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MORTALITY SALIENCE AND THE EFFECTS OF AUTONOMY ON DEATH  
ANXIETY

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Bachelor of Arts in Psychology

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May 2017

Submitted in partial fulfillment of requirements for the degree

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Cleveland State University

May 2019

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MORTALITY SALIENCE AND THE EFFECTS OF AUTONOMY ON DEATH  
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**ABSTRACT**

The present research built on prior work suggesting that mortality salience (MS) can undermine psychological well-being and explored the previously-untested hypothesis that autonomy can mitigate that effect. Specifically, the study investigated the effects of primed autonomy on measured death anxiety following a reminder of mortality. Participants ( $n = 119$ ) were randomly assigned to either an MS or control condition and then, following a delay, were primed with the concept of either autonomy or being controlled. Death anxiety was then measured. Results found that MS increased death anxiety among those in the controlled prime condition, but not among those in the autonomous/self-determined prime condition. These findings suggest that autonomy serves an important terror management function that can mitigate the effect of death-related thoughts on well-being. Importantly, the results also highlight the potential intersection between existential defense and growth.

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## CHAPTER I

### INTRODUCTION

“Everything can be taken from a man but one thing: the last of the human freedoms—to choose one’s attitude in any given set of circumstances, to choose one’s own way.”

- Viktor Emil Frankl (1959/2006, p. 66)

In his book *Man’s Search for Meaning*, Austrian psychiatrist Viktor Frankl provides a gripping account of his imprisonment in Nazi concentration camps during World War II. Frankl describes the daily anguish that he and other camp prisoners endured. Undernourishment and strenuous labor left prisoners weak and close to death; Frankl describes their bodily appearance as “skeletons disguised with skin and rags” (p. 30). However, even in such terrible circumstances, Frankl emphasizes the important utility of maintaining self-direction, suggesting that meaning and purpose in life can be found through the individual freedom to choose one’s own way, helping to mitigate existential anxieties, even when faced with death.

These ideas of mortality and individual autonomy are common themes across the works of many philosophers, scholars, and writers. Existential psychology has been able to provide insight to these issues, offering valuable perspectives and scientific understanding of these complex ideas. One useful psychological perspective is that of terror management theory (TMT; Greenberg, Pyszczynski, & Solomon, 1986; Greenberg,

Vail, & Pyszczynski, 2014), which posits that the awareness of mortality can be a potent source of existential anxiety, but can be mitigated by engaging in a variety of sociocultural activities promising symbolic permanence. Another useful perspective is that of self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2002), which suggests that the basic psychological needs of competence, relatedness, and autonomy are necessary for personal growth and well-being. The present work will explore the novel possibility that people might be able to manage death anxiety, in part, by relying on these growth-oriented psychological needs—autonomy in particular.

### **TMT and Research**

Based largely on the existential philosophy and work of anthropologist Ernest Becker (1962, 1973), TMT suggests that much of human behavior is geared toward protecting oneself from the threatening awareness of death. Culture offers this protection by providing systems of meaning and value in which people can transcend death through literal (e.g., Heaven, reincarnation) or secular (e.g., family, legacy) routes. People then strive for self-esteem within these systems as an indicator of how well they are doing at living up to the standards set forth by such beliefs. Together, this offers people the possibility to feel a sense of permanence in the face of the awareness of their own impermanence.

One hypothesis that has guided much of the TMT literature is the *mortality salience hypothesis* (Greenberg et al., 1990), which posits that if certain sociocultural and/or psychological buffers (e.g., worldviews, self-esteem) serve to defend against the awareness of mortality, then increased mortality salience (MS) should motivate people to defend and affirm them. Indeed, research has shown that MS leads people to make

harsher judgements of those who violate cultural norms and transgress moral expectancies (Rosenblatt et al., 1989). Also, it can lead to negative evaluations and derogation of dissimilar others (Greenberg et al., 1990). Furthermore, MS has been shown to influence aggressive acts and lead to support for the annihilation of individuals who hold different beliefs (McGregor et al., 1998; Hayes, Schimel, & Williams, 2008). Despite these often destructive and negative outcomes, MS can produce a number of positive outcomes as well. In fact, people living up to positive standards, increasing their motivation for better health, and building supportive relationships have all been observed as positive consequences of MS effects, demonstrating that people can manage the awareness of death through positive and socially-adaptive strategies (for review, see Vail et al., 2012).

For example, Schimel, Wohl, and Williams (2006) demonstrated that while MS leads to forgiveness when a home-team athlete commits an act of instrumental aggression, it also leads to forgiveness of an opposing player among those high in trait empathy. This suggests that those who are more empathetic strive to uphold this value by exhibiting forgiveness when reminded of their mortality. Other studies have shown similar results when mortality is made salient and worldview-consistent values are cognitively accessible. For instance, work by Rothschild, Abdollahi, and Pyszczynski (2009) demonstrated that the priming of compassionate religious values in conjunction with MS leads religious fundamentalists to endorse less support for extreme war interventions. Also, the priming of egalitarianism has been shown to reduce prejudice against Blacks in non-Black individuals following a reminder of mortality; similarly, when the cultural value of helping is made salient, MS motivates increased helping-



related intentions and behavior (Gailliot, Stillman, Schmeichel, Maner, & Plant, 2008). The priming of tolerance values as well as shared human experiences (e.g., family activities, childhood memories) has also been shown to decrease negative attitudes to worldview-threatening others following MS inductions (Greenberg, Simon, Pyszczynski, Solomon, & Chatel, 1992; Motyl et al., 2011), suggesting that the awareness of death prompts people to uphold values that are relevant and culturally significant. Collectively, these results suggest that the awareness of death does not inevitably lead to negative consequences; instead, the bolstering of one's beliefs due to existential motivations can lead to beneficial social outcomes, such as empathy and tolerance.

Other positive outcomes in response to the awareness of mortality can be seen in different domains of life as well. For instance, MS has been found to increase intentions to exercise among individuals who base their self-worth on physical fitness compared to those who do not (Arndt, Schimel, & Goldenberg, 2003). Also, Arndt et al. (2009) demonstrated that following a commercial that reveals adverse social consequences of smoking, MS leads to stronger intentions to quit among smokers who previously derived social value from smoking. Thus, MS can increase motivation for positive health-related changes. The effects of MS have also been shown to increase the desire for offspring (Fritsche et al., 2007), increase the willingness for charity donation (Hirschberger, Ein-Dor, & Almakias, 2008), and increase relationship commitment when partners are perceived as a source of positive regard (Cox & Arndt, 2012).

Ultimately, people manage the awareness of death by upholding beliefs that are aligned with their cultural worldviews, providing them with a sense of meaning and purpose and contributing to their self-esteem. Moreover, these responses offer protection

from mortality-related concerns. The outcomes of such defense can be marked by negativity or hostility; however, as described above, there are many ways in which the awareness of death can be managed through adaptive and beneficial strategies as well. Regardless of the positive or negative characterization, TMT suggests that the awareness of death is a threat that must be defended against. However, as we will now turn, there is another side to the existential coin.

### **SDT and Research**

While TMT describes the defensive orientations that people may rely upon to manage death awareness, there is another side of human nature concerning growth orientations and motivation. SDT (Ryan & Deci, 2002) posits that the satisfaction of three basic psychological needs is essential for growth-oriented goals and personal well-being. Specifically, these needs include competence, relatedness, and autonomy.

*Competence* concerns the effectiveness in which one can interact with his or her environment; *relatedness* concerns the connectedness and relatability that one shares with others; and *autonomy* concerns one's volition and ability to control his or her actions. SDT states that the satisfaction of these needs increases well-being and that those high in need satisfaction are likely to be more intrinsically motivated (Ryan & Deci, 2000).

Indeed, high need satisfaction has been demonstrated to have a variety of outcomes oriented toward improved well-being and personal growth. For example, Sheldon, Ryan, and Reis (1996) found that individuals with higher trait-level fulfillment of competence and autonomy reported greater daily vitality and positive moods compared to those with lower fulfillment; also, days in which individuals felt more competent and autonomous were reported as better days compared to respective baselines. Thus, the

effects of need satisfaction in both between-subject and within-subject contexts were found, illustrating the importance of such needs in different circumstances (see also Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). Similarly, profiles of high satisfaction of all three needs (i.e., competence, relatedness, autonomy) compared to low satisfaction are associated with higher reported levels of personal growth and purpose in life (Ferrand, Martinent, & Durmaz, 2014), and overall well-being is associated with higher perceived need satisfaction, even when viewed cross-culturally (Church et al., 2012; Chen et al., 2015; Tay & Diener, 2011). Additionally, high need satisfaction is predictive of greater relationship well-being and quality of post-disagreement relations (Patrick, Knee, Canevello, & Lonsbary, 2007), and positive affect and life satisfaction is predicted by balanced fulfillment of all three needs (Sheldon & Niemiec, 2006).

In addition to overall well-being, the role of need satisfaction extends into other areas of life as well. For example, work by Baard, Deci, and Ryan (2004) suggests that perceived autonomy support from employers is associated with increased workplace performance and better psychological adjustment in employees. Similarly, Vansteenkiste et al. (2007) found that intrinsic work orientation, compared to extrinsic work orientation, is tied to more positive job outcomes (e.g., satisfaction, vitality, dedication); moreover, in a second study, need satisfaction was found to account for this relationship. Thus, the fulfillment of competence, relatedness, and autonomy serves as an important predictor of workplace performance.

This positive relationship between need satisfaction and performance is also observed in academics. Niemiec and Ryan (2009) suggest that competence, autonomy, and relatedness are important for student success and motivation, and research has

supported this perspective. For instance, teachers who endorse an autonomy-oriented approach toward teaching are viewed as more autonomy-supportive by their students; moreover, these students tend to be more competent and intrinsically motivated (Deci, Schwartz, Sheinman, & Ryan, 1981). Also, greater autonomy support can predict more autonomous self-regulation, reduced anxiety, and heightened perceptions of competence in an academic setting (Black & Deci, 2000), and recent work has suggested that autonomy support in the classroom is associated with increased autonomous motivation to complete homework outside of school (Hagger, Sultan, Hardcastle, & Chatzisarantis, 2015). Support for relatedness is also important; students who report higher levels of relatedness show greater behavioral and emotional engagement in the classroom, as evidenced by both self-reports and teacher evaluations (Furrer & Skinner, 2003).

Need satisfaction is further implicated in athletics, contributing to performance and motivation. For instance, athletic persistence is associated with self-determined motivation and autonomy support (Pelletier, Fortier, Vallerand, & Brière, 2001). Moreover, a series of studies by Hodgins, Yacko, and Gottlieb (2006) suggests that autonomy serves to lower defensiveness and leads individuals to approach challenging tasks with less avoidance, leading to increased athletic performance (e.g., increased rowing performance among a sample of collegiate rowers). Other research further supports the role of the three basic needs. Work by Perreault, Gaudreau, Lapointe, and Lacroix (2007) suggests that higher need satisfaction is associated with lower reports of athlete burnout (i.e., reduced accomplishment, sport devaluation, physical/emotional exhaustion). Also, Sheldon, Zhaoyang, and Williams (2013) found that pre-game feelings

of competence and autonomy before basketball games is associated with improved performance, indicated by total points scored and shooting percentage.

Collectively, the SDT literature offers considerable support for the role of competence, relatedness, and autonomy in a variety of life domains. The satisfaction of these basic needs contributes to well-being (e.g., positive affect, vitality, purpose) as well as personal growth and improved task performance. The present analysis will explore the potential intersection of the SDT and TMT perspectives by exploring the possibility that basic need satisfaction may, at least in part, serve to also reduce the impact of MS on death-related anxiety.

### **Interfacing TMT and SDT**

Conceptually, TMT and SDT appear to describe two different sides of the same existential coin. As described above, TMT explains the defense-oriented behaviors that are associated with managing the awareness of death, whereas SDT describes the role of basic psychological needs in facilitating personal growth and well-being. However, these two views may not be mutually exclusive. At least under certain circumstances, TMT processes may motivate defensive orientations that lead people to engage in growth-oriented behaviors; and conversely, the three needs posited by SDT could potentially pave the way to pursue personal growth by mitigating existential threat and anxieties. Here, we can consider some of the prior work interfacing the two perspectives regarding competence and relatedness, and then we will turn our attention to autonomy.

First, some prior work has explored the role of competence and has found that feelings of self-efficacy reduce risky self-esteem strivings following MS (Ben-Ari, Florian, & Mikulincer, 1999; Miller & Ben-Ari, 2004), pointing to the existential-

buffering qualities of competence. Also, perhaps more importantly, although prior work has indeed shown that existential threat (MS) can induce motivation for self-esteem that, at times, can lead to self-deceptive biases—for example, in the form of self-serving attributional biases (Mikulincer & Florian, 2002)—other work has shown that it can *also* motivate efforts toward building self-esteem through genuine competence. For instance, Peters, Greenberg, Williams, and Schneider (2005) demonstrated that MS leads individuals who derive self-esteem from strength ability to increase their genuine strength output on a hand dynamometer, suggesting that MS may elicit improved performance for those with a fitness-oriented worldview. In a similar vein, work by Zestcott, Lifshin, Helm, and Greenberg (2016) demonstrated that, among a sample of people who value basketball skills, reminders of mortality led to increased basketball performance, both in a one-on-one setting as well as a shooting performance task. Furthermore, MS and prevailing worldviews can influence academic test performance and increase reading comprehension with worldview-consistent information (Landau, Greenberg, & Rothschild, 2009; Williams, Schimel, Hayes, & Faucher, 2012). These studies illustrate that, in addition to perhaps disingenuous defensive biases, the effects of MS can—at least under certain circumstances—motivate a variety of behaviors aimed toward genuine competence in worldview-relevant domains.

Second, research has found similar effects for relatedness, converging with the perspective that close relationships serve an existential function by providing a sense of personal continuity and lastingness that can transcend one’s lifetime, offering opportunities to: build families and live on through children; contribute and be remembered by a larger social community; and/or feel an intimate connection with a

close other who bolsters one's self-esteem (Mikulincer, Florian, & Hirschberger, 2003). Research has found that MS motivates increased desire for intimacy among those with secure attachment, and these individuals also exhibit reduced worldview defense (Mikulincer & Florian, 2000). Similarly, MS has been found to increase affiliation strivings (Wisman & Koole, 2003) as well as motivation to form close relationships, even if mate selection must be compromised (Hirschberger, Florian, & Mikulincer, 2002). As noted above, MS can motivate increased relationship commitment when romantic partners are perceived as a source of positive regard; perhaps more notably, activating thoughts about this positive regard from partners reduces the accessibility of death-related cognitions following MS (Cox & Arndt, 2012). In a similar vein, threats to close relationships have been shown to increase death-related cognitions and distress (Florian, Mikulincer, & Hirschberger, 2002; Mikulincer, Florian, Birnbaum, & Malishkevich, 2002). Together, these studies not only suggest that relatedness and close connections with others can offer protection from existential threat and anxiety, but that MS motivates people to strive toward such relationships.

Third, although these buffering qualities of competence and relatedness have been addressed in the TMT literature, the role of autonomy in attenuating existential concerns has yet to be explored. However, various theoretical accounts as well as empirical findings point to the instrumental role of autonomy and self-determined behavior. First, from a terror management perspective, autonomy should be important because the self-esteem accrued from cultural worldviews is dependent upon the internalization of these beliefs (Greenberg & Arndt, 2012), which can be thought of as an autonomous orientation toward those beliefs. For example, as described above, MS leads people to

strive for competence in autonomously-valued domains but not in domains unrelated to their own worldviews (e.g., Peters et al., 2005); moreover, MS motivates defensive reactions to worldview-relevant threats as opposed to worldview-irrelevant events (e.g., McGregor et al., 1998). Such findings suggest that MS does not motivate defensiveness arbitrarily but instead orients people toward personally-relevant, autonomously-endorsed systems of meaning. As such, an experienced sense of autonomy might affirm these worldviews and prevent MS effects—consistent with research finding that the affirmation of worldviews and self-esteem buffers against MS effects (e.g., Schmeichel & Martens, 2005; Harmon-Jones et al., 1997).

Additionally, autonomy may mitigate the effects of death awareness because it provides a more secure sense of self-esteem, one unencumbered by the need to live up to sociocultural standards of worth. Put simply, autonomy may be a more secure sense of value, ultimately providing more psychological security in the face of death. Indeed, Pyszczynski, Greenberg, and Arndt (2012) propose an interfacing of TMT and SDT to elucidate this issue (see also Vail & Juhl, 2015). Pyszczynski et al. (2012) suggest that while both intrinsic and extrinsic self-esteem—that is, autonomous and contingent/controlled orientations—can be effective in buffering death anxiety, the latter requires continued vigilance and defense. Thus, an autonomous orientation may be more effective in mitigating death-related concerns, allowing people to engage life in a self-determined rather than externally-controlled way. Research has offered suggestive evidence for this perspective, finding that contexts in which intrinsic self-worth is manipulated (vs. contingent self-worth or neutral conditions) result in reduced self-handicapping and downward social comparison (Arndt, Schimel, Greenberg, &



Pyszczynski, 2002; Schimel, Arndt, Pyszczynski, & Greenberg, 2001). Also, specific to death-related concerns, research has found that MS motivates worldview defense and heightened endorsements of sociocultural health appeals (e.g., exercise, tanning) among those with high extrinsic esteem orientations, but not among those with low extrinsic esteem orientations (Williams, Schimel, Hayes, & Martens, 2010; Arndt et al., 2009). These findings suggest that an internal, autonomous orientation may serve as a more effective buffer against the threat of increased death awareness.

Further, research on personal control and presumed autonomy found that MS increased perceived controllability (that is, the belief that an outcome is under one's control) for failures, but only in contexts that had personally-relevant consequences (Willis, Tapia-V, & Martínez, 2011). Research has also found that MS increased death-related thoughts, but not among those with high trait and state-level self-regulatory control (Gailliot, Schmeichel, & Baumeister, 2006), as well as motivated heightened choices for risk among those with an external (but not internal) locus of control (Miller & Mulligan, 2002). Although these findings may be more aligned with the concept of personal control rather than autonomy from the SDT perspective, they at least hint at the potential existential role of autonomy.

Finally, further research points more specifically to self-determination and autonomous orientations in mitigating MS effects. For example, personally-satisfying and growth-related orientations appear to buffer against MS-induced strivings and defensiveness; specifically, MS led to increased financial greed among people with stronger extrinsic, but not intrinsic, goal orientation (Cozzolino, Staples, Meyers, & Samboceti, 2004). Also, MS increased worldview defense, but not when participants first

engaged in a creative design task (Routledge, Arndt, & Sheldon, 2004); and, MS increased self-esteem striving and worldview defense among those who were low, but not high, in openness to experience (Boyd, Morris, & Goldenberg, 2017). Furthermore, correlational data shows that an intrinsic (self-determined) goal orientation is associated with reduced depressive symptoms, despair, and death anxiety, as well as greater ego-integrity, death acceptance, and well-being (Van Hiel & Vansteenkiste, 2009). Thus, whereas prior work has found that autonomous self-determination plays a key role in personal growth, open-minded engagement, and intrinsic goal orientations, this work points to the specific role of self-determination in managing death-related existential concerns.

Thus, collectively, various perspectives as well as empirical work appear to converge on a critical point: that the ability to be an autonomous agent in one's life appears to serve both protective as well as growth-oriented functions, and that the lack of such self-direction can have detrimental consequences. Indeed, even when faced with death, the ability to function as an autonomous being may have value. The present research was designed to explore this idea and investigate the previously-untested hypothesis that autonomy might serve as an existential buffer against increased death anxiety. This research might therefore help to better understand what Viktor Frankl observed during his experienced horrors of Nazi imprisonment: that those who were able to maintain a sense of self-direction—a sense of autonomy in such adverse circumstances—were able to persevere even with the awareness of their own mortality.

## CHAPTER II

### THE PRESENT RESEARCH

As described above, competence and relatedness have been shown to defend against the effects of mortality reminders, but no work has yet investigated the effects of autonomy. Therefore, this study was designed to provide an initial investigation for the existential, death-denying role of autonomy. Also, despite the large amount of research examining basic terror management processes such as MS-induced worldview defense and strivings for self-esteem, relatively little work has focused on a core assumption of the theory: that death awareness represents a threat to psychological well-being. One early study found that watching a death-related film clip increased anxiety, but not if participants first had their self-esteem experimentally boosted (Greenberg et al., 1992). Also, more recent work has found that MS increased death anxiety, but not if participants had heightened perceptions of meaning in life (Routledge & Juhl, 2010), had high levels of nostalgia proneness (Juhl, Routledge, Arndt, Sedikides, & Wildschut, 2010), or were high in personal need for structure (Routledge, Juhl, & Vess, 2013).

Thus, the present study extended this previous research by experimentally manipulating autonomy and examining its effects on MS-induced death anxiety. Since previous work has found that MS can increase death anxiety (e.g., Routledge & Juhl,

2010), and because increased death-related cognition is associated with various detriments to psychological well-being (e.g., lower meaning in life, decreased life satisfaction, lower subjective vitality, decreased exploration; Routledge et al., 2010), measuring death anxiety was a useful strategy to empirically test the potential for autonomy to mitigate death-related existential concerns.

The study utilized a 2 (MS vs. dental pain) x 2 (prime: autonomy vs. controlled) experimental design; participants were randomly assigned to either an MS or control condition and then, following a delay, were primed with either autonomy/self-determination or the concept of being controlled. Death anxiety was then measured. Based on the extant literature regarding MS and basic need satisfaction, it was hypothesized that MS would lead to increased death anxiety among participants in a controlled orientation prime condition, but that this effect would be eliminated among participants in an autonomy orientation prime condition, demonstrating the role of autonomy in mitigating existential anxiety.

## CHAPTER III

### METHOD

#### **Estimation of Minimal Sample Size**

A prior meta-analysis of MS studies (Burke, Martens, & Faucher, 2010) found an overall MS effect size of  $d = .75$  ( $f = .37$ ; a large effect) derived over a broad variety of outcomes (e.g., defense of national identity, health risk evaluations, sports team affiliations, physical aggression, etc.). However, prior research has tended to use small samples (associated with artificial effect size inflation, see Button et al., 2013) and has focused on motivational outcomes, whereas the present research had an outcome relevant to well-being (i.e., death anxiety). Therefore, the present research adopted the sample size planning strategy of anticipating a more modest effect size. Thus, a power analysis (G\*Power; Faul, Erdfelder, Buchner, & Lang, 2009) for F-family tests was conducted, with power set to .80 for detecting an effect size of  $f = .27$  (a medium effect size, .10 smaller than observed in prior meta-analysis) at  $p = .05$ , with 1 numerator df and 4 groups. This analysis recommended a minimum sample size of at least 110 participants.

#### **Participant Recruitment and Characteristics**

Undergraduate students were recruited for participation in exchange for partial course credit. A total of 131 participants were initially recruited via a research exposure

program; one participant discontinued immediately after providing informed consent, and eleven other participants discontinued before completing the dependent measure and were therefore excluded listwise, resulting in a final sample of 119 participants. As shown in *Table 1*, this final sample tended to be: college-aged adults (age  $M = 20.39$ ,  $SD = 4.42$ , 6 did not report; years education  $M = 13.27$ ,  $SD = 1.55$ ), including 28 males and 91 females; mostly White (73 Caucasian, 26 African American, 5 Asian, 11 “other,” and 4 not reporting); and typically Christian (81 Christian, 1 Muslim, 4 Jewish, 2 Buddhist, 9 atheist, 8 agnostic, 10 “other,” and 4 not reporting).

### **Materials and Procedure**

Materials were printed and compiled into single packets; participants completed the measures in individual cubicles during a single session (See *Appendices D-K* for full materials). A brief introduction to the study was provided. Following these brief instructions and after obtaining informed consent, participants completed the tasks below in the following order:

**Filler measure.** As part of a cover story, a “personality assessment” was administered at the beginning of the study. The assessment was a 15-item measure of mindfulness (Brown & Ryan, 2003) and is unrelated to the current hypothesis; thus, it will not be discussed further.

**Mortality salience.** Following previous research (e.g., Rosenblatt et al., 1989), participants were randomly assigned to one of two conditions: an MS induction or control topic. In the MS condition, participants responded to two open-ended questions: “Briefly describe the emotions that the thought of your own death arouses in you” and “Jot down, as specifically as you can, what you think will happen to you physically as you die and

once you are physically dead.” The control condition consisted of parallel questions regarding dental pain, chosen to test whether MS exerts effects above and beyond other negative stimuli.

**Delay and distraction tasks.** Participants completed the Positive and Negative Affect Schedule Expanded Form (PANAS-X; Watson & Clark, 1994) as well as two other tasks: a brief reading task (an excerpt from “The Growing Stone,” a short story from *Exile and the Kingdom* by Albert Camus, 1957) and a word-search task. These items served as a task-switching activity to remove death thoughts from conscious awareness, allowing death-thought to enter non-conscious awareness where death-anxieties may emerge. This implementation of a task-switching activity is based on research finding that conscious awareness of death first motivates problem-solving strategies aimed at minimizing or removing death-related thoughts from focal attention (e.g., suppression, denial, safety checks); but, when death thoughts are moved outside of conscious awareness (through subliminal primes, or as in the present study, an explicit MS primed followed by delay/distractor tasks), death awareness then exerts its effects on motivation and well-being (see Pyszczynski, Greenberg, & Solomon, 1999).

**Autonomy manipulation.** Following previous priming literature (Bargh, Chen, & Burrows, 1996; Hodgins, Brown, & Carver, 2007), participants were randomly assigned to one of two conditions: an autonomy prime or a controlled prime condition. In both conditions, participants were presented with 30 sets of 5 words; each set included a four-word sentence and a fifth unrelated word, in scrambled order. Participants were asked to identify the unneeded word and unscramble the remaining four words to create a sentence and were instructed to write the completed sentence on a line next to the word set. Fifteen

of these sentences were neutral sentences and common to both the autonomy prime and controlled prime conditions, including sentences such as the following: “sale for by sweatshirts are” (sweatshirts are for sale) and “is the now desk wooden” (the desk is wooden). In the autonomy prime condition, the remaining 15 sentences were autonomous/self-determined statements, such as “actions and my are independent” (my actions are independent); “to go and I decided” (I decided to go); and “am I still for self-determined” (I am still self-determined). In the controlled prime condition, the remaining 15 sentences expressed non-autonomous actions, such as “forced by to study I’m” (I’m forced to study); “do we to this must” (we must do this); and “so behavior my they restrict” (they restrict my behavior). Previous research has found that this priming technique produces effects consistent for autonomous/self-determined orientations; specifically, those primed with the autonomy-oriented task subsequently report greater intrinsic motivation and heightened perceptions of choice compared to those primed with the control-oriented task (e.g., Levesque & Pelletier, 2003).

**Death anxiety.** Following previous research (e.g., Routledge & Juhl, 2010; Routledge, Juhl, & Vess, 2013), participants responded to 14 items assessing the extent to which they feel disturbed or anxious about various death-related concepts. This measure consists of the ‘Your Own Death’ and ‘Your Own Dying’ subscales from the Revised Collett-Lester Fear of Death Scale (Lester, 1990). Responses were made using a 10-point Likert-type scale, ranging from 1 (*Not at all disturbed/anxious*) to 10 (*Very disturbed/anxious*). Sample items from this measure include the following: “The social isolation of death”; “The possibility of dying in a hospital away from friends and family”; “The pain of dying”; and “Your lack of control over the process of dying.” Overall mean



scores were computed ( $\alpha = .85$ ;  $M = 6.29$ ,  $SD = 1.74$ ) such that higher scores indicated greater death anxiety.

**Demographics.** At the end of the packet, participants completed a basic demographic questionnaire recording age, sex, race, ethnicity, religious affiliation, political orientation, and education level.

## CHAPTER IV

### RESULTS

#### **Preliminary Analyses: Assumptions**

The present study utilized a 2 (MS vs. dental pain) x 2 (prime: autonomy vs. controlled) experimental design, with death anxiety as the measured outcome. Before moving to the target analyses, relevant assumptions were checked/tested to ensure appropriate use of a two-way analysis of variance (ANOVA) for the present data. It should be noted that the responses on the dependent variable (i.e., death anxiety) generated continuous mean values; the independent variables each consisted of two independent groups; and independence of observations was maintained. Thus, three remaining assumptions were checked.

First, for the presence of outliers, a visual box-plot assessment indicated the presence of one outlier (mean death anxiety score of 1.14) that was 2.96 standard deviations below the mean. However, given that this score was likely not due to measurement error and instead reflective of actual reported death anxiety, and because there was not an a-priori plan to exclude outliers, it was retained. Second, for normality, a visual histogram assessment suggested that the data were normally distributed; indeed, death anxiety scores had a skewness of  $-.38$  ( $SE = .22$ ) and kurtosis of  $-.17$  ( $SE = .44$ ),

indicating a normal distribution. Finally, Levene's Test for Equality of Variances was not significant, indicating equal variances across groups,  $F(3,115) = 2.27, p = .084$ . Thus, the planned target analyses were conducted.

### **Target Analyses: Death Anxiety**

ANOVA methods were used to examine the 2 (MS vs. dental pain) x 2 (prime: autonomy vs. controlled) interaction on death anxiety. There was no main effect of autonomy prime ( $F(1, 115) = 1.77, \eta_p^2 = .02, p = .186$ ), though there was a main effect of MS ( $F(1, 115) = 5.72, \eta_p^2 = .05, p = .018$ ) such that death anxiety was higher in the MS ( $M = 6.67, SD = 1.90$ ) than the pain ( $M = 5.91, SD = 1.48$ ) condition. However, that main effect was qualified by an apparent interaction,  $F(1, 115) = 3.82, \eta_p^2 = .03, p = .053$ .

Because the target hypothesis focused on simple main effects, those analyses were further examined using pairwise comparisons; estimated mean death anxiety scores are reported in *Table 2*. In the controlled prime condition, death anxiety was higher in the MS condition than the pain condition ( $t(58) = 3.09, p = .003, d = .90$  [95%CI = .36, 1.42]). In the autonomy prime condition, death anxiety did not statistically differ between the MS and pain condition ( $t(57) = .31, p = .76, d = .07$  [95%CI = -.44, .58]). From another perspective: when reminded of dental pain, death anxiety did not statistically differ between the controlled and autonomy condition ( $t(57) = -.44, p = .66, d = -.13$  [95%CI = -.64, .38]). But when reminded of death, death anxiety was higher in the controlled condition than the autonomy condition ( $t(58) = 2.33, p = .021, d = .55$  [95%CI = .03, 1.06]) (see *Figure 1*).

### **Ancillary Analyses: Death Anxiety Controlling for Sadness**

An assessment of the PANAS-X subscale scores revealed a significant difference

on the ‘sadness’ subscale such that MS (vs. dental pain) increased sadness,  $F(1, 117) = 4.92, p = .029, \eta_p^2 = .04$ . To ensure that the pattern of results reported above was not due to differential MS (vs. dental pain) effects on sadness, an analysis of covariance (ANCOVA) was used to examine the 2 (MS vs. dental pain) x 2 (salience: autonomy vs. controlled) interaction on death anxiety while controlling for sadness.

The pattern of results was unaltered from above. There was no main effect of autonomy prime ( $F(1, 114) = 1.67, p = .199, \eta_p^2 = .01$ ), though there was a main effect of MS ( $F(1, 114) = 6.32, p = .013, \eta_p^2 = .05$ ) such that death anxiety was higher in the MS ( $M = 6.67, SD = 1.90$ ) than the pain ( $M = 5.91, SD = 1.48$ ) condition. However, that main effect was qualified by an apparent interaction,  $F(1, 114) = 3.53, p = .063, \eta_p^2 = .03$ .

Because the target hypothesis focused on simple main effects, those analyses were further examined using pairwise comparisons. In the controlled prime condition, death anxiety was again higher in the MS condition than the pain condition ( $t(58) = 3.15, p = .002, d = .90$  [95% CI = .36, 1.42]). In the autonomy prime condition, death anxiety again did not statistically differ between the MS and pain condition ( $t(57) = .47, p = .64, d = .07$  [95% CI = -.44, .58]). From another perspective: when reminded of dental pain, death anxiety again did not statistically differ between the controlled and autonomy condition ( $t(57) = -.42, p = .68, d = -.13$  [95% CI = -.64, .38]). But when reminded of death, death anxiety was again higher in the controlled condition than the autonomy condition ( $t(58) = 2.25, p = .027, d = .55$  [95% CI = .03, 1.06]).

## CHAPTER V

### DISCUSSION

The present study found a main effect of MS on death anxiety, supporting previous research finding that the awareness of death can, overall, undermine well-being by increasing death-related anxiety. Furthermore, further analyses showed that MS increased death anxiety in those primed with the concept of being controlled, but this effect was eliminated when participants were primed with autonomy/self-determination. These results are consistent with previous work finding that personally-satisfying and presumably autonomous orientations can shield against death-related existential threats; however, this work extends beyond those findings and offers direct evidence for the moderating role of autonomy/self-determination on MS effects. This finding bears numerous implications for both TMT and SDT—it reveals important implications for the impact of existential concerns on psychological adjustment and offers an intriguing interface between existential defense and growth orientations.

#### **Implications for TMT and Psychological Adjustment**

The present findings converge with those of previous research but also make an important and novel contribution. First, a main effect of MS was found, such that those primed with death awareness showed increased death anxiety. This finding

converges with previous work showing similar MS effects (Juhl et al., 2010; Routledge & Juhl, 2010; Routledge et al., 2013). Second, although this previous work has found that MS-induced death anxiety can be mitigated by certain psychological buffers (e.g., nostalgia proneness, meaning in life, personal need for structure), the present work was the first study to show that autonomy/self-determination also moderates this effect. This moderating role of autonomy is important because death-related cognition has been tied to various detriments to well-being, such as lower meaning in life, decreased life satisfaction, lower subjective vitality, and decreased exploration (Routledge et al., 2010).

### **Implications for SDT and Adjustment**

The present work also converges with prior research finding that need satisfaction—and autonomy specifically—is associated with personal growth and well-being. Prior work has found that greater need satisfaction is associated with increased personal growth and purpose in life (Ferrand et al., 2014) and greater overall well-being (Chen et al., 2015; Church et al., 2012; Reis et al., 2000). More specifically, autonomy/self-determination has been tied to less defensiveness and avoidance as well as greater personal growth and well-being (Hodgins et al., 2006; Weinstein et al., 2012). Although there was not a main effect of autonomy on death anxiety, the predicted interaction emerged, corroborating previous research connecting autonomy to well-being and extending its role to death-related concerns, such that MS increased death anxiety among those who were primed with a controlled, but not an autonomous, orientation.

### **Interfacing Existential Defense and Growth**

Importantly, the present research found evidence for the moderating role of autonomy on death-related harm to well-being, namely death-related anxiety. The study

found that an experimental prime of an autonomous/self-determined (vs. controlled) orientation mitigated the impact of death awareness on increasing anxiety. While previous research has connected terror management processes to the constructs of competence and relatedness (e.g., Peters et al., 2005; Zestcott et al., 2016; Cox & Arndt, 2012; Mikulincer & Florian, 2000), the present study was the first to provide an experimental investigation of the specific role of autonomy.

These findings offer an interesting intersection between the defensive-oriented perspective of TMT and the growth-oriented perspective of SDT. On one hand, TMT suggests that much of human behavior is geared toward defense—affirming one’s sense of personal value to defend against the threatening awareness of death. On the other hand, SDT suggests that people are naturally oriented toward personal growth and personally-satisfying experiences, facilitated by intrinsic motivation and heightened feelings of autonomy (for review, see Deci & Ryan, 2002). The present results point to the possibility that autonomy/self-determination may serve both functions; that is, it may provide both a defense against death-related concerns *as well as* promote more growth-oriented functioning. Indeed, several lines of research noted above suggest that more self-determined and presumably autonomous orientations buffer against death-related concerns (e.g., Cozzolino et al., 2004; Boyd et al., 2017; Van Hiel & Vansteenkiste, 2009), and that personal control plays an important existential role in mitigating MS effects (e.g., Willis et al., 2011; Gailliot et al., 2006; Miller & Mulligan, 2002). And, MS effects have been found to be specific to internalized and worldview-relevant domains rather than unrelated/arbitrary events (e.g., Peters et al., 2005; McGregor et al., 1998).

Perhaps most importantly, research has found that MS motivates worldview defensiveness among those whose esteem is contingent upon external/extrinsic sources, but not among those who do not have this external orientation (Williams, Schimel, Hayes, & Martens, 2010; Arndt et al., 2009). Thus, an autonomous orientation toward life (vs. a controlled orientation that requires one to live up to others' expectations) may serve to buffer against death-related concerns and, as a result, provide a more secure foundation from which people can then engage life in more open-minded and growth-oriented ways (Pyszczynski et al., 2012; Vail & Juhl, 2015). Indeed, those with more autonomous and self-determined orientations show reduced stress and anxiety as well as decreased suppression of emotionally-distressing information (Quested et al., 2011; Weinstein, Deci, & Ryan, 2011; Weinstein & Hodgins, 2009). And, reduced depressive symptoms, despair, and death anxiety, as well as greater ego-integrity, death acceptance, and well-being, are associated with an intrinsic goal orientation, an orientation supported by autonomy and self-determined functioning (Van Hiel & Vansteenkiste, 2009). Thus, autonomy may provide a sense of security in the face of death, and this security might then allow people to explore the world with greater psychological equanimity. Of course, further empirical work is needed to explore this possibility, investigating how autonomous/self-determined functioning might serve this dual existential function. Nevertheless, the moderating role of autonomous (vs. controlled) orientations found in the present study might point to such possibility.

### **Implications and Future Directions**

These findings lend themselves to applied domains and also point to several generative directions for future research. For example, one group of individuals who



often experience limited autonomy and face mortality-related concerns are older adults. Research has found that nursing homes providing and supporting opportunities for autonomy are associated with higher self-determined motivations for care, and this is mediated by higher experienced autonomy among residents (O'Connor & Vallerand, 1994). Also, older adults who perceive nursing home staff to be more autonomy-supportive also tend to report greater well-being (i.e., higher vitality and life satisfaction; Kasser & Ryan, 1999), and intrinsic goal attainment among older adults has been associated with greater ego-integrity and decreased fear of death (Van Hiel & Vansteenkiste, 2009). These findings suggest that orientations aligned with more autonomous and self-determined functioning may help bolster well-being among this population. Based on the present findings, research could extend this prior work by investigating how autonomy support might help older adults engage more constructively with end-of-life care as well as productively process/manage mortality-related concerns.

More broadly, the endorsement and engagement of health-related behaviors—specifically those associated with life-threatening outcomes—may also be impacted by feelings of autonomy/self-determination. For example, research has found that cancer-related primes increase accessibility of death-related cognitions; but, interestingly, when people are able to suppress these cognitions, men and women report greater intentions for testicular and breast self-examinations (Arndt, Cook, Goldenberg, & Cox, 2007). Accordingly, future research could test whether feelings of autonomy might suppress death-related cognition and in turn lead to more open engagement with health behaviors. In a similar vein, when breast self-examinations were framed as empowering, women with higher dispositional levels of death-related cognition reported greater intentions to

perform such assessments; but, when these examinations were framed as having practical benefits, this heightened level of endorsement was not present (Cooper, Goldenberg, & Arndt, 2011). Thus, research could explore if framing health-related assessments as autonomy-supportive could impact the extent to which MS motivates people to perform these activities.

In addition to extending these areas of work, future research could also explore if autonomy can: mitigate MS-induced worldview defense; buffer against death-related cognitions; moderate MS effects on other indicators of well-being (e.g., meaning in life, satisfaction with life, subjective vitality); and facilitate increased motivation to explore the world and pursue personally-satisfying experiences in the face of death. Such research would help elucidate the terror management function of autonomy and would further address the potential intersection of existential defense and growth orientations.

### **Strengths and Limitations**

One strength of the present study was the sufficiently-powered estimations of effect sizes. As noted above, a previous meta-analysis (Burke et al., 2010) found an overall MS effect size of  $d = .75$  on a broad range of studies using various outcomes. Presently, there was an overall medium main effect of MS on death anxiety,  $\eta_p^2 = .05$ ; and, in the controlled prime condition, MS (vs. dental pain) had a strong effect on death anxiety,  $d = .90$ . Also, in the MS condition, autonomy had a medium effect,  $d = -.55$ . Thus, the study found a medium-to-large effect of MS on harming well-being and a medium effect for the moderating role of autonomy. Another strength was the experimental design, which provided the necessary controls to demonstrate a causal

relationship between the autonomy and controlled orientations and MS-induced death anxiety.

Despite these strengths, there are some limitations. First, while it is clear that priming MS can lead to death-related anxieties and cognitions, the priming of autonomy/self-determination as manipulated in the present study is likely only a temporary frame of mind; thus, future research could further investigate the natural fluctuations and interrelationships of autonomy and death-related concerns over time.

Second, almost all participants were Christian, White, college-aged females. Such characteristics are not necessarily representative of the larger population, and due to emerging concerns about research on so-called “WEIRD” (White, educated, industrialized, rich, democratic) populations (e.g., Henrich, Heine, & Norenzayan, 2010), generalizations for these findings are limited.

Third, only an autonomy prime and controlled prime condition were used, so it is not certain whether the autonomy prime mitigated, or the controlled prime exacerbated, MS-induced death anxiety. This question could be resolved in future research if those two conditions were compared to a neutral condition. However, most previous SDT work has been concerned with whether an autonomous orientation *relative to* a controlled orientation has differential effects; and, some authors have noted that the critical implication is whether momentary activation of more autonomous or controlled orientations influences susceptibility of threat (Hodgins et al., 2010). Yet, a true neutral condition would help elucidate the present pattern of results.

Finally, due to cross-cultural variations in independence (vs. interdependence) orientations, additional research could be useful for exploring the moderating role of

autonomy in various populations, both within the United States and abroad. Importantly, however, autonomy from the SDT perspective does not refer to independence but rather one's ability to volitionally (i.e., autonomously) endorse either independent or interdependent engagements. Thus, autonomy should be relevant across cultures, and prior SDT research has indeed garnered considerable cross-cultural support (e.g., Chen et al., 2015; Church et al., 2012; Tay & Diener, 2011). Nevertheless, additional work would contribute to the understanding of autonomy's role in mitigating death-related existential concerns more broadly.

### **Conclusion**

Death-related anxieties and cognitions can harm well-being and psychological adjustment, but an autonomous/self-determined orientation can buffer these detrimental effects. Those who feel a sense of self-direction—the ability to choose one's own way—may be better equipped for psychological adjustment, even when faced with death. The results from this study shed light on this idea, finding that an orientation toward autonomous (vs. controlled) functioning prevents death awareness from increasing death-related anxiety. Importantly, this finding points to the impact of growth orientations on terror management processes, which will hopefully facilitate future theoretical and empirical contributions that can further advance our understanding of these unique interrelationships.

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## APPENDIX A

Table 1. Participant descriptive and frequency statistics.

Demographic		
Age		20.39 (4.42)
	Did not report	6
Sex		
	Male	28
	Female	91
	Did not report	0
Ethnicity		
	Hispanic or Latino	8
	Non-Hispanic or Latino	107
	Did not report	4
Race		
	Caucasian	73
	African American	26
	Native American/Native Alaskan	0
	Asian	5
	Native Hawaiian/Pacific Islander	0
	Other	11
	Did not report	4
Religion		
	Christian	81

	Muslim	1
	Jewish	4
	Buddhist	2
	Hindu	0
	Atheist	9
	Agnostic	8
	Other	10
	Did not report	4
Political orientation (1 = progressive, 10 = conservative)		4.88 (2.12)
	Did not report	3
Years of education		13.27 (1.55)

Note. Sums and means are presented with standard deviations following means in parentheses.

## APPENDIX B

Table 2. Death anxiety mean, standard deviation, and n per condition.

	Controlled salience			Autonomy salience		
	M	SD	n	M	SD	n
Mortality salience	7.15	1.64	32	6.13	2.05	28
Dental pain salience	5.81	1.28	28	6.00	1.66	31

### APPENDIX C

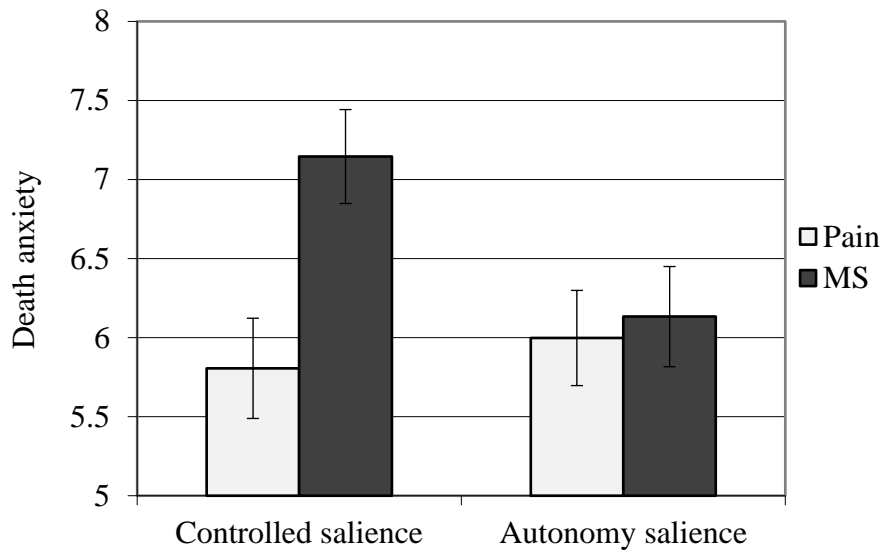


Figure 1. MS increased death anxiety among participants in the controlled prime conditions, but not in the autonomy prime condition. Error bars depict standard error.

**APPENDIX D**  
**PERSONALITY ASSESSMENT**

Please rate your agreement with the following statements. Use the following scale:

1 2 3 4 5 6 7 8 9 10  
Not True at all Completely true

- \_\_\_\_ 1. I could be experiencing some emotion and not be conscious of it until some time later.
- \_\_\_\_ 2. I break or spill things because of carelessness, not paying attention, or thinking of something else.
- \_\_\_\_ 3. I find it difficult to stay focused on what’s happening in the present.
- \_\_\_\_ 4. I tend to walk quickly to get where I’m going without paying attention to what I experience along the way.
- \_\_\_\_ 5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.
- \_\_\_\_ 6. I forget a person’s name almost as soon as I’ve been told it for the first time.
- \_\_\_\_ 7. It seems I am “running on automatic” without much awareness of what I’m doing.
- \_\_\_\_ 8. I rush through activities without being really attentive to them.
- \_\_\_\_ 9. I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there.
- \_\_\_\_ 10. I do jobs or tasks automatically, without being aware of what I’m doing.
- \_\_\_\_ 11. I find myself listening to someone with one ear, doing something else at the same time.
- \_\_\_\_ 12. I drive places on “automatic pilot” and then wonder why I went there.
- \_\_\_\_ 13. I find myself preoccupied with the future or the past.
- \_\_\_\_ 14. I find myself doing things without paying attention.
- \_\_\_\_ 15. I snack without being aware that I’m eating.

# APPENDIX E

## MORTALITY SALIENCE CONDITION

### The Projective Life Attitudes Assessment

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

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

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

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**DENTAL PAIN SALIENCE CONDITION**  
**The Projective Life Attitudes Assessment**

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

1. PLEASE BRIEFLY DESCRIBE THE EMOTIONS THAT THE THOUGHT OF DENTAL PAIN AROUSES IN YOU.

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2. JOT DOWN, AS SPECIFICALLY AS YOU CAN, WHAT YOU THINK HAPPENS TO YOU AS YOU PHYSICALLY EXPERIENCE DENTAL PAIN.

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## APPENDIX F

### PANAS

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now. Use the following scale to record your answers.

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

# APPENDIX G

## Verbal Cues Questionnaire: Literature

*Please read the following short passage and answer the questions below it.*

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

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

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

1. Do you think the author of this passage is male or female?

\_\_\_\_\_ male      \_\_\_\_\_ female

2. Do you think the narrator is a character in the story, or a third-person voice?

\_\_\_\_\_ A story character      \_\_\_\_\_ A third-person voice

3. What age might the author have been at the time this passage was written?

\_\_\_\_\_ 15-20 years old      \_\_\_\_\_ 41-50 years old  
\_\_\_\_\_ 21-30 years old      \_\_\_\_\_ 51-60 years old  
\_\_\_\_\_ 31-40 years old      \_\_\_\_\_ 61-70 years old

4. How do you feel about the overall descriptive quality of the passage?

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

## APPENDIX H

### Verbal distinction task

Circle as many words as you can in the puzzle below. Words may be forward, backward, or diagonal.

Book	Computer	Grass
Desk	Phone	Beer
Movie	Train	Music
Paper	School	Actor

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

# APPENDIX I

## [AUTONOMY PRIME CONDITION]

### Verbal comprehension task

This task will assess your ability to comprehend, and unscramble, a scrambled thought.

Many people find this task enjoyable and interesting, and we are asking you to complete the task to help establish the norm for the task. So please feel free to complete it at a comfortable pace.

#### Instructions:

- Each item contains one scrambled sentence; one word should be discarded and the remaining four words can be rearranged to create the sentence.
- To complete this task, please identify the words that make up the sentence, unscramble them, and write the correct sentence on the line provided.

1. options have I two and \_\_\_\_\_
2. book we the read top \_\_\_\_\_
3. sale for by sweatshirts are \_\_\_\_\_
4. feel are choiceful I usually \_\_\_\_\_
5. is to this opportunity my \_\_\_\_\_
6. dollars salad on costs two \_\_\_\_\_
7. I to are choose live \_\_\_\_\_
8. often soda but drink I \_\_\_\_\_
9. on bookmark used the she \_\_\_\_\_
10. enjoy I freedom my he \_\_\_\_\_
11. in we autonomous often are \_\_\_\_\_
12. tablecloth and blue the is \_\_\_\_\_
13. have by preference a we \_\_\_\_\_
14. bright is the yes lamp \_\_\_\_\_
15. is to here served lunch \_\_\_\_\_

**Verbal comprehension task (cont'd)**

This task will assess your ability to comprehend, and unscramble, a scrambled thought.

Many people find this task enjoyable and interesting, and we are asking you to complete the task to help establish the norm for the task. So please feel free to complete it at a comfortable pace.

**Instructions:**

- Each item contains one scrambled sentence; one word should be discarded and the remaining four words can be rearranged to create the sentence.
- To complete this task, please identify the words that make up the sentence, unscramble them, and write the correct sentence on the line provided.

- |     |                                 |       |
|-----|---------------------------------|-------|
| 16. | to go and I decided             | _____ |
| 17. | to our we classes selected      | _____ |
| 18. | is the now desk wooden          | _____ |
| 19. | on choice we a have             | _____ |
| 20. | apple was to the delicious      | _____ |
| 21. | here the by telephone is        | _____ |
| 22. | we today unconstrained were our | _____ |
| 23. | can self-regulate to usually I  | _____ |
| 24. | the her to fits shoe            | _____ |
| 25. | actions and my are independent  | _____ |
| 26. | you coffee the is hot           | _____ |
| 27. | tell the computer new is        | _____ |
| 28. | now to I unrestricted am        | _____ |
| 29. | am I still for self-determined  | _____ |
| 30. | he now are wears glasses        | _____ |

**[CONTROL PRIME CONDITION]**  
**Verbal comprehension task**

This task will assess your ability to comprehend, and unscramble, a scrambled thought.

The task correlates with verbal intelligence in adults. Most high school and college-age students are expected to be able to complete it quickly and with ease.

Instructions:

- Each item contains one scrambled sentence; one word should be discarded and the remaining four words can be rearranged to create the sentence.
- To complete this task, you **MUST** identify the words that make up the sentence, unscramble them, and write the correct sentence on the line provided. Do this as quickly and accurately as you can.

1. do we to this must \_\_\_\_\_
2. book we the read top \_\_\_\_\_
3. sale for by sweatshirts are \_\_\_\_\_
4. do I should to homework \_\_\_\_\_
5. to I smile ought desk \_\_\_\_\_
6. dollars salad on costs two \_\_\_\_\_
7. for required to I'm study \_\_\_\_\_
8. often soda but drink I \_\_\_\_\_
9. on bookmark used the she \_\_\_\_\_
10. work to with obligated I'm \_\_\_\_\_
11. meet we on deadlines must \_\_\_\_\_
12. tablecloth and blue the is \_\_\_\_\_
13. for boss coerced my me \_\_\_\_\_
14. bright is the yes lamp \_\_\_\_\_
15. is to here served lunch \_\_\_\_\_

**Verbal comprehension task (cont'd)**

This task will assess your ability to comprehend, and unscramble, a scrambled thought.

The task correlates with verbal intelligence in adults. Most high school and college-age students are expected to be able to complete it quickly and with ease.

Instructions:

- Each item contains one scrambled sentence; one word should be discarded and the remaining four words can be rearranged to create the sentence.
- To complete this task, you **MUST** identify the words that make up the sentence, unscramble them, and write the correct sentence on the line provided. **Do this as quickly and accurately as you can.**

- |     |                                 |       |
|-----|---------------------------------|-------|
| 16. | was obey we're compelled to     | _____ |
| 17. | compulsory to attendance is our | _____ |
| 18. | is the now desk wooden          | _____ |
| 19. | giving in to necessary is       | _____ |
| 20. | apple was to the delicious      | _____ |
| 21. | here the by telephone is        | _____ |
| 22. | manipulates my to me boss       | _____ |
| 23. | so behavior my they restrict    | _____ |
| 24. | the her to fits shoe            | _____ |
| 25. | forced by to study I'm          | _____ |
| 26. | you coffee the is hot           | _____ |
| 27. | tell the computer new is        | _____ |
| 28. | the by limits restrained us     | _____ |
| 29. | very are we pressured that      | _____ |
| 30. | he now are wears glasses        | _____ |





# APPENDIX K

## Demographic

- 1.) What is your sex?  Male  Female      2.) Age? \_\_\_\_\_
- 3.) What is your ethnicity?  
 Hispanic or Latino       Not Hispanic or Latino
- 4.) What is your race? (check only one)  
 1. Caucasian/White       4. Asian  
 2. African American/Black       5. Native Hawaiian/Pacific Islander  
 3. American Indian/Native Alaskan       6. Other (specify): \_\_\_\_\_
- 5.) Please rate your political orientation:  
1      2      3      4      5      6      7      8      9      10  
Progressive      Moderate      Conservative
- 6.) How strongly do you identify with your political orientation, indicated in #5 above? (circle one)  
1      2      3      4      5      6      7      8      9      10  
Very Weak      Moderate      Very Strong
- 7.) With which political party do you most strongly identify? (circle one)  
Democrat      Republican      Don't know      None      Other \_\_\_\_\_
- 8.) How strongly do you identify with the political party indicated in #7 above? (circle one)  
1      2      3      4      5      6      7      8      9      10      N/A  
Very Weak      Moderate      Very Strong
- 9.) Please indicate your religious affiliation, if any (please circle one):  
1. Christian      5. Jewish  
2. Hindu      6. Atheist  
3. Buddhist      7. Agnostic  
4. Muslim      8. Other: \_\_\_\_\_
- 10.) Please indicate the strength of your religious/philosophical belief indicated in #9 above:  
1      2      3      4      5      6      7      8      9      10  
Very Weak      Moderate      Very Strong
- 11.) Please indicate the total number of years of education you have completed: \_\_\_\_\_  
(for example: high school graduation is 12yrs., so two years of college is 14yrs.)

What do you think this study is about? \_\_\_\_\_  
\_\_\_\_\_

What thoughts/feelings do you have about this study? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_