.26$ [95%CI: .96, 1.56], $p < .001$), though the effect size was 45% smaller than among the low posttraumatic stress.

Analyzed another way, in the worldview-support condition, worldview defense was higher among high posttraumatic stress group than the low posttraumatic stress group ($t(192) = 2.03, d = .33$ [95%CI: .04, .57], $p = .04$). In contrast, in the worldview-threat condition, worldview defense was higher among low posttraumatic stress group than the high posttraumatic stress group ($t(202) = 2.33, d = .30$ [95%CI: .02, .57], $p = .02$).

Moderated Mediation

The observed interaction patterns were largely consistent with a priori hypotheses. Therefore, we next tested the prediction that among the low (but not high) posttraumatic stress

group, worldview threat would increase DTA, which would in turn mediate a corresponding increase in worldview defense. To do so, we conducted a formal test of the conditional indirect effect of worldview threat \rightarrow DTA \rightarrow worldview defense within the low and high posttraumatic stress groups using Model 8 (Figure 2, Panel A) of the PROCESS statistical macro for SPSS (Hayes, 2017). This model used a bootstrapping method (5,000 bootstrapped resamples) to estimate the various path coefficients specified in Figure 2 Panel B. Detailed model results are available in the online supplemental materials, Table S2. In addition to similarly detecting the abovementioned interactions on DTA and worldview defense, the model indicated that DTA was positively associated with worldview defense (path b_1) and indeed detected a conditional indirect effect (index of moderated mediation). Among the low posttraumatic stress group, worldview threat had a small indirect effect on worldview defense through DTA ($b = .05, 95\% CI = [.007, .13]$); in the high posttraumatic stress group, there was no such indirect effect ($b = -.01, 95\% CI = [-.07, .01]$). However, despite the clear indication of conditional mediation, note that the interac-

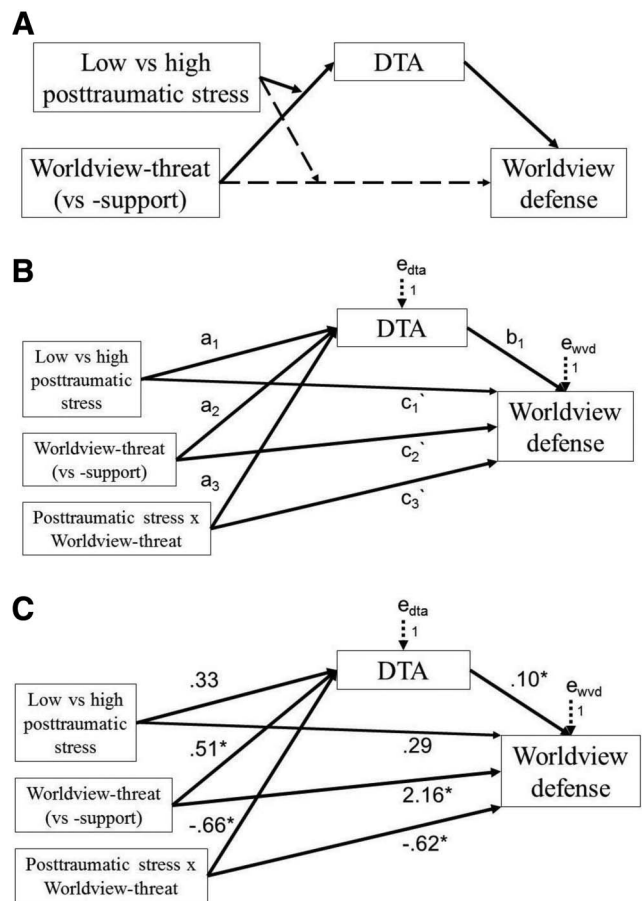


Figure 2. An illustration of the mediated moderation model, which revealed that increased DTA mediated the effect of worldview threat (vs. -support) on increased worldview defense among the low, but not the high, posttraumatic stress group. Panel A depicts the conceptual model, panel B the statistical model, and panel C the results. DTA = death thought accessibility. * $p \leq .05$.

This document is copyrighted by the American Psychological Association or one of its allied publishers. This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.

tion on worldview defense (path c_3) remained significant when controlling for DTA (Figure 2, Panel C), indicating that the effect on worldview defense was only partially mediated by DTA, suggesting other unknown/unmeasured mediators as well.

Discussion

The present study tested the hypothesis that posttraumatic stress reflects anxiety buffer disruption, rendering people's sociocultural belief systems less effective in protecting against increased death awareness, and therefore reducing their motivation to bolster and defend those belief systems. Specifically, we hypothesized that (a) among individuals with low posttraumatic stress, worldview threat (vs. -support) would increase DTA, which would in turn lead to (mediate) increased worldview defense; but (b) among those with high posttraumatic stress, worldview threat would neither increase DTA nor worldview defense. Results were largely consistent with those hypotheses.

The present findings in the low posttraumatic stress group are consistent with the broader TMT literature in a number of ways. First, the prior literature on the DTA hypothesis includes dozens of studies finding that threatening or undermining one's worldview increases the accessibility of death-related cognitions (Hayes et al., 2010). Second, the prior literature on the mortality salience hypothesis includes hundreds of studies showing that increased death awareness motivates people to affirm and defend their worldview-based beliefs and identities (Burke et al., 2010). Further, prior work also found that increased DTA mediates the impact of death-related stimuli on worldview defense (Fransen et al., 2008; Vail, Arndt et al., 2012). Together, that prior work suggests that people's sociocultural belief systems typically function to shield against increased death awareness, and that increased death-related thought motivates worldview defense to manage that awareness of death. The present findings in the low posttraumatic stress group converge with each of these sets of prior findings, as the worldview-threat (anti-United States condition) increased DTA, which mediated increased worldview defense.

However, the present research also suggests that these processes are limited to people with low posttraumatic stress symptoms. Consistent with ABDT, the present research found that high posttraumatic stress is associated with being less protected from death awareness and less engaged in defense of typically protective worldviews. First, in the no-threat (worldview-support) condition, the high posttraumatic stress group had elevated DTA. Second, the present findings among the high posttraumatic stress group contribute to a growing literature suggesting that posttraumatic stress symptoms reflect the disruption of otherwise normally functioning sociocultural anxiety buffers (Pyszczynski & Kesebir, 2011; Pyszczynski & Taylor, 2016). Studies have found that when reminded of death, high posttraumatic stress participants fail to engage typical worldview defenses (Abdollahi et al., 2011; Kesebir et al., 2011), and being prompted to engage in otherwise-effective worldview-based buffering tasks similarly fails to attenuate DTA following death reminders (Vail et al., 2018). The present research converges with that prior work and is the first to find that, consistent with ABDT, among the high posttraumatic stress group, worldview threat was not associated with increased DTA. Similarly, although worldview threat in the high posttrau-

matic stress group was, unexpectedly, still associated with increased worldview defense, the strength of this effect in the high posttraumatic stress group was 45% weaker than in the low posttraumatic stress group. Together, these findings suggest that posttraumatic stress may reflect disruption to sociocultural anxiety buffer systems, rendering people's sociocultural belief systems less able to shield against increased death awareness and thereby reducing people's motivation to bolster and defend those belief systems.

This research also highlights the distinction between the reasons mortality salience (death reminders) and worldview defense threats influence DTA. Mortality salience primes are simply reminders of death that prime related thoughts and thus increases DTA just like any other prime would increase thoughts related to it, and research shows that cultural worldview defenses function to manage that death awareness. Worldview threats, on the other hand, undermine the protection that one's (effectively functioning) worldview provides against death concerns and, consequently, can make such thoughts come to mind (become more accessible) more readily. Previous studies have shown that people with high PTSD and/or trauma exposure show especially large increases in DTA in response to death reminders, presumably because they lack the protection provided by a well-functioning worldview (anxiety buffer). From the perspective of ABDT, the present study shows that high PTSD participants do not show an increase in DTA in response to worldview threat, ostensibly because their worldview is no longer being used to protect them from death concerns. Thus, this study provides a new and distinct line of evidence that the worldviews of people with high PTSD levels are not used to buffer death concerns.

The present work also carries implications for mental health. Prior TMT research finds that effectively managing death awareness serves a mental health function, as failing to manage DTA is associated with greater anxiety and poorer well-being (Juhl & Routledge, 2016), greater depression (Edmondson et al., 2008) and more anxiety-related symptoms (Strachan et al., 2007), and may even be a transdiagnostic construct underlying a variety of anxiety-related disorders (Iverach et al., 2014). And ABDT research conducted during the brutal civil war in Cote d'Ivoire found that experimentally increasing death awareness exacerbated reported PTSD symptoms among those living in combat regions with higher trauma severity, and thus presumably stronger anxiety buffer disruption (Chatard et al., 2012). The present research similarly found that high posttraumatic stress is associated with being less protected from death awareness and less engaged in defense of typically protective worldviews, which may help explain why those with high posttraumatic stress are susceptible to anxiety, view the world as dangerous, have difficulty with intrusive thoughts about the trauma, and engage in effortful (and largely unsuccessful) attempts to avoid reminders of the experience—major PTSD symptom clusters.

Regarding implications for therapeutic treatment, common interventions for PTSD include cognitive processing therapy (Galovski, Wachen, Chard, Monson, & Resick, 2015) and prolonged exposure (Foa et al., 2005), which emphasize repeated mental and in vivo exposure coupled with anxiety management techniques. This and prior ABDT work (Yetzer & Pyszczynski, 2019) suggest effect treatment might also seek to restore anxiety buffer functioning (Iverach et al., 2014; Lewis, 2014; Major, Whelton, & Duff,

2016) by helping clients to rebuild effective sociocultural buffer systems, identify and commit to meaningful cultural belief systems, and (re)establish close social relationships.

Limitations and Future Directions

There are several possible limitations of this study. First, note that the PCL-C (Weathers et al., 1993) used here corresponds to the *DSM-IV*; a PCL-5 has been developed to correspond to the current *DSM-5*, and future research should follow that advance in assessment. Relatedly, we emphasize that the PCL measures only symptoms, and not the quantity, quality, or diversity of traumatic experiences (e.g., sexual abuse, natural disasters, combat) or comorbid conditions (e.g., depression). The present research did not include a measure of traumatic event exposure, such as the life experiences checklist (Gray, Litz, Hsu, & Lombardo, 2004), which is a limitation insofar as it becomes difficult to attribute the observed effects to stress following DSM-congruent traumas specifically (vs. DSM-incongruent stressors); that is, it is possible that PCL scores can be high in response to nontraumatic life stressors (Larsen & Pacella, 2016). Such a possibility is consistent with the ABDT perspective, which does suggest that posttraumatic stress is a reflection of anxiety buffer disruption but does not suggest the reverse—that traumatic experiences are the only cause of anxiety buffer disruption.

Additionally, at this stage ABDT does not appear to differentiate between various types of traumatic experiences and/or populations (e.g., veterans, community), but rather is focused on the psychological impact of having disrupted the assumptions of one's worldview belief system. There also remains an open question about the specific mechanisms of anxiety buffer disruption. One strong possibility is that some individuals may appraise specific experiences as high magnitude violations of their global meaning system, which can be measured (Park et al., 2012, 2016). Appraisals of global meaning system violations may also differ for different types of traumas/stressors (earthquakes, domestic violence, apostasy) and may be more or less likely as a function of individuals' various resilience factors, such as (low) need for structure (Vess, Routledge, Landau, & Arndt, 2009), mindfulness (Niemiec et al., 2010), or open-mindedness (Boyd, Morris, & Goldenberg, 2017), among others to be sure. We also note that the present work is limited in its generalizability and largely restricted to middle-aged, college-educated, non-Hispanic White Christians, leaving an open question about the effects of these processes among other demographic strata. Future ABDT research could further explore the impact of varieties of DSM-congruent traumas and DSM-incongruent stressors, specific populations, certain mechanisms, and various resilience and demographic factors.

We also note that in the low posttraumatic stress group, worldview threat had a medium effect ($d = .38$) on DTA and an exceptionally large effect ($d = 2.28$) on worldview defense; in contrast, in the high posttraumatic stress group, the effect of worldview threat on DTA was eliminated ($d = -.11$) whereas the effect was reduced by almost half but was still large ($d = 1.26$). This suggests that posttraumatic stress may disrupt the existential utility of worldviews, whereas other unmeasured factors continued to motivate worldview defense (or simply umbrage at rude tourists). The presence of multiple mechanisms is not inconsistent with the present analysis; many psychological processes are multiply

determined and ABDT does not claim that existential concerns (e.g., DTA) are the only forces at work; future research could therefore further investigate those other factors contributing to worldview defense.

Conclusion

This research contributes a theory-driven empirical test of the impact of posttraumatic stress on sociocultural anxiety buffer functioning. First, when individuals with low posttraumatic stress were presented with a worldview threat, they displayed increased death-related thought, which in turn mediated a large increase in worldview defense. Second, and in contrast, among those with high posttraumatic stress, worldview threat did not increase death-related thought and had only half the influence on worldview defense. The former finding converges with and supports prior TMT research, yet the latter finding reveals boundary conditions and is consistent with ABDT—suggesting that posttraumatic stress reflects anxiety buffer disruption, rendering people's sociocultural belief systems less effective in protecting against increased death awareness, and therefore reducing defense of those belief systems. Beyond theoretical implications, practical implications include improved understanding of the existential dimension of PTSD symptomatology, as failure to effectively manage death awareness is known to cause anxiety, exacerbate anxiety-related symptoms, and potentially contribute to PTSD.

References

- Abdollahi, A., Pyszczynski, T., Maxfield, M., & Luszczynska, A. (2011). Posttraumatic stress reactions as a disruption in anxiety-buffer functioning: Dissociation and responses to mortality salience as predictors of severity of posttraumatic symptoms. *Psychological Trauma: Theory, Research, Practice, and Policy*, *3*, 329–341. <http://dx.doi.org/10.1037/a0021084>
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Blanchard, E. B., Jones-Alexander, J., Buckley, T. C., & Forneris, C. A. (1996). Psychometric properties of the PTSD Checklist (PCL). *Behaviour Research and Therapy*, *34*, 669–673. [http://dx.doi.org/10.1016/0005-7967\(96\)00033-2](http://dx.doi.org/10.1016/0005-7967(96)00033-2)
- Boyd, P., Morris, K. L., & Goldenberg, J. L. (2017). Open to death: A moderating role of openness to experience in terror management. *Journal of Experimental Social Psychology*, *71*, 117–127. <http://dx.doi.org/10.1016/j.jesp.2017.03.003>
- Burke, B. L., Martens, A., & Faucher, E. H. (2010). Two decades of terror management theory: A meta-analysis of mortality salience research. *Personality and Social Psychology Review*, *14*, 155–195. <http://dx.doi.org/10.1177/1088868309352321>
- Chatard, A., Pyszczynski, T., Arndt, J., Selimbegović, L., Konan, P. N., & Van der Linden, M. (2012). Extent of trauma exposure and PTSD symptom severity as predictors of anxiety-buffer functioning. *Psychological Trauma: Theory, Research, Practice, and Policy*, *4*, 47–55. <http://dx.doi.org/10.1037/a0021085>
- Edmondson, D., Chaudoir, S. R., Mills, M. A., Park, C. L., Holub, J., & Bartkowiak, J. M. (2011). From shattered assumptions to weakened worldviews: Trauma symptoms signal anxiety buffer disruption. *Journal of Loss and Trauma*, *16*, 358–385. <http://dx.doi.org/10.1080/15325024.2011.572030>
- Edmondson, D., Park, C. L., Chaudoir, S. R., & Wortmann, J. H. (2008). Death without God: Religious struggle, death concerns, and depression in the terminally ill. *Psychological Science*, *19*, 754–758. <http://dx.doi.org/10.1111/j.1467-9280.2008.02152.x>

- Florian, V., Mikulincer, M., & Hirschberger, G. (2002). The anxiety-buffering function of close relationships: Evidence that relationship commitment acts as a terror management mechanism. *Journal of Personality and Social Psychology, 82*, 527–542. <http://dx.doi.org/10.1037/0022-3514.82.4.527>
- Foa, E. B., Hembree, E. A., Cahill, S. P., Rauch, S. A. M., Riggs, D. S., Feeny, N. C., & Yadin, E. (2005). Randomized trial of prolonged exposure for posttraumatic stress disorder with and without cognitive restructuring: Outcome at academic and community clinics. *Journal of Consulting and Clinical Psychology, 73*, 953–964. <http://dx.doi.org/10.1037/0022-006X.73.5.953>
- Fransen, M. L., Fennis, B. M., Pruyn, A. T. H., & Das, E. (2008). Rest in peace? Brand-induced mortality salience and consumer behavior. *Journal of Business Research, 61*, 1053–1061. <http://dx.doi.org/10.1016/j.jbusres.2007.09.020>
- Friedman, M., & Rholes, S. (2007). Successfully challenging fundamentalist beliefs results in increased death awareness. *Journal of Experimental Social Psychology, 43*, 794–801. <http://dx.doi.org/10.1016/j.jesp.2006.07.008>
- Gailliot, M. T. (2012). Mortality salience and metabolism: Glucose drinks reduce worldview defense caused by mortality salience. *Psychology, 3*, 991–996. <http://dx.doi.org/10.4236/psych.2012.311149>
- Galovski, T. E., Wachen, J. S., Chard, K. M., Monson, C. M., & Resick, P. A. (2015). Cognitive processing theory. In U. Schnyder & M. Cloitre (Eds.), *Evidence based treatments for trauma-related psychological disorders* (pp. 189–203). New York, NY: Springer International.
- Gray, M. J., Litz, B. T., Hsu, J. L., & Lombardo, T. W. (2004). Psychometric properties of the Life Events Checklist. *Assessment, 11*, 330–341. <http://dx.doi.org/10.1177/1073191104269954>
- Greenberg, J., Arndt, J., Schimel, J., Pyszczynski, T., & Solomon, S. (2001). Clarifying the function of mortality salience-induced worldview defense: Renewed suppression or reduced accessibility of death-related thoughts? *Journal of Experimental Social Psychology, 37*, 70–76. <http://dx.doi.org/10.1006/jesp.2000.1434>
- Greenberg, J., Martens, A., Jonas, E., Eisenstadt, D., Pyszczynski, T., & Solomon, S. (2003). Psychological defense in anticipation of anxiety: Eliminating the potential for anxiety eliminates the effect of mortality salience on worldview defense. *Psychological Science, 14*, 516–519. <http://dx.doi.org/10.1111/1467-9280.03454>
- Greenberg, J., Pyszczynski, T., Solomon, S., Rosenblatt, A., Veeder, M., Kirkland, S., & Lyon, D. (1990). Evidence for terror management theory II: The effects of mortality salience on reactions to those who threaten or bolster the cultural worldview. *Journal of Personality and Social Psychology, 58*, 308–318. <http://dx.doi.org/10.1037/0022-3514.58.2.308>
- Greenberg, J., Pyszczynski, T., Solomon, S., Simon, L., & Breus, M. (1994). Role of consciousness and accessibility of death-related thoughts in mortality salience effects. *Journal of Personality and Social Psychology, 67*, 627–637. <http://dx.doi.org/10.1037/0022-3514.67.4.627>
- Greenberg, J., Vail, K., & Pyszczynski, T. (2014). Terror management theory and research: How the desire for death transcendence drives our strivings for meaning and significance. *Advances in Motivation Science, 1*, 85–134. <http://dx.doi.org/10.1016/bs.adms.2014.08.003>
- Hayes, A. F. (2017). *Introduction to Mediation, Moderation, and Conditional Process Analysis, Second Edition: A Regression-Based Approach*. Guilford Publications.
- Hayes, J., Schimel, J., Arndt, J., & Faucher, E. H. (2010). A theoretical and empirical review of the death-thought accessibility concept in terror management research. *Psychological Bulletin, 136*, 699–739. <http://dx.doi.org/10.1037/a0020524>
- Hayes, J., Schimel, J., Faucher, E. H., & Williams, T. J. (2008). Evidence for the DTA Hypothesis II: Threatening self-esteem increases death-thought accessibility. *Journal of Experimental Social Psychology, 44*, 600–613. <http://dx.doi.org/10.1016/j.jesp.2008.01.004>
- Hayes, J., Schimel, J., & Williams, T. J. (2008). Fighting death with death: The buffering effects of learning that worldview violators have died. *Psychological Science, 19*, 501–507. <http://dx.doi.org/10.1111/j.1467-9280.2008.02115.x>
- Iverach, L., Menzies, R. G., & Menzies, R. E. (2014). Death anxiety and its role in psychopathology: Reviewing the status of a transdiagnostic construct. *Clinical Psychology Review, 34*, 580–593. <http://dx.doi.org/10.1016/j.cpr.2014.09.002>
- Janoff-Bulman, R. (1992). *Shattered assumptions: Towards a new psychology of trauma*. New York, NY: Free Press.
- Juhl, J., & Routledge, C. (2016). Putting the terror in terror management theory: Evidence that the awareness of death does cause anxiety and undermine psychological well-being. *Current Directions in Psychological Science, 25*, 99–103. <http://dx.doi.org/10.1177/0963721415625218>
- Kesebir, P., Luszczynska, A., Pyszczynski, T., & Benight, C. (2011). Posttraumatic stress disorder involves disrupted anxiety-buffer mechanisms. *Journal of Social and Clinical Psychology, 30*, 819–841. <http://dx.doi.org/10.1521/jscp.2011.30.8.819>
- Larsen, S. E., & Paccella, M. L. (2016). Comparing the effect of DSM-congruent traumas vs. DSM-incongruent stressors on PTSD symptoms: A meta-analytic review. *Journal of Anxiety Disorders, 38*, 37–46. <http://dx.doi.org/10.1016/j.janxdis.2016.01.001>
- Lerner, M. (1980). *Belief in a just world: A fundamental delusion*. New York, NY: Plenum Press. <http://dx.doi.org/10.1007/978-1-4899-0448-5>
- Lewis, A. M. (2014). Terror management theory applied clinically: Implications for existential-integrative psychotherapy. *Death Studies, 38*, 412–417. <http://dx.doi.org/10.1080/07481187.2012.753557>
- Major, R. J., Whelton, W. J., & Duff, C. T. (2016). Secure your buffers or stare at the sun? Terror management theory and psychotherapy integration. *Journal of Psychotherapy Integration, 26*, 22–35. <http://dx.doi.org/10.1037/a0039631>
- Niemiec, C. P., Brown, K. W., Kashdan, T. B., Cozzolino, P. J., Breen, W. E., Levesque-Bristol, C., & Ryan, R. M. (2010). Being present in the face of existential threat: The role of trait mindfulness in reducing defensive responses to mortality salience. *Journal of Personality and Social Psychology, 99*, 344–365. <http://dx.doi.org/10.1037/a0019388>
- Norris, F. H., & Hamblen, J. L. (2004). Standardized self-report measures of civilian trauma and PTSD. In J. P. Wilson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 63–102). New York, NY: Guilford Press
- Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin, 129*, 52–73. <http://dx.doi.org/10.1037/0033-2909.129.1.52>
- Park, C. L., Mills, M. A., & Edmondson, D. (2012). PTSD as meaning violation: Testing a cognitive worldview perspective. *Psychological Trauma: Theory, Research, Practice, and Policy, 4*, 66–73. <http://dx.doi.org/10.1037/a0018792>
- Park, C. L., Riley, K. E., George, L. S., Gutierrez, I. A., Hale, A. E., Cho, D., & Braun, T. D. (2016). Assessing disruptions in meaning: Development of the Global Meaning Violation Scale. *Cognitive Therapy and Research, 40*, 831–846. <http://dx.doi.org/10.1007/s10608-016-9794-9>
- Pyszczynski, T., & Kesebir, P. (2011). Anxiety buffer disruption theory: A terror management account of posttraumatic stress disorder. *Anxiety, Stress, and Coping, 24*, 3–26. <http://dx.doi.org/10.1080/10615806.2010.517524>
- Pyszczynski, T., & Taylor, J. (2016). When the buffer breaks: Disrupted terror management in posttraumatic stress disorder. *Current Directions in Psychological Science, 25*, 286–290. <http://dx.doi.org/10.1177/0963721416645537>
- Schimel, J., Hayes, J., Williams, T., & Jahrig, J. (2007). Is death really the worm at the core? Converging evidence that worldview threat increases death-thought accessibility. *Journal of Personality and Social Psychology, 92*, 789–803. <http://dx.doi.org/10.1037/0022-3514.92.5.789>

- Simon, L., Greenberg, J., Harmon-Jones, E., Solomon, S., Pyszczynski, T., Arndt, J., & Abend, T. (1997). Terror management and cognitive-experiential self-theory: Evidence that terror management occurs in the experiential system. *Journal of Personality and Social Psychology*, *72*, 1132–1146.
- Strachan, E., Schimel, J., Arndt, J., Williams, T., Solomon, S., Pyszczynski, T., & Greenberg, J. (2007). Terror mismanagement: Evidence that mortality salience exacerbates phobic and compulsive behaviors. *Personality and Social Psychology Bulletin*, *33*, 1137–1151. <http://dx.doi.org/10.1177/0146167207303018>
- Vail, K. E., III, Arndt, J., Motyl, M., & Pyszczynski, T. (2012). The aftermath of destruction: Images of destroyed buildings increase support for war, dogmatism, and death thought accessibility. *Journal of Experimental Social Psychology*, *48*, 1069–1081. <http://dx.doi.org/10.1016/j.jesp.2012.05.004>
- Vail, K. E., III, Juhl, J., Arndt, J., Vess, M., Routledge, C., & Rutjens, B. T. (2012). When death is good for life: Considering the positive trajectories of terror management. *Personality and Social Psychology Review*, *16*, 303–329. <http://dx.doi.org/10.1177/1088868312440046>
- Vail, K. E., III, Morgan, A., & Kahle, L. (2018). Self-affirmation attenuates death-thought accessibility after mortality salience, but not among a high post-traumatic stress sample. *Psychological Trauma: Theory, Research, Practice, and Policy*, *10*, 112–120. <http://dx.doi.org/10.1037/tra0000304>
- Vess, M., Routledge, C., Landau, M. J., & Arndt, J. (2009). The dynamics of death and meaning: The effects of death-relevant cognitions and personal need for structure on perceptions of meaning in life. *Journal of Personality and Social Psychology*, *97*, 728–744. <http://dx.doi.org/10.1037/a0016417>
- Weathers, F., Litz, B., Herman, D., Huska, J. A., & Keane, T. (1993). *The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility*. Paper Presented at the Annual Convention of the International Society for Traumatic Stress Studies.
- Yetzer, A. M., & Pyszczynski, T. (2019). Terror management theory & psychological disorder: Ineffective anxiety-buffer functioning as a transdiagnostic vulnerability factor for psychopathology. In M. Vess & C. Routledge (Eds.), *Handbook of terror management theory* (pp. 417–447). Amsterdam, The Netherlands: Elsevier.

Received October 1, 2018

Revision received December 30, 2018

Accepted January 11, 2019 ■