

SCARED TO DEATH: AN EXAMINATION OF UNDERLYING  
TERROR FOLLOWING DEATH AWARENESS

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## ABSTRACT

According to Terror Management Theory, when mortality is made salient the potential to experience terror causes powerful worldview defenses to manifest to suppress this potential. Recently, however, the theory has been criticized because no actual evidence has been found to show this potential to experience terror. The current research used Galvanic Skin Response and a battery of self-report measures (e.g. negative affect, stress, fear, distress, etc.) to attempt to provide evidence of potential terror. The results were partially confirmatory suggesting that although mortality salience failed to evoke arousal, negative affect, and stress, it did evoke sadness and distress and suggests that terror is a highly complex combination of multiple negative components as well as physiological arousal. Interpretations and explanations of these results are discussed in accordance with previous Terror Management research.

## DEDICATION

This thesis is dedicated to my mother, Ruth Diane Gentry, and my sister Ashlynn Brienne Gentry, who always supported me unconditionally no matter where my heart led and to my grandmother, Lucy Virgie Clark, and the memory of my grandfather, Newton Garland (Bud) Clark, who gave me an ideal to strive for. This thesis is also dedicated to my aunt, Frieda Edwards, for her continued excitement upon my journey. And finally this thesis is dedicated to Charity Alice Justice, for her unconditional support, love, and patience even at my worst times. Thank all of you for everything – I would not have been able to make it far without you.

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## LIST OF ABBREVIATIONS

TMT, Terror Management Theory

IAT, Implicit Associates Test

GSR, Galvanic Skin Response

SSSQ, Short State Stress Questionnaire

PANAS-X, Positive Affect, Negative Affect Schedule, Expanded Form

SEM, Structural Equation Model

*RMSEA*, Root Mean Square Error of Approximation

## LIST OF SYMBOLS

$n$ , Number

$\alpha$ , Cronbach's Alpha

$M$ , Mean

$SD$ , Standard Deviation

$F$ , F-statistic

$t$ , T-statistic

$p$ , significance statistic

$U$ , Mann-Whitney  $U$ -statistic

$\beta$ , Beta weight

## CHAPTER I.

### INTRODUCTION

In everyday life, people are surrounded by reminders of death and dying. Consider the local news reporting on a wreck that killed several people or horror movies displaying often graphic depictions of death. Additionally, there are a vast number of cemeteries throughout the world that serve as very literal reminders of our finite existence. These constant reminders of death should cause us as humans to experience a significant amount of anxiety, thus causing us to avoid them (Greenberg, Pyszczynski, & Solomon, 1986). We *should* deplore watching the news, avoid horror movies, and even drive quickly past even the smallest roadside cemetery or memorial because they remind us of our ultimate end. Interestingly, we often enjoy these reminders of death, however. The news still broadcasts several times daily, new horror movies are filmed and presented several times each year, and many of the larger cemeteries have become national parks with millions of visitors each year. Research into Terror Management Theory (TMT) attempts to explain this phenomenon, suggesting that we hold several ego defensive mechanisms that allow us to transcend death and achieve a degree of immortality (Greenberg et al., 1990; Solomon, Greenberg, & Pyszczynski, 1991). According to TMT, these defense mechanisms allow us to avoid the anxiety associated with death and actually enjoy the many themes of death present in everyday life.

Research into TMT is largely based on the philosophical works of cultural anthropologist Ernest Becker (1962; 1973; 1975) in which he argues that humans are capable of thinking in a

self-reflective, temporal, and symbolic manner. Subsequent research suggests that this ability can be quite beneficial to optimistic experience (Gilbert, 2007), but it also allows us to conceptualize more negative experiences. For instance, we can contemplate our purpose in life (or lack thereof), or even a world in which we do not exist. We can even think about our own death and a variety of ways in which that may occur. This conceptualization is exacerbated by the realization that the world is an uncontrollable place in which our death could occur at any moment and without any foreseeable reason in many cases. Further, Becker (1973) suggests that this realization should be so anxiety provoking that we should be immobilized with fear. Culture, however, provides a way to instill the world with order and permanence, thus allowing us to achieve a degree of immortality by being part of something larger than ourselves (Greenberg et al., 1986) and to transcend death and the uncertainty involved.

### **The Need for Self-Esteem**

In order to successfully defend against death anxiety, TMT posits that it is imperative to boost self-esteem (Greenberg et al., 1986). This self-esteem boost comes from the human desire to view the world as a just place in which people who do good are rewarded and those that do bad are punished (Lerner, 1965). The development of this need for self-esteem and the just-world conception comes largely from our early life experiences with our parents. As children, we are quick to view the world as orderly and predictable due to our parents' reactions to our behavior and actions. As children gain more cognitive capabilities, they are able to recognize the conditional love given to them by their parents. Well-behaved children are rewarded with love and affection from their parents. These rewards are associated with an increase in self-esteem due to the positive feelings that they evoke. Misbehaved children, however, are given some form

of punishment (e.g. spankings, withdrawal of love, time-outs). Alternatively, these punishments are associated with a decrease in self-esteem due to the negative feelings associated with them. As children age, they are able to predict the outcome of their actions and determine the response given to them by their parents before the action is even committed, causing them to view the world as just and predictable. Children must believe that they are good so that they do not have to worry about a punishment and the negative feelings associated with it (Greenberg et al., 1986). Thus, TMT suggests that good and bad children get what they deserve based on their actions and these responses cause the differences in self-esteem associated with them.

With this increasing cognitive ability, however, children are eventually able to realize that there are forces that supersede their parents. Additionally, they can grasp the concept of mortality. With this realization, children are not only able to understand that they are mortal, but also that their parents are mortal and will not always be able to protect them, causing them to lose the primary mechanism to promote self-esteem. In order to maintain the belief in a just world of order and permanence, the importance of parents in maintaining self-value is replaced by culture and the tenets important to each culture (nationalism, religion, relationships, etc.). Just as the parents did during early childhood, culture has certain rules, customs, and traditions that allow us to attain self-value by upholding those tenets important to that culture. By following these rules, customs, and traditions, we are able to boost our self-esteem because we do not have to worry about a punishment that would come from violating these values, whereas that someone who deviates from these tenets should be punished before a follower (Greenberg et al., 1986).

This need for self-esteem is not a novel argument within TMT. Much research leading into the development of TMT provided empirical evidence for human's innate desire to boost self-esteem in order to feel accomplished. Research into self-handicapping (Berglas and Jones,

1978) argued for a human desire to externally threaten their own chances of successfully completing a task if we anticipate the possibility of failing the task. Although initially perplexing, this suggests that humans are motivated to protect their self-esteem by seeking out external justifications for their inability to complete a task that could possibly end with failure. Additionally, one simply needs to closely examine cognitive dissonance theory (Festinger, 1957) in which people who have cognitions that are juxtaposed with one another will experience a state of cognitive dissonance. According to cognitive dissonance theory, this state is so unpleasant that it forces the person to alter one of the two juxtaposed cognitions in order to make them harmonious with one another, even when changing the cognition alters the meaning, context, etc. within that cognition. One such interpretation of this phenomenon consistent with TMT argues that the purpose of this attitude change is to shield the person from having to admit that they believe or have done something that was considered negatively by others or society (Greenberg et al., 1986). This ultimately allows humans to shield themselves from threats to self-esteem.

This need for self-esteem is not contained to public displays of accomplishment, however. Although the previous examples do suggest a need for public recognition and self-esteem maintenance, other research suggests that personal self-esteem maintenance becomes paramount when one's public image is vulnerable (Greenberg et al., 1986). Greenberg, Pyszczynski, & Paisley (1984) provide evidence for this private self-esteem maintenance by demonstrating self-esteem maintenance strategies (i.e. test anxiety) even under anonymous testing conditions. Additionally, this effect was removed when a strong incentive was given to perform well, suggesting that private self-esteem maintenance was important in the absence of external incentives. To add further support to this phenomenon, subsequent research suggests that following a public failure, people boost their personal self-image privately in order to

compensate for the public failure (Greenberg & Pyszczynski, 1985). Concerning other people's judgment however, Tesser and Paulhus (1983) argue that people who know that they publicly perform well, but believe that other people evaluate their performance poorly, reduced their private belief that the dimension was relevant.

From a TMT perspective and the aforementioned evidence integral to the founding of TMT, the importance of self-value and a just world are paramount to death transcendence. By following the rules, values, and customs important to our culture, we do not have to worry about death because we are boosting our self-esteem. We are publically performing in a way that does not allow for self-esteem to be threatened, thus playing an important role within the culture and ultimately boosting self-worth. A just world that upholds order would not allow someone to die that is upholding these values, allowing us to avoid the anxiety and terror associated with death awareness. Just as children must believe that they are good to avoid the worry of a punishment from their parents, we must believe that we are good to avoid the ultimate punishment (death) from the world (Greenberg et al., 1986). Within this link, harming self-esteem would allow for the anxiety and terror of the ultimate punishment to manifest, therefore we greatly overcompensate failures with private inflation of self-esteem (Greenberg and Pyszczynski, 1985). Without this influx, we face the reality of confronting our finite existence.

Interestingly, the aforementioned assumption in children has never been empirically examined from a TMT framework. Becker (1962; 1973) and Sullivan (1953) argue that feelings of security and safety are associated with increasing self-worth and that feelings of dread and terror are associated with decreased self-worth. Additionally Rochlin (1965) argues that as children age they change from a fear of abandonment by their parents to a fear of being perceived as useless. It is primarily from these works that the developmental portion of TMT was

derived, suggesting that this may be a simplistic or erroneous (especially when considering the age of these arguments) understanding of self-esteem and meaning making in children that leads to the development of defense mechanisms. Although the origins are suspect to error and require further empirical research, other research does provide support for the primary tenets of TMT that humans can use culture to provide a sense of personal meaning to boost self-esteem.

### **Psychodynamic Assumptions**

Many of the psychological assumptions integral to TMT come from classical psychoanalytic theory. Through the work of Rank, Becker was directly influenced by the works of Freud (Becker, 1973; Martin & van den Bos, 2014). Possibly the largest influence into TMT was that of the unconscious. Freud (1900/1953) explicitly argues that “the unconscious is the true physical self” (p. 557). Further, he suggests that the unconscious can influence observable behavior (Freud, 1914) in order to achieve personal gratification (Freud, 1924/1961). Although many of the early interpretations of this unconscious mind were primarily associated with repressed memories, this is a simplistic understanding of psychodynamic theory. Although psychodynamic theory posits that the unconscious mind *does* hold repressed memories, it also holds the mechanisms responsible for the *Id* and the *Ego* (Freud, 1923/1961). Primarily, the *Id* operates solely to bring pleasure to the person, functioning under the “pleasure principle,” and the *Ego* attempts to control the influence of the *Id* by exerting pressures from the external world via the “reality principle” (p. 25). According to Freudian psychodynamic theory, this unconscious struggle between the *Id* and *Ego* can interact with external forces to influence observable behavior (For a thorough explanation of one interpretation of the unconscious see Sletvold, 2013).

Certainly, much of psychology has moved passed this classical psychodynamic theory due to more recent research; however, other research has suggested some credibility in *certain* areas Freud's theory. Primarily, Wilson (2002) suggests that an adaptive, unconscious mind is integral to survival. Further, according to the lens model, unconscious processes are capable of influencing behaviors and decisions whereby decisions are made through a complex interplay between internal mechanisms and the environment (Brunswik, 1952; Karelaia & Hogarth, 2008). Although the lens model suggests that environmental influences are primarily responsible for judgments, these influences need not be observed consciously; unconscious perceptions have the potential to influence judgments. This suggests that environmental influences can affect our behavior even when we are not aware of this influence (Newell & Shanks, 2014). Further, a meta-analysis by Karelaia and Hogarth (2008) found that linear models can successfully predict judgments providing further validation for the lens model. These results together do suggest that the unconscious can influence behavior by illustrating the interplay between conscious awareness and unconscious motivations in decision-making.

Although the degree to which the unconscious can influence cognition is quite controversial (Newell & Shanks, 2014), it is quite apparent that factors outside of conscious awareness can influence cognition and behavior (i.e. the lens model). It is from this assumption that much of TMT is drawn in that worldview defense mechanisms used to shield against death awareness, provide meaning, and boost self-esteem operate outside of conscious awareness in order to attain self-meaning in response to existential terror (Greenberg et al., 1986). More recently, TMT has been modified to suggest that these worldview defenses are not actually defending against actual terror, but unconscious terror (Pyszczynski, Greenberg, & Solomon, 1999). Thus, in accordance with psychodynamic theory, this unconscious struggle with

existential terror causes the manifestation of worldview defenses. One final modification (and the current TMT) suggests that neither conscious nor unconscious terror manifest, but the *potential* to experience existential anxiety is what causes the worldview defense manifestation (Greenberg et al., 2003). Thus this potential to experience unconscious anxiety causes the manifestation of worldview defenses to keep anxiety from manifesting by boosting self-esteem.

### **Worldview Defensive Mechanisms**

In order to shield against death anxiety, culture provides several defense mechanisms that allow us to boost our self-esteem and self-value. These mechanisms allow us to achieve a degree of symbolic or literal immortality by boosting our self-esteem, ultimately shielding against death anxiety (Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989). We use the same cognitive mechanisms used to incite feelings of terror in order to suppress these feelings. Although the specific cognitive mechanisms are never defined by TMT, TMT argues that they are a byproduct of human evolution. Specifically, within our evolutionary history, increasing cognitive capabilities eventually allowed us to contemplate events that had not happened yet (i.e. death). An extreme interpretation of TMT argues that culture and the values inherent in each culture were created for the sole purpose of shielding against death anxiety. We are able to deny our creatureliness and achieve a degree of immortality by living up to the expectations and values important to our culture. When we contemplate or are made aware of death, we are, thus, able to remember times that we adhered to the values important to our culture in order to boost our self-esteem, giving us a defense against death anxiety. This suggests that the culture one belongs to is primarily responsible for the defense mechanisms necessary to defend against the terror of nonexistence (Greenberg et al., 1986).

Subsequent research into TMT has revealed that these defense mechanisms are successful at mitigating the anxiety associated with mortality salience (see Arrowood & Pope, 2015 for a review) because of their ability to promote self-esteem. In a typical TMT laboratory paradigm, participants are asked to vividly write about their deaths and the inherent emotions within this cognition (Greenberg, Pyszczynski, Solomon, Simon, & Breus., 1994). Following this manipulation, participants are given a short delay. This delay is necessary because TMT suggests that participants initially attempt to actively repress death awareness, but due to the cognitively taxing nature of repression, worldview defenses manifest as a more feasible shield against potential anxiety. This process of delayed worldview defense is known as the dual process of model of terror management (Pyszczynski et al. 1999). Following this delay, worldview defenses are analyzed by having participants rate the credibility of two essays written by someone from an out-group. One essay is very favorable of the specific worldview and the other criticizes it. For instance, participants have been told that two immigrants wrote the two essays; one promoted the United States and the other criticized it. These essays are primarily used to examine a nationalism worldview defense and defense of one's culture. Following the essays, participants are asked to rate the credibility of the essays and the authors as well as overall liking (Greenberg et al., 1994). TMT suggests that cultural worldviews can be threatened by someone who does not ascribe to the particular worldview of the individual being threatened (i.e. an atheist to a Christian), often causing hostile or negative evaluations and reactions to the opposing viewpoint or group (Schimel et al., 1999). Conversely, we react positively and agree with those who support our personal, cultural worldviews, suggesting a powerful in-group/out-group effect of mortality salience (Rosenblatt et al., 1989). These people "affirm" the beliefs that we hold causing us to bolster and be more confident in them. Because we use culture to imbue ourselves

with meaning, a promotion of one's culture is a promotion of personal self-worth; however, a degradation of this culture leads to a degradation of personal self-worth.

Interestingly, these results are only found when participants are thinking about their own death. Greenberg et al. (1994) found that thinking about the death of a close family member *can* cause worldview defenses to manifest, but not as powerfully as thinking about one's personal death. They argued that this was because the death of another person *can* serve as a reminder of personal vulnerability, but that this differs from person to person. They found that only reminders of personal death consistently cause worldview defense manifestation. Thoughts of a threatening or anxious situation also do not cause worldview defenses to manifest suggesting that it is not the emotional valence associated with death thoughts.. Additionally, Baldwin and Wesley (1996) found that thinking about how meaningful life is, is also ineffective at causing worldview defense. These results together suggest that only existential concerns associated with death awareness are capable of causing worldview defense.

The cultural defense mechanisms capable of shielding against death anxiety are largely based on values that are considered important to the culture where one lives. Arndt, Greenberg, and Cook (2002) suggest that nationalistic thoughts are much more accessible following death awareness. Other research suggests that we react strongly against those who criticize the culture in which we live when under death awareness (e.g. Greenberg et al. 1994; Jonas & Fischer, 2006). In accordance with TMT, this result would be expected because we should try to defend our personal worldviews strongly in the face of death (Greenberg et al., 1990; Greenberg et al., 1994; Rosenblatt et al., 1989). This finding is not always consistent across gender, however. Women do not always show this nationalism increase. Instead, death awareness caused thoughts of relationships to be more accessible in women and only occasionally in men. After priming

thoughts of America in women, however, they displayed the previously mentioned nationalistic cognitions instead of thoughts of relationships following death awareness suggesting that they were using nationalism as a worldview defense (Arndt et al., 2002), perhaps because it assisted in affirming this worldview. This suggests that nationalism and relationships play a role in mitigating death anxiety due to their inherent value by the culture, but also that individual differences and situational differences may cause different defense mechanisms to manifest.

A closer examination of relationships, however, reveals that mortality salience has been shown to influence sexual interest variously, depending on its interaction with other factors (Arndt et al., 2002; Birnbaum, Hirshberger, & Goldenberg, 2010; Goldenberg et al., 2000). Mortality salience has been found to decrease interest in casual sex, whereas it has been found to increase interest in romantic sex, perhaps because of the greater emotional connection and transcendence offered by the context of the romantic relationship (Birnbaum et al., 2010) and the importance of belonging (Greenberg et al., 1986) and relationships (Arndt et al., 2002) inherent in TMT. Several individual differences influence these findings, however. Although interest in romantic sex was consistent across gender and personality variables, interest in casual sex generally decreased, but was found to increase in male samples that tended to avoid relationships (Birnbaum et al., 2010). This finding is consistent with prior research suggesting that death awareness reacts differently with sexual interest due to individual differences such as body self-esteem and appearance monitoring (Goldenberg et al., 2000).

The desire for offspring shows similar individual differences in relation to death awareness. Baumeister (1991) suggests that children provide a degree of immortality (see also Hood and Morris, 1983 for the biosocial mode of death transcendence). Parents can instill the beliefs and values important to them in their children. By passing on these values, children

provide a symbolic form of immortality capable of decreasing death anxiety (Fritsche et al., 2006). Wisman and Goldenberg (2005) suggest that men show a strong increase in the desire for children after mortality is made salient, but women *only* show this increase when they are not highly motivated by their career. Highly career motivated women show a decrease in desire for children. This phenomenon is due to the additional costs associated with raising children that only affect women (e.g., carrying the baby, nursing, etc.).

Although the previous worldview defenses are highly dependent on individual differences, other ego defensive mechanisms are much more robust and are resistant to many other influences. Religious belief has been observed to greatly mitigate death anxiety regardless of many individual differences. Most religions not only provide their followers with rules and customs that allow followers to boost their self-esteem by adhering to these values, but unlike other defense mechanisms, also provide followers with a literal afterlife (van den Bos et al., 2012). Research into TMT and religion suggests that confirmation of an afterlife successfully shields against death anxiety without evoking personal worldview defenses in which participants were given the typical TMT death writings following by a fake scientific article that either provided “evidence” of an afterlife or refuted it. They were then given the standard worldview defense essays to check for their manifestation. Participants under death awareness who were given evidence of an afterlife did not show the typical nationalistic worldview defense manifestation, but also did not report negative affect suggesting that death anxiety did not manifest. Interestingly, this finding was not contained to religious samples. Self-reported atheists were also shielded from death anxiety without evoking traditional worldview defenses suggesting that religion can buffer the manifestation of death anxiety. Without having an afterlife confirmed, however, both theists and atheists showed the normal worldview defense increase

(Heflick & Goldenberg, 2012). Other research suggests that when religious people are able to uphold and support their religious beliefs following death awareness, they do not need to bolster the traditional worldview defenses to mitigate death anxiety. Their intrinsic religious beliefs are effective anxiety buffers (Jonas & Fischer, 2006). This suggests that religious belief mimics the general worldview defense outcomes. Additionally, death awareness has been found to increase thoughts of supernatural agents (i.e. God) in both theists and atheists and faster responding that these agents are real. Jong, Halberstadt, and Bluemke (2012) suggest that death awareness caused implicit religious belief in atheists. During this study, participants were made aware of their death and given a supernatural agents modified of the Implicit Associates Test (IAT; Greenwald, McGhee, & Schwartz, 1998). Participants (both atheists and theists) in the death awareness condition, as opposed to a neutral prime, were faster to respond that the supernatural agents presented in the IAT were real suggesting an implicit belief in these agents. Interestingly, this finding goes against other TMT research in which death awareness should cause personal beliefs to be bolstered as worldview defenses (Rosenblatt et al., 1989). Jong et al. (2012) suggest that this implies a strong cultural acceptance of Western, religious beliefs which instead suggests a careful distinction between implicit belief and ease of activation in which death awareness likely caused religious cognition to be more easily available. Despite the difference between belief and cultural linking, research into TMT and religion suggests that religion is a powerful buffer of death anxiety.

### **Recent Criticisms**

Although TMT research has produced many significant findings that have been replicated since its origination, many of the integral, theoretical assumptions have recently been challenged.

Martin and van den Bos (2014) suggest several problems with the basic assumptions of TMT and many of the findings derived from research. Primarily, TMT is not falsifiable. Even null results can be interpreted to support TMT. Consider the previous research by Jong et al. (2012) in that TMT would have been supported either by atheists' implicit religious beliefs *or* by bolstering their personal worldviews in order to decrease death anxiety. TMT predicts that atheists can either adopt implicit religious belief or embrace their personal atheistic belief because both are ego defensive mechanisms. As further evidence of unfalsifiability, Greenberg, Simon, Pyszczynski, Solomon, and Chatel (1992) found that that following death awareness, conservatives were more likely to react negatively against liberals, but liberals reacted positively toward conservatives. These conflicting results can be interpreted as supporting TMT in which we should degrade members of an out-group (Rosenblatt et al., 1989) in the case of conservatives, but also because an important liberal value is tolerance, liberals are also upholding their specific worldview. Martin and van den Bos (2014) suggest that although these interpretations may not be wrong, the theory is unable to predict the specific ego defensive mechanism in which people will engage. Instead, results are interpreted by the best fitting ego defense mechanism.

Additionally, Martin and van den Bos (2014) suggest that ambiguous findings can also be used to support TMT. Consider Wisman and Goldenberg's (2005) finding that interest in children may increase or decrease depending on several individual differences (e.g., gender, race, profession, drive, etc.) and how these differences interact. Martin and van den Bos (2014) argue that such qualifications do not add sufficient information that can be used to predict behavior in any individual person. Additionally, these qualifications allow for any result to support TMT, regardless of the outcome (see previous claim of unfalsifiability).

Although there are several other critical evaluations of TMT posed by Martin and van den Bos (2014), the most important critique in regards to the current study is the lack of terror reported in lab based death anxiety research. TMT suggests the potential to experience terror alleviates any potential anxiety before it successfully manifests without us ever actually experiencing terror (Greenberg et al., 2003). Martin and van den Bos (2014) argue that although many studies suggest that death awareness does incite some emotional reactions, there has been no evidence to show that these emotions are actually terror or the potential to experience it. For instance, when asked to talk about their death, several studies have found that participants become emotionally upset at these thoughts (J. Jong, personal communication, February 27, 2015), but this depressed mood and sadness is not directly evidence of terror. Further, most studies fail to reveal negative affect following death awareness (see Greenberg et al., 1994 for an example). It is from this assertion that the proposed research is drawn.

### **Current Research**

In response to the challenge posed by Martin and van den Bos (2014), the current study attempts to examine the underlying emotions of death awareness in order to determine if potential terror can be examined with physiological measures. Although self-report measures of anxiety have failed to indicate the presence of negative emotions (i.e., terror), physiological measures of terror may indicate some level of potential terror. For the current study, Galvanic Skin Response (GSR) was chosen due to its ability to detect a fear response among fear-evoking materials (Kreibig, Wilhelm, Roth, & Gross, 2007). Primarily, the presence of a GSR is due to activation of the endocrine sweat glands. This activation is often due to activity within the sympathetic nervous system (Uno, 1997). Additionally, activation of the sympathetic nervous

system is often due to a fight-or-flight response especially when presented with threatening stimuli or situations (Porgas, 2011). As the name suggests, in response to stressful situations (i.e. something terrifying), humans either stay and “fight” through the stressful situation or flee (“flight”) from it altogether (Cannon, 1932). Thus, from within the context of TMT, although participants are not actively experiencing terror but instead defending against this potential (Greenberg et al., 2003), the body may naturally begin to prepare for this fight-or-flight response in addition to traditional worldview defenses in order to alleviate the “paralyzing terror” (Greenberg et al., 1986) caused by mortality salience.

Within this paradigm, GSR is not novel to TMT; however, the examination of this arousal has largely been neglected following the initial research. Rosenblatt et al. (1989) examined college students’ bond assessments for a prostitute following mortality salience or a neutral control (Study 5). During the testing, however, participants were examined along several physiological measures including GSR. The results of this study revealed that GSR did not significantly covary with the mortality manipulation to influence bond assessments. Put another way, those who were made death aware set the prostitute’s bond significantly higher than those in the control condition regardless of GSR. Although this does suggest that GSR does not influence worldview defense manifestation (harsher punishment suggests defensive behaviors), the study failed to indicate whether or not participants within the mortality salient condition reacted physiologically to their death awareness. Additionally, Solomon, Greenberg, and Pyszczynski (1991) argue from a TMT perspective, GSR should not increase among those who are experiencing higher levels of self-esteem. By boosting participants’ self-esteem via a fake feedback task, participants showed lower GSR response to an impending shock. Although this has largely been interpreted as though mortality salience should not increase GSR because

worldview defenses increase self-esteem, this assertion has not been empirically tested using a mortality salience paradigm.

Given this research and challenges, the current research examined the effects of mortality salience on levels of GSR during the introduction of a death prime. Given the dual process model of TMT (Pyszczynski et al., 1999), I hypothesized that participants should exhibit a higher GSR when they are actively being made aware of their death. This hypothesis is based on the assumption that the potential to experience terror should prepare the body for a fight-or-flight response (Cannon, 1932), but also because worldview defenses are not manifested and will not manifest until several minutes have passed following the completion of the mortality prime (Pyszczynski et al., 1999). Additionally, I hypothesize that participants will not self-report any change in stress levels due to the mortality prime. Participants will, however, be able to self-report sadness and distress (J. Jong, personal communication, February 27, 2015). Finally, participants in the death aware condition will display more worldview defense in order to combat potential anxiety.

## CHAPTER II.

### METHOD

#### **Participants**

Sixty-four participants from a medium, public university in the Southeastern United States volunteered to participate in the study. Of this initial number, 3 had to be excluded due to exceptionally high GSRs that the sensors were unable to pick-up due to a ceiling on the sensors. Thus, 61 participants (female = 44) were included in the study. Previous research suggests that mortality salience manipulations are rather robust in finding large effect sizes especially after longer delays (Burke, Kosloff, & Landau, 2013; Martin & van den Bos, 2014). A power analysis revealed that the current study had an 86% chance of finding an effect if the manipulation caused a large difference. Additionally, participants' ages ranged from 18 to 45 with the largest age groups being 20 ( $n = 18$ ) and 21 ( $n = 16$ ). Participant ethnicity was largely Caucasian ( $n = 46$ ), followed by African American ( $n = 12$ ), Hispanic/Latino ( $n = 2$ ), and Other ( $n = 1$ ). Finally, participants were largely Christian ( $n = 41$ ), followed by No religion ( $n = 7$ ), Atheist/Agnostic ( $n = 5$ ), Other ( $n = 4$ ), Hindu ( $n = 1$ ), Muslim ( $n = 1$ ), Jewish ( $n = 1$ ), and Pagan ( $n = 1$ ).

#### **Materials and Procedure**

Prior to any recruitment or testing, Institutional Review Board approval was obtained from the UTC human subjects committee. Upon reporting to the lab, participants read an informed consent telling them that they will be completing questionnaires about basic personality

variables and how they interact with thoughts of an unpleasant situation and arousal. This cover story was crafted in order to keep participants from prematurely considering their own mortality and to keep the control group uncontaminated. Once informed consent was attained, participants completed basic demographics (e.g. age, ethnicity, etc.). Prior to any prime, participants completed the pretest version of the Short State Stress Questionnaire (SSSQ; Helton & Naswall, 2014) in order to control for pre-existing differences in stress (“I’m reflecting about myself”). The scale is composed of 3 subscales (Distress,  $\alpha = .854$ ; Engagement,  $\alpha = .783$ ; and Worry,  $\alpha = .820$ ) and scores were calculated by averaging the response to each of the 24 items among each subscale. Following the SSSQ pretest, two electrodes were placed on the index and ring finger of each participant in order to obtain GSR levels. Participants were instructed to wipe their hands if they were perceived as wet by the experimenters prior to connection or if the sensors were unable to attain a reading. The responses were collected by a Neulog GSR Logger Sensor NUL-217. Each sensor was calibrated to sample at a rate of 10 samples per second. Participants were instructed to place their hand on the desk in front of them and not move while the sensor was connected. Participants were then randomly assigned to either the experimental or control condition. During this assignment, experimenters instructed participants to stare at a fixation point on a screen directly in front of them. A baseline GSR was taken for each participant at this time.

In the experimental condition, participants had death awareness manipulated using the standard death manipulation. This procedure asked participants to answer two open-ended questions (“Please briefly describe the emotions that the thought of your own death arouses in you” and “Tell me, as specifically as you can, what you think will happen to you physically as you die and once you are physically dead;” Greenberg et al., 1994, p 628). These questions are

traditionally used in TMT research in order to manipulate death awareness (Greenberg et al., 1994). In the control condition, participants were asked to respond to two open-ended questions about watching TV (“Please briefly describe the emotions that the thought of watching TV arouses in you” and “Tell me, as specifically as you can, what you think will happen to you physically as you watch TV;” Greenberg et al., 1994, p 628). Participants responded to these questions orally due to the GRS equipment on their hand. Additionally, the experimenters probed participants for longer responses if their response was less than one minute.

Following the final question in each condition, participants completed the posttest version of the SSSQ (Helton & Naswall, 2014) in order to examine self-reported stress immediately following the primes (“I felt self-conscious”). Participants were instructed to answer each question relating back to how they felt during the talking task. Scores were calculated by averaging the 24 items together among each subscale (Distress,  $\alpha = .848$ ; Engagement,  $\alpha = .792$ ; and Worry,  $\alpha = .875$ ). Participants then completed the Positive Affect, Negative Affect Schedule – Expanded Form (PANAS-X; Watson et al., 1988) to assess self-reported negative affect (i.e. Afraid) and to serve as a delay in order for worldview defenses to manifest. Items on the negative affect subscale were calculated by averaging the 10 items ( $\alpha = .892$ ). Additionally, the PANAS-X has several subscales of which Negative Affect Fear ( $\alpha = .893$ ) and Negative Affect Sadness ( $\alpha = .851$ ) hold significance within the current study. The other subscales (i.e. positive affect) were simply used as a delay. Finally, participants read two essays that they were told were written by immigrants to the United States. One essay is overtly positive toward the United States and the other is highly critical (Greenberg et al., 1994). Participants were asked to evaluate each essay and the authors via overall credibility, agreement, and liking of both the essays and the authors (positive essay  $\alpha = .878$ ; negative essay  $\alpha = .895$ ). These essays are often used in

TMT research and examine the manifestation of worldview defenses. Participants were then thanked, debriefed, and allowed to ask questions.

## CHAPTER III.

### RESULTS

#### **Preliminary Analyses**

In order to prepare the data for analysis, pretest scores were subtracted from posttest scores in order to create change variables. These change variables controlled for individual differences within the GSR and stress. Prior to any group comparisons, each dependent variable was examined so that it meets statistical assumptions. A Kolmogorov-Smirnov test revealed that the GSR change scores were both positively skewed and kurtotic,  $p = .003$ . A base 1 was added to each score and a log10 transformation was conducted to correct for non-normality. Following the transformation, a Kolmogorov-Smirnov test revealed that the transformed GSR change scores met the assumption of normality,  $p > .200$ . Additional Kolmogorov-Smirnov tests revealed that both the positive essay ( $p > .200$ ) and the negative essay ( $p > .200$ ) met the assumption of normality. The negative essay scores were then subtracted from the positive essay scores in order to create an overall measure of worldview defense. This transformation is consistent with previous research (Greenberg et al., 1994). A Kolmogorov-Smirnov test revealed that the overall measure of worldview defense met the assumption of normality as well,  $p > .200$ . Kolmogorov-Smirnov tests were also conducted on the pretest/posttest change on the 3 SSSQ subscales and revealed that Engagement ( $p > .200$ ) and Worry ( $p > .200$ ) met the assumption of normality; however, Distress was negatively skewed and positively kurtotic,  $p < .001$ . A base 3 was added to each score and a log10 transformation was conducted, but failed to correct for non-

normality,  $p < .001$ . Additionally, a square root was taken for each score, but still failed to correct for non-normality,  $p < .001$ . Thus, nonparametric analyses were conducted for Distress. Finally, Kolmogorov-Smirnov tests were conducted for the PANAS-X subscales for Fear ( $p < .001$ ) and Sadness ( $p < .001$ ) revealing that the data was significantly skewed and kurtotic. A log10 transformation was conducted, but failed to correct for non-normality in both scales,  $p < .001$ . Additionally, a square root was taken for each scale but still failed to correct for non-normality,  $p < .001$ . Nonparametric analyses were also conducted for Fear and Sadness.

### **Hypothesis Testing**

In order to test the initial hypothesis that GSR will be higher among participants who are primed to think about their death, a paired samples t-test was conducted for those participants in the death aware condition to compare baseline GSR with GSR during the mortality salience. The results of this analysis revealed a significant difference between baseline GSR ( $M = 2.187$ ,  $SD = 1.481$ ) and GSR during the prime ( $M = 2.594$ ,  $SD = 1.592$ ),  $t(30) = -6.602$ ,  $p < .001$ ). This result suggests that death awareness may cause increased arousal. A paired samples t-test also revealed a significant difference in the control condition between baseline GSR ( $M = 2.113$ ,  $SD = .934$ ) and GSR while talking about TV watching ( $M = 2.590$ ,  $SD = 1.161$ ),  $t(28) = -4.690$ ,  $p < .001$ . This result suggests that the previously mentioned effect may have been influenced by talking and cognition. In order to determine that this effect was due to the death awareness and not simply due to talking and cognition, an independent samples t-test was conducted on the GSR change scores. A Levene's test revealed that equal variances could be assumed between groups,  $F = .140$ ,  $p = .710$ . The results of the t-test failed to find a significant difference in GSR change between the death aware group ( $M = .408$ ,  $SD = .344$ ) and the control group ( $M = .478$ ,  $SD =$

.548),  $t(58) = .387, p = .700$ . Research by Hirschberger, Ein-Dor, Caspi, Arzouan, and Zivotofsky (2010) and Strachan et al. (2007), however, suggests that those who are biased toward negative information (i.e. those high in negative affect) should react more strongly to mortality salience. An additional ANCOVA was conducted on GSR change scores while controlling for negative affect. A Levene's test revealed that equal variances could be assumed between groups,  $F = .132, p = .717$ . The results of the ANCOVA failed to find a significant main effect for condition even when controlling for negative affect,  $F(1, 56) = .043, p = .837$ . Results also failed to indicate a significant main effect for negative affect,  $F(1, 56) = .003, p = .956$ . Lastly, results failed to indicate a significant interaction between condition and negative affect,  $F(1, 56) = .149, p = .701$ . These results together suggest that among this sample, death awareness does not significantly influence GSR.

In order to test whether or not mortality salience influences state levels of stress, three separate independent samples t-tests were conducted on the change scores for the SSSQ subscales Engagement and Worry. A Levene's test revealed that equal variance could be assumed between groups for the Engagement subscale,  $F = .172, p = .680$ . Results failed to indicate a significant difference in Engagement between the death aware ( $M = -.371, SD = .666$ ) and the control group ( $M = -.513, SD = .719$ ),  $t(58) = -.794, p = .430$ . Further, a Levene's test revealed that equal variance could be assumed between groups for the Worry subscale,  $F = .747, p = .391$ . Results failed to indicate a significant difference in Worry between the death aware ( $M = .323, SD = .913$ ) and the control group ( $M = .410, SD = .806$ ),  $t(58) = .390, p = .698$ . A Mann Whitney test was conducted on the SSSQ Distress subscale due to significant non-normality. The results of this analysis revealed a significant difference between the death aware ( $Mean Rank =$

34.81) and the control condition (*Mean Rank* = 25.90) in which those in the death aware condition reported significantly more distress following the prime,  $U = 316.000$ ,  $p = .046$ .

An additional independent samples t-test was conducted to examine the effects of mortality salience on worldview defense manifestation measure by the combined scores on the positive and negative essay evaluations. A Levene's test revealed that equal variance could be assumed between groups,  $F = 1.835$ ,  $p = .181$ . Surprisingly, the results failed to indicate a difference in worldview defense between the death aware ( $M = 1.39$ ,  $SD = 2.58$ ) and the control condition ( $M = .51$ ,  $SD = 1.99$ ),  $t(58) = -1.475$ ,  $p = .146$ . An ANCOVA was then conducted to control for negative affect. A Levene's test revealed that equal variance could be assumed between groups,  $F = 1.712$ ,  $p = .196$ . These results failed to indicate a significant main effect for condition when controlling for negative affect,  $F(1, 56) = .469$ ,  $p = .496$ . Negative affect also failed to significantly influence worldview defense,  $F(1, 56) = .003$ ,  $p = .954$ . Finally, the results failed to indicate a significant interaction between condition and negative affect,  $F(1, 56) = .015$ ,  $p = .904$ . Overall these results suggest that among this sample, mortality salience failed to significantly increase worldview defense.

Two further analyses were conducted on the PANAS-X subscales Fear and Sadness. Due to non-normality, a Mann-Whitney test was conducted to compare groups among levels of fear and sadness. The results of the analyses failed to find a significant difference in Fear between the death aware (*Mean Rank* = 33.39) and control group (*Mean Rank* = 27.41),  $p = .182$ . The results did, however, indicate a difference in Sadness between the death aware (*Mean Rank* = 35.31) and control group (*Mean Rank* = 25.36),  $U = 300.500$ ,  $p = .022$ . These results suggest that talking about death caused participants to experience significantly more sadness than those talking about watching TV.

Finally, in order to examine multiple aspects of the terror, a Structural Equation Model (SEM) was computed allowing “terror” to be a latent variable as represented by GSR change, Negative Affect, Sadness (as scored on the PANAS-X), Fear (as scored on the PANAS-X), and the SSSQ subscales (Worry, Distress, Engagement). Condition was dummy coded (control = 0, death = 1) for this model. Additionally, covariances were assigned as 1 in the unstandardized model so as to control for underidentification. The results of the analysis can be found in Figure 1. This model suggests that death awareness caused a significant increase in “Terror,”  $\beta = .603, p < .001$ . Further analyses, however, revealed that the overall model suffered from poor goodness-of-fit,  $RMSEA = .185$ , suggesting that the model may be misrepresentative. Thus, considering the aforementioned results that death awareness did not significantly influence GSR change, Fear, Worry, or Engagement, the model suggests that better representations of terror may be needed.



## CHAPTER IV.

### DISCUSSION

The primary purpose of the current study was to examine the potential to experience terror following death awareness. The results are somewhat conflicting in which evidence of terror was found in certain analyses. The initial analyses revealed that physiological arousal did not differ between the death aware and control conditions. Subsequent analyses revealed that death awareness did not cause Fear, Worry, or Engagement to manifest. Contradictory to previous research (i.e. Greenberg et al., 1994), even worldview defenses did not manifest following mortality salience. On the other hand, Distress and Sadness (which arguably should be an aspect of Terror) did increase following death awareness. Several interpretations and conclusions are drawn from these results.

Primarily, although worldview defenses were not observed following death awareness, participants were still likely boosting their self-esteem via other defense mechanisms. For instance, Jonas & Fischer (2006) found that those who are intrinsically religious can utilize their religious beliefs as a shield without causing worldview defenses to manifest. Additionally, Vail et al. (2010), suggest that religious fundamentalist beliefs are often bolstered following death awareness. Considering that the research was conducted on a sample from the Bible Belt, participants were likely utilizing religious belief in order to boost self-esteem. Consistent with Solomon et al. (1990), when self-esteem was increased (which according to TMT death awareness should have caused, Greenberg et al., 1986), participants did not respond with

increased arousal. Thus, although not a primary goal of the current study, results did provide support for Solomon et al. (1990) by providing empirical support for the lack of arousal following death awareness. This assertion requires further empirical support using various measures of worldview defense and self-esteem following death awareness and measures of physiological arousal.

Additionally, the lack of findings within the Worry, Engagement, and Fear measures is largely consistent with previous TMT research and supports the hypothesis that participants will be unable to consciously experience any stress or terror following mortality salience.

Pyszczynski, Greenberg, Koole, and Solomon (2010) argue that death awareness does not cause any increase in negative affective mood states. Additionally, the dual-process model of TMT (Pyszczynski et al., 1999) suggest that we actively try to repress death awareness which would explain the lack of self-report evidence. Interestingly and contradictory to this finding, participants did, however report more sadness and distress following the mortality salience. This secondary finding is consistent with other research that had participants talk about their death instead of write about it (J. Jong, personal communication, February, 15, 2015). This contradiction could be due to a theoretical distinction between terror and sadness. Although sadness may accompany certain aspects of terror, certainly terror is far more complex than sadness alone.

This distinction is largely important for interpreting each finding from the current research and primarily the reason for the additional SEM. Certainly, terror is far more than arousal, fear, worry, stress, negative affectivity, or sadness by themselves. Additionally, the SEM suggests that terror is far more than these variables together as well. This may explain the lack of findings. If TMT is correct and the potential to experience terror is at the heart of everything

humans do (Greenberg et al., 1986; Greenberg et al., 2003), this potential should be accompanied by some form of physiological or biological mechanisms to prepare for this terror should it actually manifest. The fight-or-flight model (Cannon, 1932) at least suggests that this should occur. Certainly, this interpretation is evolutionarily adaptive. Although worldview defenses are largely capable of keeping this potential terror from manifesting, the fight-or-flight response should be activated to prepare for this terror. Thus, although the current study failed to find this response, this is possibly due to the complexity of terror and the unaccounted for factors that contribute to terror.

Within GSR, however, previous research suggests that this should have indicated sympathetic nervous system activity (Uno, 1997) and ultimately a fight-or-flight response (Porgas, 2011). Although this could be interpreted as a lack of terror following mortality salience, several confounds were also present within the study that may have impacted the GSR results. Initially, the lack of difference may have been due to the control prime. Watching TV has been found to cause significant arousal as recording by GSR (see Lajante, Droulers, Dondaine, & Amarantini, 2012). Participants were likely aroused by their thoughts about watching TV and the results support this interpretation. Further, this manipulation may have unintentionally, been more realistic than the death aware condition because participants were staring at a fixation cross on a screen. This effect would have been similar to having participants stare at a coffin or tombstone with their names on it while talking about their death. Thus, perhaps the control condition was far more real than the death aware condition causing the death aware condition to appear to lack an effect. Ultimately, participants in each condition may have been aroused by their memory and imagination of watching TV in the control condition and potential terror in the

death aware condition. Additional research is needed to further verify this claim in order to be certain that normal cognition and talking do not cause a GSR above death awareness.

The current study also failed to find any evidence for worldview defenses following mortality salience. Although in the death aware condition average worldview defenses were higher, this difference was not significant. A further examination of the results revealed a surprising lack of power to detect a significant effect (power = .306) given previous research in TMT. This is in direct contrast to previous research suggesting that TMT reveals large effects within worldview defenses (Burke et al., 2013). As previously mentioned, however, participants were likely relying on religious belief as a defense against the mortality salience. This may explain why the worldview defenses (as measured using cultural worldviews, Greenberg et al., 1994) did not significantly differ between groups. Considering that participants in the sample were largely religious, they may have instead relied on their religion as a shield instead of using cultural worldviews (see Vail et al., 2010). Future research using religious samples should instead focus on religious worldviews (i.e. religious fundamentalism) when assessing worldview defense.

Although cultural worldview defenses were not found in the present study, TMT predicts that other defenses were operating and necessary to contend with the potential to experience terror (Greenberg et al., 1986; Greenberg et al., 2003). With this in mind, an alternative explanation to the lack of terror found in the study may be due to these defenses and active repression. While participants were actively contending with death awareness, this active repression may have successfully kept participants from becoming aroused and terrified (see Pyszczynski et al., 1999). Once repression failed, however, worldview defenses would have then begun to keep the potential terror from manifesting (Greenberg et al. 1994). Although the fight-

or-flight model would predict that the sympathetic nervous system would begin to prepare the body for this potential terror (Cannon, 1932) should it manifest, perhaps instead, worldview defenses are far more powerful in maintaining and controlling terror than expected. Thus, through evolutionary adaptation (see TMT's evolutionary account of culture creation in introduction), worldview defenses may have supplanted fight-or-flight in response to death awareness due to their power. Although this argument is less likely, it is still consistent with TMT overall.

One final interpretation offered warrants modification to TMT. Although TMT predicts that we have the potential to experience paralyzing terror following mortality salience (Greenberg et al., 2003), the current results do question that claim. According to Hood and Morris (1983), unlike the denial perspectives of TMT which argue that we achieve immortality by denying death, we can achieve immortality through a transcendent union. This interpretation would suggest that that symbolic immortality does not manifest due to a *fear* of death, but instead due to a *mystical experience* (i.e. mysticism, see Hood, 1976) caused by the union with others, nature, deities, etc. Given this research, perhaps TMT is in need of a fourth modification (actual terror to repressed terror to potential terror) in which persons can transcend death through mystical experience. This would still account for the cultural worldviews and symbolic immortality so often defended in TMT research. Instead of potential terror causing worldviews, it is cultural union that bolsters worldviews.

### **Limitations and Future Directions**

Although the current study did hold some explanatory power and remained largely consistent with previous TMT research, several limitations are offered. Initially, even the SEM

model failed to take into account all facets of terror, perhaps explaining much of the lack of findings. Additionally, the monitor used as a fixation point and TV control likely also influenced the results considerably (see previous section for more discussion on this confound). When considering GSR, the research would have benefited from including an extended relaxation period prior to the baseline. Although participants did have several minutes in between beginning the experiment and the GSR measurement, more control could have been implemented to assure resting GSR at the baseline measurement. Within this, participants may have also been nervous when the GSR equipment was first connected. This would have caused elevated arousal that likely contaminated the GSR readings. A longer rest period with the GSR equipment would have allowed participants to become accustomed to the equipment and provided purer arousal readings. Alternative worldview defense measures would have also benefited the current study. Although all of the previous research in TMT provides evidence for defense (e.g. Greenberg et al. 1994, Pyszczynski et al. 1999; Greenberg et al., 2003), failing to show evidence of defenses, but speculating for alternative defenses based on demographic information does yield some concern.

One additional concern, however, is that although the primary goal of the study was to address the challenges of TMT by Martin and van den Bos (2014) for evidence of terror, the current interpretations of the results fail to account for their claim that TMT is unfalsifiable. Each likely interpretation could fit within a TMT framework. This limitation strongly suggests the need for future follow-up so that specific mechanisms for terror can be examined either showing that the body is preparing for sympathetic nervous system activity or that worldview defenses are solely alleviating potential terror.

In addition to improving upon the aforementioned limitations, future research should consider looking at additional indicators of terror. For instance, salivary cortisol may prove fruitful in finding evidence of the body preparing for fight-or-flight in response to potential terror. Additionally, participants may also physically display a fight-or-flight response following death awareness by “fleeing” from the location of the mortality salience. On the other hand, participants made death aware may also choose to stay and “fight” through a difficult follow-up task immediately following the mortality salience.

Overall, this research contributes to the TMT literature by re-opening the door (Solomon et al. 1991) to physiological and biological markers in response to the potential to experience terror and suggests that additional research is needed. Future research should help to narrow down the multiple predictions offered for the current study and perhaps address Martin and van den Bos’s (2014) claim that TMT does not evoke terror and that TMT is unfalsifiable. Ultimately, this research does provide some evidence for some aspects of the complexities of terror (e.g. sadness, distress, etc.) and argues for the importance of examining multiple facets of terror in order to accurately account for this potential. By examining the complexities of terror, we can better understand the theoretical assumptions inherent to TMT and obtain more explanatory power in light of criticism and controversy within the field.

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## VITA

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