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Evidence for the DTA Hypothesis II: Threatening Self-Esteem Increases the Accessibility of Death Thoughts

by

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Abstract

Two studies assess the impact of self-esteem threat on the unconscious accessibility of death thoughts. In Study 1, self-esteem was threatened by means of false feedback on an intelligence test. Participants whose self-esteem was invested in their intelligence receive positive, negative, or no feedback. In Study 2, participants' career aspirations were undermined after completing a career suitability questionnaire. Participants were told that their personality was either suited or ill suited for their chosen career path. In both studies, death thought accessibility was assessed via reaction times on a lexical decision task. Response latencies were recorded for death, negative, and neutral content. Discussion focuses on theoretical implications regarding self-esteem generally, and TMT more specifically.

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Evidence for the DTA Hypothesis II: Threatening Self-Esteem Increases the Accessibility of Death Thoughts

A primary impetus to the development of terror management theory (TMT) was to explain why people need self-esteem (Solomon, Greenberg, & Pyszczynski, 1991; Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004). From the perspective of TMT, people strive to maintain high levels of self-esteem because doing so shelters them from deeply rooted thoughts and concerns about human mortality. To put it another way, believing that our values, competencies, social identifications and life goals are meaningful and worthwhile provides us with the fortitude to go on living despite anxiety resulting from the awareness that we may be no more significant or enduring than lizards, beetles, or any other form of life. According to this view, if self-esteem functions to protect people from thoughts and concerns about death, then substantial threats to one's bases of self-esteem should lead to higher levels of death-thought accessibility in the absence of any explicit reminders of mortality. The goal of the current research was to assess this hypothesis.

Terror management theory

Terror management theory (TMT), based on the writings of Ernest Becker (1971, 1973, 1975), emphasizes the central role of death awareness in our everyday lives. The theory posits that although we share with other life forms a basic instinct for self-preservation, we differ from them significantly in terms of various cognitive abilities (e.g., self-consciousness and the ability to contemplate future events). These skills clearly enhance our ability to survive; however, they also make us aware of our inevitable mortality. In other words, we must live our lives knowing that we will ultimately die.

This knowledge of our mortality conflicts with our animal instinct for self-preservation and thus creates the potential to experience overwhelming levels of anxiety that would render ongoing, goal-directed activity burdensome if not altogether impossible. Thus, in order to carry out the daily tasks of living with a modicum of equanimity, humans had to find a way to keep their existential anxiety in check. According to TMT, humans accomplish this through the construction and maintenance of cultural belief systems, which provide people with an explanation of human existence (e.g., who we are and where we came from), standards and values to live by (e.g., what is good and what we should do with ourselves), and a promise of death transcendence for those who live up to the standards and values of their cultural belief system. Self-esteem is therefore the belief that one is a valuable member of a meaningful cultural worldview. Together, faith in one's cultural worldview and self-esteem function to protect people from deeply rooted fear concerning mortality.

Empirical assessments of TMT

Research conducted to assess the validity of TMT has traditionally been guided by two general hypotheses (see Greenberg, Solomon, & Pyszczynski, 1997). The first of these has been termed the *anxiety-buffer hypothesis*, and states that if self-esteem provides protection against anxiety, augmenting one's sense of self-worth should reduce anxiety in response to subsequent threats. In support of this notion several studies have shown that when self-esteem is increased or is dispositionally high, participants show less anxiety and defensiveness in response to the threat of receiving painful electric shocks or viewing graphic images of death (e.g., Greenberg, Pyszczynski, Solomon, Pinel, Simon, & Jordan, 1993; Greenberg et al., 1992).

A second hypothesis that has guided TMT research is referred to as the *mortality salience hypothesis*. This hypothesis states that if a psychological structure provides protection against thoughts about death, then reminding people of their mortality should increase their need for these psychological structures. In other words, reminding people of their mortality should, at least temporarily, elevate their need for self-esteem and faith in their cultural worldview. This hypothesis has received widespread support from several empirical studies conducted in both laboratory and field settings (see Pyszczynski et al., 2004 for a review). For example, reminders of mortality have been shown to increase positive evaluations of people who share similar religious and political ideologies and to decrease positive evaluations of people those with opposing religious and political ideologies (e.g., Greenberg, et al 1990). Furthermore, death reminders have been shown to increase attitudes and behaviors that are relevant for the individual's self-esteem such as driving ability (Taubman-Ben-Ari, Florian, & Mikulincer, 1999), physical strength (Peters, Greenberg, Williams, & Schneider, 2005) and material wealth (Arndt, Solomon, Kasser & Sheldon, 2004; see Pyszczynski et al., 2004 for a review).

The death thought accessibility hypothesis

Although the majority of studies supporting TMT have focused on the anxiety buffer and mortality salience hypothesis, Schimel, Hayes, Williams, and Jahrig (in press) recently proposed that a third general hypothesis can be derived from TMT, namely, *the death thought accessibility hypothesis*. This hypothesis is essentially the converse of the mortality salience hypothesis and states that if a psychological structure provides protection from thoughts of death, then threatening this structure should render death thoughts more accessible to conscious awareness. Initial support for the DTA hypothesis

has been demonstrated in a handful of recent studies. For example, Mikulincer, Florian and colleagues (Florian et al., 2002; Mikulincer, Florian and Hirschberger, 2003) found that having people think about problems in their current romantic relationship, or having people think about separation from their current partner, subsequently increased DTA. According to Mikulincer and colleagues, relationships allay concerns about death by providing a basis for achieving symbolic immortality through procreation and living on through one's offspring (see also Hart, Shaver & Goldenberg, 2005). Because relationships are linked with the means of achieving symbolic immortality, threatening them increases the unconscious accessibility of death thoughts. Other research supporting the DTA hypothesis has shown that threats to just world beliefs can increase DTA. For example, Landau et al. (2004, Study 6) recently found that people high in personal need for structure (PNS; Neuberg & Newsome, 1993) had particularly high DTA after reading an article about a good person who was the victim of a senseless crime. According to Landau et al. (2004), evidence that bad things happen to good people is particularly threatening to high PNS individuals because a just conception of the world is a psychological structure that these individuals use to control existential fear.

Although these prior studies examined peripheral versions of the DTA hypothesis, until recently, no research had examined TMT's central proposition that threats to the cultural worldview or self-esteem would bring death thoughts closer to consciousness. In an effort to close this empirical gap, Schimel et al. (in press) recently examined DTA in response to worldview threat by exposing Canadian participants to a webpage that attacked fundamental Canadian values or a webpage that attacked values that were irrelevant to their worldview (i.e., Australian values). Not only did Schimel et al. (in

press) find higher levels of DTA among those who were exposed to the anti-Canada webpage, but they also found lower levels of DTA when participants had a chance to defensively dismiss the threatening content of the webpage. As an extension of this research Schimel et al. (in press; Study 5) also found that exposing participants with a pro-creation (vs. pro-evolution) worldview to a scientific article that strongly contradicted a creationists' perspective, subsequently increased their level of DTA.

Overview of the current research.

According to TMT, our cultural anxiety buffers are composed of a worldview and self-esteem. As such, these psychological structures play a central role in assuaging concerns about death. The DTA hypothesis maintains that any threat to the anxiety buffer should make thoughts of death more accessible to consciousness. In other words, threatening the cultural worldview or self-esteem should increase DTA. Although Schimel et al. (in press) have shown increased DTA following a worldview threat, our goal was to extend this research by examining the impact of a self-esteem threat on DTA. To this end, we conducted two studies in which we threatened participants' self-esteem and then measured DTA. In Study 1, self-esteem was threatened via false feedback on an intelligence test. In Study 2, self-esteem was operationalized in terms of career aspirations, and was threatened by suggesting that participants' personality is ill suited for their desired career. In both studies DTA was assessed by measuring the relative accessibility of death constructs to that of negative and neutral constructs within the context of a lexical decision task.

Study 1

In order to address the impact of a self-esteem threat on DTA, we first conducted a study in which self-esteem was experimentally manipulated through false feedback on an intelligence test. Participants indicating in a previous mass testing session that intelligence was highly relevant for their self-worth were selected to participate in the study. We had participants complete an IQ test and then gave them feedback that they had scored above average or below average, or we gave them no feedback about their performance. Then, by assessing reaction times on a lexical decision task, we measured participants' accessibility of death, negative, and neutral thoughts. We expected participants who received negative feedback about their intelligence to have a higher level of DTA relative to those who received positive or no feedback. Moreover, among those who received negative feedback, we expected participants to have elevated levels of DTA relative to the accessibility of negative and neutral thoughts.

Method

Participants and Design. Sixty-two introductory psychology students at the University of Alberta participated in the study as partial fulfillment of course requirements, and were tested in groups of three or four. Participants were recruited on the basis of their responses to three questions included in a mass-testing session at the beginning of the semester. The questions were designed to assess the extent to which participants' self-esteem is invested in being intelligent and read: (1) *My self-esteem is influenced by how smart people think I am*; (2) *I feel better about myself when I feel intelligent*; (3) *I don't care how smart I appear to other people* (reverse scored). Only students scoring 5 or above on a 7-point scale (where 1 denotes *completely disagree* and

7 denotes *completely agree*) on all three questions were eligible to participate in the experiment. Participants were randomly assigned to one of three conditions in a 3(Intelligence feedback: positive vs. negative vs. none) X 3(construct accessibility: death vs. negative vs. neutral) mixed factorial design. Of the 62 participants, five were excluded for either misunderstanding, or suspecting the authenticity of the IQ feedback, leaving a total of 57 participants (18 males, 38 females, and 1 unknown) for the data analysis.

Procedure. The study was presented as an investigation of intelligence and its relation to cognitive and motor skills (CMS). Participants were informed that they would take an IQ test, and then perform a CMS task. All materials were presented on a Pentium III computer using e-prime software version 1.1, a program designed for the presentation of stimuli for psychological research. Before beginning, participants completed 10 practice trials of the CMS task (which was a lexical decision task) to reduce any practice effects during the experimental trials. Participants were told that these practice trials were included so that they would be familiar with the task when the time came. In private cubicles, each participant was seated in front a 15-inch computer monitor that was placed at a standard distance of 25 cm from the edge of the desk. Upon completion of the practice trials, the experimenter ensured that each participant had understood the task before proceeding to the IQ test.

The IQ test consisted of 20 multiple-choice questions of varying difficulty. Participants were told that their score would reflect a combination of whether or not they got the question right, as well as the amount of time taken to answer. This was done to lend credibility to the false feedback manipulation, regardless of how well participants *thought* they performed. Upon completion of the IQ test, participants were randomly

assigned one of three feedback manipulations. In the positive feedback condition, participants were informed that their IQ score was 139 and that in relation to other students, their score fell at the 92nd percentile. In the negative feedback condition, participants were told that their score was 91, which fell at the 35th percentile relative to other students. In the control condition, participants were told that they would receive their IQ score at the end of the experiment. Once participants were finished viewing their feedback, they informed the experimenter that they were ready to proceed to the next phase of the study.

In this phase, participants performed the CMS task. This task, which was a lexical decision task, involved distinguishing between words and non-words presented on the computer screen. Participants were instructed to press a key labeled "word" if they saw a word and a key labeled "non-word" if they saw a non-word. The task was comprised of 70 trials, presented in the same random order to all participants, which consisted of 40 non-words, 18 neutral words, 6 negative words, and 6 death words. Participants were instructed to proceed as quickly as possible, while trying to answer each trial correctly. Unbeknownst to participants, the computer recorded the speed with which they responded to each of the 70 trials. To facilitate a direct comparison of reaction times for each type of word, we controlled for word length and frequency of use in the English language, such that they would be roughly equal across word types (see Table 1). Upon completion of this task, participants again informed the experimenter that they were ready to proceed.

In the final phase of the study, the experimenter handed each participant an envelope that contained 4 manipulation check questions to assess participants'

Table 1

Frequency per million and word length (in characters) by word type

Death Words	*freq.*	*length*	Negative Words	*freq.*	*length*
Buried	21.06	6	Suffer	24.21	6
Dead	196.54	4	Wrong	212.80	5
Skull	11.58	5	Jerk	12.00	4
Killed	120.70	6	Fight	117.81	5
Grave	29.11	5	Fail	28.49	4
Coffin	4.43	6	Punish	6.64	7
M	63.90	5.3	*M*	66.99	5.0

NOTE: Mean frequency and length for neutral words were 64.26 and 5.7 respectively. Reprinted from Schimel et al. (in press).

impressions of their IQ feedback. These questions read: (1) *I performed well on the IQ test*; (2) *I am happy with the result of the IQ test*; (3) *My score on the IQ test is an accurate reflection of my intelligence*; and (4) *I performed to the best of my abilities on the IQ test*. Participants were asked to rate their agreement with each question on a 7-point scale (where 1 indicates *completely disagree*, and 7 indicates *completely agree*). Once completed, participants were probed for suspicion and fully debriefed.

Results

Manipulation checks. To assess whether our feedback manipulation had the desired effect, we summed the manipulation check items to form an overall composite of participants' satisfaction with their performance such that higher scores denote higher satisfaction ($\alpha = .93$). This composite was then subjected to a one-way ANOVA revealing a highly significant effect of feedback condition, $F(2, 54) = 64.28, p < .001$. Post-hoc comparisons revealed that satisfaction was significantly higher in response to positive feedback relative to no feedback, $t(54) = 6.20, p < .001$. Moreover, participants' level of satisfaction was significantly lower in response to negative feedback relative to no feedback, $t(54) = 5.57, p < .001$.

Construct Accessibility. In order to assess the impact of self-esteem threat on construct accessibility, we first conducted some minor transformations to our reaction time data. In keeping with accepted procedures for this type of data, we cropped outlying response latencies such that any response that was greater than 2,000 ms was recoded to 2,000 ms (see Bargh and Chartrand, 2000). In addition, any incorrect responses were excluded from the analysis. Mean reaction times (RT) were then computed for death, negative, and neutral words for each participant. Although response latency data often

violates assumptions of homogeneity of variance, after performing the above mentioned minor transformations, our sample did not encounter this problem, $F_{max} = 3.92$, and the assumption of sphericity was also met, $\chi^2(2) = 2.14$, $p > .30$.

A 3 (feedback: positive vs. negative vs. none) between-subjects X 3 (accessibility: death vs. negative vs. neutral) within-subjects ANOVA was then conducted on the mean RTs. This analysis revealed only the predicted feedback X accessibility interaction, $F(4, 108) = 2.66$, $p < .04$. The cell means and standard deviations for this interaction are presented in Table 2.

Given that we had a priori predictions regarding the precise pattern of results, we conducted planned comparisons to assess these predictions. Within the negative feedback group, we expected significantly faster RTs to death words than both negative and neutral words. In contrast, we expected no differences among word types within both the positive and no feedback conditions. To assess these predictions, we first conducted three separate within-subjects ANOVAs for each level of feedback. These analyses revealed only a significant effect in the negative feedback condition, $F(2, 32) = 5.02$, $p < .02$. There was no difference among word types within the positive feedback condition, $F < 1$, *ns*, nor the no feedback condition, $F < 1$, *ns*. To further assess the nature of the effect in the negative feedback condition, we conducted two planned contrasts. In the first comparison we assigned contrast weights of 2, -1, and -1 to the mean response latencies for the death, negative and neutral words, respectively. In the second comparison we assigned contrast weights of +1 and -1 to the mean RTs of the negative and neutral words, respectively. The first comparison was significant, $t(16) = 3.54$, $p < .01$, whereas the second comparison was not, $t < 1$, *ns*.

Table 2

Mean response latencies for the interaction of feedback by word type in Study 1.

	Word Type		
Feedback	Death	Negative	Neutral
Positive	613.4 (96.0) $n = 19$	604.9 (64.9) $n = 19$	612.8 (86.5) $n = 19$
Negative	564.5 (72.3) $n = 17$	610.5 (63.0) $n = 17$	605.7 (100.0) $n = 17$
None	613.9 (124.7) $n = 21$	605.9 (103.27) $n = 21$	603.2 (104.2) $n = 21$

NOTE: Standard deviations are presented in parentheses. Lower mean values represent faster reaction times (in milliseconds).

Discussion

The results of Study 1 provide initial support for the notion that self-esteem helps keep thoughts of death from entering consciousness. Subjecting participants to a self-esteem threat lead to an increase in DTA relative to participants who were not subjected to such a threat. More specifically, participants in the negative IQ feedback condition had faster reaction times to death words than did participants in the positive and no-feedback conditions. Moreover, the results show that this increase in DTA for participants in the negative feedback condition was not the result of a more general increase in the accessibility of negative constructs. Within the negative condition, participants had significantly faster reaction times to death words relative to both negative and neutral words. This pattern, however, was not observed for participants in the positive and no-feedback conditions. Reaction times were essentially equal, regardless of wordtype, for participants in these two conditions.

Importantly, significant differences among the manipulation check items demonstrate that our self-esteem feedback did indeed have the desired impact. Participants in the positive feedback condition perceived their IQ results to be significantly better than participants in the control condition, who in turn perceived their results to be better than participants in the negative condition. This suggests that DTA was highest in the negative feedback condition because self-esteem was indeed threatened for these participants.

At first glance, given that perceived performance was significantly different between the positive and no feedback conditions, it may seem somewhat surprising that these two conditions did not differ with regard to DTA. According to the overall analysis,

only the negative feedback condition showed increased DTA relative to both the positive and the no-feedback conditions. Although we did not expect DTA to differ between the positive and no-feedback conditions, it would be reasonable to assume that the positive feedback provided participants with a self-esteem boost, which might have in turn lead these participants to be further buffered from thoughts of death. One explanation for why this result may not have been obtained is because being buffered against thoughts of death might simply mean that such thoughts are no more likely to enter consciousness than any other thought. Thus, once thoughts of death are equally accessible as any other type of thought, one has reached the maximum amount of buffering. If this reasoning is correct, given that in both the positive and no-feedback conditions, death and neutral RTs are essentially equal, death thoughts are simply not especially accessible for participants in either condition. It is only when one's self-esteem has been significantly threatened, as is the case for participants in the negative feedback condition, that thoughts of death become more likely to enter consciousness than other thoughts.

Overall, the results of Study 1 provide strong support for the notion that self-esteem helps keep thoughts of death from entering consciousness. When people's self-esteem was undermined, thoughts of death became more accessible to awareness. Although this study provides compelling evidence in support of the DTA hypothesis, we nevertheless conducted a second study to replicate and extend this finding to a broader type of self-esteem threat that more closely reflects TMT's conceptualization of self-esteem.

Study 2

Although the belief that one is intelligent can no doubt make up a significant portion of one's self-worth, a more complete conceptualization of self-esteem goes beyond any mere belief that one possesses a particular valued trait. Our overall self-evaluations are based not only on beliefs about who we are currently, but can also include beliefs of what we might one day become. According to Markus and Nurius (1986) our self-concept is also comprised of *possible selves*, which include the ideal selves toward which we strive. The extent to which we believe that we will be successful in becoming these ideal selves can therefore contribute significantly to our overall feelings of self-worth. Indeed, William James (1890) describes self-esteem as the ratio of our successes to our pretensions. In other words, what we aspire to become is as much an aspect of self-esteem as what we feel we are already.

This perspective is entirely consistent with a TMT conceptualization of self-esteem. According to TMT, self-esteem is ultimately the belief that one is a valuable contributor to a meaningful world. In Western society at least, becoming a valuable contributor in the world involves a fair bit of preparation. From birth, we are encouraged to imagine what we might become when we are older. Eventually, most people develop a sense of who they would like to be, and over the course of their lives, attempt to fulfill this projection. In other words, we are continuously engaged in a life project, and according to TMT, this project helps us to believe that there is purpose to our existence and that our lives are worth living. These life projects will most certainly take different forms at different points in our lives, but to maintain self-esteem we must believe that we

are progressing toward some desired end. When we reach a roadblock in our life projects, we may come to reflect upon our existential dilemma anew.

For most introductory university students, a life project is yet in its infancy, and is often still relatively inchoate. However, nearly every university student has chosen the path to education in pursuit of a valuable career. Indeed, the very reason for seeking a post-secondary education is to acquire valued employment. Furthermore, a good number of students have decided on a career path with a fair degree on certainty. Thus, for these students, continued indication that they will be successful in achieving their career aspirations (c.f., Gollwitzer & Kirchhof, 1998; Wicklund & Gollwitzer, 1981) provides a sense that they are well on their way to becoming valuable members of society. Thus, from a TMT perspective, the extent to which one believes that he or she will achieve career success will make up a significant portion of the average student's self-esteem. An alternative way of threatening a student's self-esteem would therefore involve calling into question that student's ability to succeed in his or her career aspirations. Thus, in Study 3 we threatened participants' self-esteem by telling them they were either well suited or ill suited to their desired career choice and then assessed their level of death, negative and neutral thoughts.

To ensure that all of our participants were invested in the pursuit of a career, we selected only participants who were particularly focused on pursuing a specific career. After administering the career suitability feedback, we measured DTA in the same way that was used in Study 2: measuring the accessibility of death, negative, and neutral constructs in the context of a lexical decision task. We expected significantly more DTA for participants in the incongruent than in the congruent feedback condition. Moreover,

consistent with the results of Study 1, we expected this increase in DTA to be independent of a more general increase in the accessibility of negative constructs. More specifically, within the incongruent feedback condition we expected reaction times to death words to be significantly faster than both neutral and negative words, while there should be no difference in reaction times among word types in the congruent feedback condition.

Method

Participants and Design. Thirty-one (12 males, 18 females, and 1 unknown) introductory psychology students at the University of Alberta participated in the study as partial fulfillment of course requirements, and were tested in groups ranging from two to four. Participants were recruited on the basis of their responses to three questions included in a mass-testing session at the beginning of the semester. The questions were designed to assess the life project in which students were invested. First, students were asked: *If you had to choose between becoming a stay at home Mom/Dad or pursuing a professional career and you could only choose one, which one would it be?* Only those who chose a professional career were eligible to participate. Furthermore, students were asked to indicate what career they hoped to pursue, and to indicate on an 8-point scale (where 1 denotes *not at all* and 8 denotes *very much*) (1) *How important is it for you to pursue this career*; (2) *To what extent are you certain that you want to pursue this career*; and (3) *How upset would you be if you were unable to pursue this career*. Only students who reported 7 or higher to all three of these questions were eligible to participate in the experiment. Participants were randomly assigned to one of two conditions in a 2(career feedback: congruent vs. incongruent) X 3(construct accessibility: death vs. negative vs.

neutral) mixed factorial design. Of 31 participants, one was excluded for suspicion of the cover story, leaving a total of 30 participants (11 males, 18 females, and 1 unknown) for the data analysis.

Procedure. The procedure for Study 3 was nearly identical to that used in Study 2. This time, however, the study was presented as an investigation of career suitability and its relation to cognitive and motor skills (CMS). Participants were told that they would complete a personality questionnaire designed to assess career suitability, and then perform a CMS task. All materials were again presented on Pentium III computers using e-prime software version 1.1. As was the case in Study 1, participants engaged in 10 practice trials of the CMS task before beginning, and the experimenter ensured that all participants understood the task before proceeding to the career suitability test.

The career suitability test, which we termed the Personality-based Career Suitability Scale (PCSS), consisted of 96 multiple-choice questions that were ostensibly designed to measure scores on the Big-Five personality dimensions. Regardless of how participants responded to these questions, however, they all received the same set of relatively meaningless personality scores (see top of Figure 1). Next, participants were prompted to type their career choice into the computer. They were informed that the program would then display the ideal personality scores associated with that career so that participants could compare these scores to their own. Regardless of what career choice was entered into the computer, participants were randomly assigned to one of two feedback conditions (congruent vs. incongruent). In the congruent feedback condition, the computer displayed career-ideal personality scores that were quite similar to participants' own scores, amounting to a total difference score of only 6 points across the

Figure 1

Career Feedback Manipulation (Congruent vs. Incongruent) used in Study 2.

Your personality scores:

Openness to Experience: 36
Conscientiousness: 45
Extroversion: 41
Agreeableness: 37
Neuroticism: 21

Ideal personality scores associated with your career choice:

Congruent condition:
Openness to Experience: 37
Conscientiousness: 43
Extroversion: 42
Agreeableness: 36
Neuroticism: 22

Total difference = 6

Incongruent condition:
Openness to Experience: 47
Conscientiousness: 51
Extroversion: 56
Agreeableness: 44
Neuroticism: 12

Total difference = 47

Difference:	Compatibility:
less than 10	Your personality is very compatible with this career.
between 10-20	Your personality is compatible with this career.
between 20-30	Your personality is somewhat compatible with this career.
more than 30	Your personality is incompatible with this career.

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5 personality dimensions. In the incongruent feedback condition, however, the career-ideal scores were quite divergent from participants' own scores, with a total difference of 47 points. Participants were also given instructions on how to interpret their difference scores, indicating that their personality was 'very compatible' with their career in the congruent condition and 'incompatible' with their career in the incongruent condition (see Figure 1).

After having viewed their career feedback, participants proceeded to the cognitive and motor skills task, which was in fact a lexical decision task, used to measure DTA in the same manner as in Study 2. After completing the lexical decision task, participants answered a number of manipulation check questions designed to assess individual perceptions of the career feedback. Similar to Study 2, these questions were included to ensure that our career feedback manipulation was indeed threatening to participants in the incongruent condition. Participants were asked to rate there agreement to each of the following question on a 7-point scale (where 1 indicates *completely disagree* and 7 indicates *completely agree*): (1) *I am happy with the career suitability assessment made by the PCSS*; (2) *I was satisfied with the results of the PCSS*; (3) *The PCSS made an accurate assessment of my career suitability*; and (4) *My career suitability, as outlined by the PCSS, is consistent with my career aspirations*. Upon completion, participants were probed for suspicion and fully debriefed.

Results

Manipulation Checks. An overall composite of participants' satisfaction with their feedback was created by summing their responses to the four manipulation check items ($\alpha = .99$). This composite was then subjected to an independent-samples t-test, revealing

a highly significant difference, $t(28) = 13.23, p < .001$, such that participants in the congruent condition reported more satisfaction with their career feedback than did participants in the incongruent condition.

Construct Accessibility. In order to assess the impact of career suitability feedback on DTA, we performed the same minor transformations to our reaction time data that we did in Study 1. More specifically, we cropped outlying response latencies that were greater than 2,000ms and recoded them to 2,000ms (see Bargh and Chartrand, 2000), and all incorrect responses were excluded from the analysis. Mean reaction times (RT) were then computed for death, negative, and neutral words for each participant. Once again, after performing these minor transformations the data did not violate assumptions of homogeneity of variance, $F_{max} = 2.08$. However, the data did violate the assumption of sphericity, $\chi^2(2) = 12.03, p < .01$. As such, in testing the significance of our omnibus F value, we used the Geisser and Greenhouse (1958) adjusted degrees of freedom. Given that this adjustment is the most conservative test of the null hypothesis, if this procedure produces a significant result, there is increased confidence that the outcome is indeed significant, irrespective of the sphericity assumption (Hays, 1994). A 2 (career feedback: congruent vs. incongruent) between-subjects X 3 (accessibility: death vs. negative vs. neutral) within-subjects ANOVA was thus conducted on the mean RTs, revealing only the predicted feedback X accessibility interaction, $F(1.47, 56) = 3.73, p < .05$ (with Geisser-Greenhouse adjusted degrees of freedom). The cell means and standard deviations for this interaction are presented in Table 3.

Given that we had a priori predictions, we conducted two separate within-subjects ANOVAs on each feedback group. Specifically, we expected death RTs to be

Table 3

Mean response latencies for the interaction of feedback by word type in Study 2.

	Word Type		
Feedback	Death	Negative	Neutral
Congruent	650.3 (121.6) $n = 15$	637.6 (92.5) $n = 15$	635.3 (114.1) $n = 15$
Incongruent	556.0 (84.3) $n = 15$	593.2 (101.8) $n = 15$	597.0 (106.1) $n = 15$

NOTE: Standard deviations are presented in parentheses. Lower mean values represent faster reaction times (in milliseconds).

significantly faster than both negative and neutral RTs within the incongruent condition. Within the congruent condition, however, we expected no differences among RTs for each word type. Accordingly, separate within-subjects ANOVAs revealed a significant effect of word-type in the incongruent condition, $F(2, 28) = 5.04, p < .02$ (sphericity assumed, $\chi^2(2) = 2.10, p > .35$), but not in the congruent condition, $F < 1$. To further assess the nature of the effect in the incongruent condition, we conducted two planned contrasts using the same contrast weights as those assigned in Study 1. More specifically, weights of 2, -1, and -1 to death, negative and neutral RTs, respectively, were assigned in the first contrast, and weights of +1 and -1 to negative and neutral RTs, respectively, in the second. The first comparison was significant, $t(14) = 2.74, p < .02$, whereas the second comparison was not, $t < 1$, *ns*.

Discussion

The results provide further support for the notion that self-esteem helps to keep thoughts of death out of consciousness. Consistent with the results of Study 1, participants under self-esteem threat displayed higher DTA than did participants who were not subjected to such a threat. More specifically, participants who received incongruent career feedback displayed faster reaction times to death words than did participants in the congruent feedback condition. Once again, the increase in DTA was found not to be the result of a more general increase in the accessibility of negative thoughts. Within the incongruent condition, death RTs were significantly faster than both negative and neutral RTs. Moreover, the manipulation check items demonstrate that our career feedback was indeed threatening to participants. Participants in the incongruent feedback condition reported far less overall satisfaction with the results of the career

suitability test than did participants in the congruent condition. This suggests that the heightened DTA observed in the incongruent feedback condition was indeed the result of the self-esteem threatening nature of the career results.

The results of Study 2 mirror those of Study 1, providing conceptual replication and adding further support for the DTA hypothesis. One interesting aspect of the data in Study 2 that was not observed in Study 1, however, was the overall increase in speed of reaction times regardless of word type for participants in the incongruent feedback condition. As shown in Table 3, participants in the incongruent condition had faster reaction times across the board compared to participants in the congruent condition. Although this main effect was not quite significant, $F(1, 28) = 2.72, p > .10$, it is interesting to note that this general pattern of results was also obtained in Schimel et al.'s (in press) Study 3, which used similar methodology. Schimel and colleagues speculated that the overall decrease in reaction times might have been the result of increased arousal among participants who were subjected to the anti-Canada worldview threat. As suggested by Schimel et al. (in press), it may be that the increase in arousal led to increased vigilance in responding to all words in the lexical decision task. Assuming that this process may also have been acting upon participants in the present study, it seems somewhat puzzling that this pattern was not obtained in Study 1. Why would the career self-esteem threat have increased arousal, when the IQ threat did not? One explanation for this discrepancy is that the career threat may have been slightly more impactful than the IQ threat. Consistent with our intentions, threatening a student's career aspirations can potentially have farther-reaching implications than threatening a student's intelligence. Notably, students receive several indicators of their overall intelligence over

the course of their academic careers. Having been admitted to university in the first place is likely indication enough that they are at least somewhat intelligent relative to other people their age. On the other hand, indicators of career success are not so easily found. For many students, our bogus career suitability test may have been the first concrete indicator of their ability to fulfill their career aspirations. Thus, in comparison to receiving a poor result on an IQ test, incongruent feedback with regard to career aspirations might potentially be quite devastating for students, carrying the ability to alter their life-perspective. With this in mind, it might therefore not be unreasonable to infer that, relative to the IQ feedback used in Study 1, the career feedback generated more arousal, which in turn increased participants' reaction times to all stimuli in the lexical decision task.

Although RTs were faster in the incongruent condition for all word types, it is important to point out that within the incongruent condition, RTs were still faster to death words, relative to negative and neutral words. Thus, the observed increase in RTs across the board for participants in the incongruent condition cannot be solely responsible for the increase in DTA.

General Discussion

The results of these two studies demonstrate that experimentally induced threats to self-esteem cause thoughts of death to become more accessible to consciousness. In Study 1, participants who derived self-esteem from the belief that they are intelligent showed increased DTA after being told that they performed poorly on an IQ test. In Study 2, increased DTA resulted from threatening people's career aspirations. Participants who were told that their personality was not suited for their desired career

showed significantly more DTA relative to those who were told that their personality was well suited for that career. Moreover, the results of these studies show that the obtained increases in DTA were not the result of a more general increase in the accessibility of negative thoughts. In both studies, thoughts of death were found to be more accessible than both neutral and negative words in the self-esteem threat conditions. Taken together, these studies provide converging evidence that self-esteem helps allay concerns regarding human mortality.

General Considerations

Although social psychologists agree that people have a need for self-esteem, there has been little consensus about *why* we have such a need. Theories attempting to answer this question have suggested a number of possibilities. Some theorists, for example, have argued that self-esteem needs are rooted in a more basic need for social inclusion (e.g., Baumeister & Tice, 1990; Leary, Tambor, Terdal & Downs, 1995). Others have suggested that a need for meaning underlies self-esteem, arguing that threats to self-esteem are threatening because they undermine a more general sense of meaning as opposed to a specific fear of death (Heine, Proulx, & Vohs, 2006). While these theories and several others all have a stake in answering the question of why we need self-esteem, the present research findings provide unique support for a terror management perspective. We can think of no sound rationale for why thoughts of death would be aroused when self-esteem is threatened, unless, as suggested by TMT, self-esteem functions to manage concerns about death specifically.

One criticism that might be raised regarding the current studies pertains to our choice of words used to measure the accessibility of negative constructs. Although both

studies demonstrated increased death accessibility relative to negative accessibility in response to threat, it might be argued that this result was obtained because our negative words were obscure or not directly related to the threat manipulations. While this may be a possibility, we feel that it is unlikely for a number of reasons. First, great pains were taken to ensure that the frequency and length of the negative words were roughly equal to those of the death words. In fact, as indicated in Table 1, a slight advantage with regard to these factors was given to the negative words. Furthermore, death accessibility was only higher than negative accessibility in our threat conditions. In the positive and no feedback conditions of Study 1 and the congruent condition of Study 2, death and negative thought accessibility was essentially equal. Thus, it seems unlikely that reaction times to negative (vs. death) words in the threat conditions were slower because they were more obscure. Second, two of the six negative words that were employed made at least some reference to participants' test performance. The words 'fail' and 'wrong' are directly related to poor performance on an intelligence test, and at least indirectly related to the belief that one's personality is ill suited to their desired career choice. Finally, the inclusion of negative words in our procedures was done to contrast the specific accessibility of death constructs with a more *general* accessibility of negative constructs. A variety of negative words was therefore used to exemplify general negativity. Had we used only negative words that pertained to test failure or disappointment, we would have been measuring the specific accessibility of failure constructs, which was not our intention. There would be no reason to assume that, after performing poorly on an intelligence test, participants should not have heightened accessibility of thoughts pertaining to their poor performance. Indeed, we might expect such accessibility to be quite high after our manipulations. What is

important, however, is that the observed effects regarding DTA were not the result of a more general accessibility of negative constructs, which spread to activate death constructs. Had this been the case, we would have seen relatively fast reaction times to our selection of negative words. Given that this was not observed, the DTA effects cannot be explained by reference to mere spreading activation. We can therefore think of no reason for DTA to have increased as a result of our self-esteem threats, unless self-esteem functions to manage thoughts of death specifically.

Further Support for the DTA hypothesis

In addition to the general considerations regarding self-esteem discussed above, the present research provides further support for the addition of a third theoretical hypothesis to TMT. Originally, research conducted in support of TMT was derived from one of two theoretical hypotheses: the anxiety buffer hypothesis, and the mortality salience hypothesis. Recently, however, Schimel et al. (in press) have proposed a third hypothesis from which to generate research questions: the death thought accessibility hypothesis. Across five experiments, these researchers demonstrated that thoughts of death become more accessible in response to a potent worldview threat. The present research extends the work of Schimel et al. to the self-esteem component of the cultural anxiety buffer, providing considerable support for the DTA hypothesis beyond that obtained by the worldview threat studies. More specifically, the present research shows that DTA will also increase in response to a self-esteem threat.

Conclusion

The prospect of dying is of particular concern for human beings. Knowledge of death can lead to the fatalistic view that there is no sense in continuing on with one's life.

There may seem to be little point in doing anything at all if everything will be erased by the passage of time. This bleak view of reality can often bog us down with depression and render us immobilized by dread. In order to continue functioning in society, we must push such thoughts out of our minds, and convince ourselves that life really is worth living. We must believe that we possess valuable traits that are useful and necessary; that we are valuable contributors to a meaningful world; and that due to our existence the world is in some way better off. Such beliefs help us to forget that we are only here for a short time, and help us to get on with the daily tasks of living rather than dwell on the inevitability of dying. When these beliefs are called into question, however, mundane life can sometimes seem trivial. And unless we can restore faith in our personal value and importance, we may come to ponder the futility of life and ruminate on the death that awaits us.

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