Applications of Terror Management in the Ecological Crisis:

A Literature Review on the topics of Human-Nature Relations & Economic Behaviour

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- Abstract -

Over the last thirty years, Terror Management Theory (TMT) has become an established explanatory tool in social psychology, producing an impressive body of research that illuminates the insidious but significant role the awareness of death plays in the daily affairs of human life. Inspired by the work of cultural anthropologist Ernest Becker, TMT proposes that existential anxiety is mitigated and managed by cultural worldviews, i.e. humanly constructed meaning systems that provide purpose and permanence and offer a sense of value through the mechanism of self-esteem. An empirical framework generating nearly 500 experiments by researchers working in twenty countries, TMT has revealed the profound influence of death awareness on human behaviour in a great many social and societal contexts. This paper explores and summarizes the major contributions to TMT research as well as the theory's critiques, and investigates the existential psychodynamic processes inherent within human-nature relations and economic behaviour and their implications for the impending climate crisis.

Research conducted to assess the validity of TMT has traditionally been guided by the following premises: reminders of mortality should intensify the need to maintain one's worldview and self-esteem, while augmenting or threatening aspects of culturally valued beliefs and behaviours should respectively reduce or encourage the existential anxiety cultural worldviews are constructed to mitigate. Behaviours including driving, voting, tanning, and eating, and cultural allegiances including race, religion, gender, nationality, and political affiliation have been influenced by intimations of mortality in TMT experimentation.

A vibrant discourse outside TMT literature maintains a strong scepticism towards some of the theory's major tenets and assumptions. Criticisms discussed in this paper include: inconsistencies with contemporary evolutionary biology; the adaptive capacity of a psychological system that reduces anxiety; the conflicting standards of behaviour that alleviate existential anxiety; and TMT's anthropocentric, reductionist view of the planet's creative and integrated life system. An alternative account of TMT research is provided through the findings of Coalitional Psychology, and responses to these criticisms and alternate explanations are offered by TMT experimenters.

In light of these criticisms, this paper reviews the empirical findings for two contemporary applications of TMT: *human-nature relations* (i.e., attitudes towards nature

and animals; perceptions of the mind and physical body), and *economic behaviour* (i.e., money, materialism, branding, charitable behaviour, and progress). These two concepts were chosen due to their foundational role in a peaceful and prosperous existence for humankind on planet earth. TMT's empirical findings show that the existential foundations of Western culture are founded upon the separation from and superiority over the rest of nature - an outlook that demonstrably impacts the female gender to a greater extent since females have historically been viewed as ruled by their bodies and thus closer to nature and the status of other animals. A supposition is thus put forward that capitalism, an ecologically defiant economic system fundamentally predicated upon the exploitation of both nature and women, is a manifestation of the Western paradigm's attempt to abolish death. Limitations of TMT experimentation, opportunities for further research, and concluding remarks are provided.

Over almost three decades, the Intergovernmental Panel on Climate Change (IPCC) has been publishing increasingly stern reports on the 'unequivocal' changes in the planet's climate system and humanity's 'clear' influence. Nearly 200 scientific organizations worldwide hold this position, including institutions from all G8 plus Five members. Though a significant majority of practicing climate scientists endorse this information, the efforts made towards addressing the challenges presented by climate change do not align with the severity and limited timescale these issues impose.

From my research perspective, the problems presented by the ecological crisis are not scientific or technological. Rather, they are a cultural issue where competing worldviews attempt to define the source of the problems and subsequent solutions. Opposing views of the problem also lead to an opposing sense of risk: the economic risks associated with aggressive climate action are too great to support for some, while the environmental and social risks of climate inaction are too great to ignore for others. My Masters research has explored the cultural conflicts at play, the origins of these opposing belief systems, and why they are so inflexible. My research draws upon cultural anthropology, social psychology, and psychoanalysis to explore the role of unconscious, non-rational drivers of human beliefs, values, and behaviour. More specifically, my research illustrates the insidious yet significant influence of existential concerns.

My M.E.S. Plan of Study consisted of three main research components to address over the course of my Masters work: ecological and economic systems, law and governance systems, and socio-cultural systems. Using a systems approach, my aim was to understand the intricate connections between cultural worldviews, human activity, and the critical state of the planet's ecological systems. The present paper will expand upon my third component, socio-cultural systems, by providing an extensive review of existing Terror Management Theory (TMT) literature regarding human-nature relations and economic behaviour. TMT is an emerging branch of research within social psychology that provides an empirical framework for exploring the role of existential concerns in human values and behaviour. This paper was originally initiated during a research internship with the Centre for the Understanding of Sustainable Prosperity (CUSP) at the University of Surrey, UK. The Centre investigates the concept of

prosperity in the context of an economy that respects the limits of our planet's biosphere. CUSP also examines the social and psychological understandings of "the good life" in order to identify areas of consensus and inform an integrated view of sustainable prosperity. A good life is ultimately defined by the overarching culture and the extent to which one achieves the goals subscribed. By improving our understanding of the unconscious dynamics behind existential concerns and cultural worldviews, my research intends to better inform policy interventions that can shift sustainability-informed behaviour change that can potentially span entire populations and lifestyles.

This paper has helped to fortify my knowledge of the tools and experimental platforms available in TMT research, and furthermore elucidates the implications of unconscious, existential concerns within social, economic, and environmental realms (Learning Objectives 3.1 and 3.2).

Life is tragic simply because the earth turns and the sun inexorably rises and sets, and one day, for each of us, the sun will go down for the last, last time. Perhaps the whole root of our trouble, the human trouble, is that we will sacrifice all the beauty of our lives, will imprison ourselves in totems, taboos, crosses, blood sacrifices, steeples, mosques, races, armies, flags, nations, in order to deny the fact of death, the only fact we have. It seems to me that one ought to rejoice in the fact of death--ought to decide, indeed, to earn one's death by confronting with passion the conundrum of life. One is responsible for life: It is the small beacon in that terrifying darkness from which we come and to which we shall return.

– James Baldwin, *The Fire Next Time* (1963)

*Oh set me up with the spirit in the sky
That's where I'm gonna go when I die
When I die and they lay me to rest
I'm gonna go to the place that's the best.*

– Norman Greenbaum, "Spirit in the Sky" (*Spirit in the Sky* 1969)

*Lend me your eyes I can change what you see
But your soul you must keep totally free.*

– Mumford and Sons, "Awake My Soul" (*Sigh No More* 2009)

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1.0   Introductory Statements

'Why do people do what they do when they do it?'

This was the leading question behind cultural anthropologist Ernest Becker's (1971; 1973; 1975) search for a better understanding of human behaviour. Building upon the works of Sigmund Freud, Otto Rank, Norman Brown, Carl Jung, Soren Kierkegaard, and many others, Becker argued that a juxtaposition persists between our evolutionary drive for survival, and the uniquely human awareness of death. The anxiety resulting from the inevitability of this unfortunate realization is managed, claimed Becker, by cultural worldviews – humanly constructed meaning systems that provide purpose and permanence and offer a sense of value through the mechanism of self-esteem.

Becker's work directly inspired the creation of Terror Management Theory (TMT), an empirical framework founded in social psychology in the late 1980's that tests and observes the unconscious influence of existential concerns in beliefs, values, behaviour, and decision-making. TMT posits that death plays an unconscious, non-rational, yet extremely pervasive role in the motivations behind human behaviour by influencing values and beliefs that conform to the standards of social conduct prescribed by the overarching worldview. This claim has potentially wide-ranging implications for the construct of human society and its relationship to the environment at both local and global scales.

The purpose of this literature review is to explore and summarize the major contributions to TMT research as well as its critiques, and investigate the existential psychodynamic processes integral to human-nature relations and economic behaviour. This particular focus was chosen since these two concepts are foundational to a peaceful and prosperous existence for humankind on planet earth. Moreover, divergence in cultural views seem to be a pivotal factor in gaining support for environmental and social change (Hoffman, 2015; Marshall, 2014). By providing a more nuanced understanding of the unconscious psychological forces at play, this paper will demonstrate how the findings in TMT research can provide insight into the motivations behind environmental and economic behaviour and identify points of leverage that can lead to positive change.

This paper is divided into four major sections. Section 2.0 will introduce TMT by discussing the theory's central thesis, primary methodologies, and notable findings.

Section 3.0 examines current critical discourses in the scholarly literature that problematize some of TMT's integral assumptions and claims. In light of these criticisms, section 4.0 provides contemporary applications of TMT regarding human-nature relations and economic behaviour, key concepts that are integral to the construct of human society and its relationship to the planet. Supplementary scholarship is reviewed that directly parallels the applications of TMT highlighted in section 4.0 with a particular emphasis on ecofeminist literature, illustrating the integral role of dominating both women and nature in the rise of an exploitative economy. Section 5.0 identifies any limitations that may impede this literature review, and also offers ideas for furthering TMT research and provides closing remarks. Since Ernest Becker was the principal mind behind the inspiration for TMT, his work will be referenced throughout this paper to link the empirical framework's findings with Becker's original theoretical proposals. Furthermore, a detailed table listing all TMT studies reviewed in this paper can be found in Appendix H.

2.0 The Role of Death in Life: An Overview of TMT

Some refuse the loan of life to avoid the debt of death.
- Yalom, 2008.

Terror Management Theory (TMT; Greenberg, Pyszczynski, & Solomon, 1986) has become an established explanatory tool in social psychology, producing an impressive body of research that illuminates the insidious but significant role the awareness of death plays in the daily affairs of human life. This section will outline TMT's origins, central thesis and claims, primary methodological approaches, and research findings.

2.1 Terror Management Theory: Origins and Central Thesis

2.1.1 *Ernest Becker and the Denial of Death*

In answering the question "Why do people do what they do when they do it?", cultural anthropologist Ernest Becker published the Pulitzer Prize-winning book *The Denial of Death* (1973) which offered a "broad and powerful conceptual analysis of human motivation based on the notion that the awareness of death, and the consequent denial thereof, is a dynamic force that instigates and directs a substantial proportion of human activity" (Solomon, Greenberg, & Pyszczynski, 1998:10). Building upon the rich tradition of existential psychoanalytic thought found in the works of Freud (1989/1920), Rank (1945/1936), Brown (1959), Jung (1964), and Kierkegaard (1957/1844), Becker (1971; 1973; 1975) identified the importance in understanding the similarities and differences between humans and animals in order to truly comprehend human behaviour. Specifically, he attributed the uniquely human awareness of death to much of the motivation behind human behaviour. From Becker's perspective, "the existential dilemma is conceptualized as the conflict between our biological proclivity to survive and our cognitive capabilities to be aware that death is inevitable" (Arndt & Vess, 2008:910).

The advanced cognitive capacities of our ancestors, signified by the emergence of self-reflective consciousness, were evolutionarily advantageous by affording the ability to project oneself "throughout a linguistically constructed metaphorical universe of space and time" and affording the capacity to strive toward and attain specific goals (Solomon et al., 2003:21). But this ability also brought about an inevitable truth, culminating in what many (Freud, 1989; Roheim, 1943; Langer, 1982) claim is the "most significant event in

the evolutionary history of humankind: the explicit awareness of death as a natural and inevitable event, an awareness that threatened to undermine consciousness, intellectually and emotionally, as a viable form of mental organization" (Solomon et al., 2003:22). Becker remarks:

> Man emerged from the instinctive thoughtless action of the lower animals and came to reflect on his condition. He was given a consciousness of his individuality and his part-divinity in creation, the beauty and uniqueness of his face and his name. At the same time he was given the consciousness of the terror of the world and of his own death and decay. This paradox is the really constant thing about man in all periods of history and society; it is thus the true "essence" of man (Becker, 1973:69).

Becker claimed that the resulting terror from the awareness of our inevitable demise, or what he entitled *annihilation anxiety*[1], is managed by sustained beliefs in an enduring cultural drama. Humans develop psychological mechanisms for "civilizing, spiritualizing, and ultimately denying their fleshy mortality" (Rowe, 2014:2) in order to view ourselves as "enduringly significant contributors to a meaningful reality rather than as mere transient animals groping for survival" (Greenberg, Solomon & Arndt 2008:116). In line with Becker's assertions, the primary mechanism for denying death is through the creation of cultural worldviews, "shared meaning systems that provide a theory of existence, which gives meaning to life, and standards of value, which are guides for appropriate behaviour and yardsticks against which people's value can be assessed" (Pyszczynski and Kesebir, 2012:76).

Although these meaning systems are necessary components for creating meaningful conceptions of reality, they are not sufficient (Solomon, Greenberg, & Pyszczynski, 2003). Becker also proposed that humans require a sense of unique significance, or heroism, by participating in prescribed social roles that allow individuals to perceive themselves as persons of value in a world of meaning. "An animal who gets his feelings of worth symbolically… must desperately justify himself as an object of primary value in the universe; he must stand out, be a hero, make the biggest possible contribution to world life, show that he *counts* more than anything or anyone else" (Becker, 1973:4). For Becker, society itself is a "symbolic action system, a structure of statuses and roles, customs and rules for behavior, designed to serve as a vehicle for earthly heroism" (Becker, 1973:4). From this perspective, the standards of value offered

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[1] Refer to **Appendix A.** List of Definitions to clarify any *italicized terminology* within this paper.

by each and every culture provide the opportunity for feelings of significance and purpose and ultimately mitigate the fear of death.

2.1.2 *TMT as an Empirical Framework*

Although Becker's work was awarded the Pulitzer Prize in 1974, his writings were largely dismissed by academics as either untestable or wildly speculative (Solomon et al., 1998). But in the 1980's, three young experimental social psychologists came across Becker's work and recognized its profound and powerful implications. Sheldon Solomon, Jeff Greenberg, and Tom Pyszczynski subsequently created Terror Management Theory (TMT): "The idea that much of our basic identity and motivation function to assuage deeply rooted anxieties emanating from the awareness that, ultimately, no matter how you slice it, we are doomed to the grave" (Arndt & Vess, 2008:910). The first academic peer-review of a TMT approach contained one single sentence: "'I am absolutely certain that these ideas will be of no use to any psychologist, alive or dead" (ibid:910). The principal concern behind this response was the lack of empirical evidence to support the sweeping claims held by TMT. Solomon, Greenberg, and Pyszczynski utilized their skills in experimental psychology and designed experiments to test the generative role of death in human values and behaviour. Over the past three decades, TMT has inspired nearly 500 studies by researchers working in over twenty countries offering a distinctively integrated account of social psychological phenomena that includes prejudice, altruism, conformity, terrorism, aesthetic and political preference, and interpersonal relations.

Most importantly, TMT addressed two substantial gaps in the psychology literature: the psychological foundations of culture, and the purpose of self-esteem (Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989; Solomon, Greenberg, & Pysczynski, 2000). The idea that people are motivated to maintain high levels of self-esteem, and that this motivation provides the foundation for much human behaviour is "so pervasive and widely accepted that most theorists use it as a postulate or paradigmatic assumption without providing justification or explanation…the vast majority of psychological theories assume that self-esteem is a pervasive force in human motivation that is generally adaptive and associated with a broad range of desirable outcomes" (Goldenberg, Mccoy, Pyszczynski, Greenberg, & Solomon, 2000:435; See also Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004). One of TMT's principal

goals was to address this theoretical vacuum, and was the first empirically-oriented theory to do so.

2.1.3 *Dual-Component Anxiety Buffer: Self-Esteem and Culture*

Following Bowlby's attachment theory (1969/1982), origins of self-esteem and its anxiety-buffering qualities are rooted in the formation of psychological attachment to and dependence on primary caretakers during an infant's initial socialization, relations which are retained throughout their entire life span. Human beings are born exceptionally immature and particularly helpless, and consequently find a sense of security through their seemingly omnipotent parent's love, comfort, and protection. The subsequent dependence on these infant-parent relationships are carried on throughout childhood as language, beliefs, and customs are introduced and parental affection, and thus security, become increasingly contingent on "good" behaviour. When a child misbehaves by violating the standards imposed by their parents, which are ultimately an internalized version of the prevailing cultural worldview, there is "perceived threat of loss of protection and often the threat of punishment" (Greenberg, 2008:50). Children consequently associate being good with safety and security, and associate being bad with vulnerability and anxiety, leading to self-esteem as "a potent anxiety buffer" (Solomon, 2012:404).

Over time, as children are socialized into the cultural scheme of things, "the caressing and praise received from his parents is transformed into praise from his countrymen. Fame and praise are socialized equivalents of love" (Roheim, 1943:31). A transition takes place in the derivation of self-esteem as culturally prescribed standards of conduct conveyed and validated by peers, teachers, and media, expand upon the initial good-bad behaviour associations established in the child's youth. Cultural worldviews facilitate effective terror management by offering an account of the origin of the universe, appropriate social roles for the individual to partake in, and most importantly, opportunities for immortality either literally, through concepts such as heaven or reincarnation, or symbolically by achieving culturally validated accomplishments (procreation, wealth, property, art). "Culturally derived worldviews may thus provide the possibility of being a self that transcends time and space—one which is perceivably immortal" (Goldenberg, Kosloff, & Greenberg, 2006:128).

Following Becker, TMT asserts that cultural worldviews and self-esteem provide an *anxiety buffer* that protects the human mind from deeply rooted existential fears, and that a wide range of behaviours can be better understood as "attempts to maintain meaning and value in the ultimate service of managing deeply held mortality concerns" (Landau et al., 2006:131). The role of mortality concerns in social behaviour is well articulated by Arndt et al. below:

> Thus, intimations of death become associated with aspects of the security-providing internalized worldview, particularly those aspects central to providing meaning and bases of self-worth. This analysis implies that the cognitive architecture constructed over the socialization process puts knowledge of one's mortality in a prominent and deeply rooted position within a larger network of knowledge structures that function as self-protective beliefs (Arndt, Greenberg, & Cook, 2002:308).

Through a TMT lens, self-esteem is viewed as not only an essential mechanism in maintaining psychological equanimity, but throughout the socialization process, the awareness of death and subsequent management of these thoughts becomes a structural element of one's cognition that remains a pivotal factor in beliefs, values, motivations, and behaviours on a deeply unconscious level. "As the cultural immortality ideology comes to be grounded in one's muscles and nerves, one lives it naturally, as a secure and confident part of one's daily action" (Becker, 1973:219).

Though the narratives and contents of specific cultural conceptions of reality may diverge in historical, ecological, and pragmatic terms, TM theorists assert that "one fundamental determinant of their character is their ability to quell the potential for terror inherent in the human awareness of vulnerability and mortality by imbuing life with meaning, and the individuals who subscribe to them with significance" (Greenberg, Solomon & Arndt, 2008:116). Accordingly, much of human cognition and behaviour should be motivated by sustaining faith in a cultural worldview, meeting the standards of that worldview, and achieving social validation within the context of that worldview. The following section will provide empirical support for TMT's intriguing claims.

2.2   Methodology and Present Findings in TMT

Research conducted to assess the validity of TMT's claims has traditionally been guided by three general premises[2]: the mortality salience, anxiety-buffer, and death-thought accessibility hypotheses (Hayes, Schimel, Faucher, & Williams, 2008). This

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[2] See **Appendix B** for visualization of and interactions among the three premises.

section will describe the assertions behind each hypothesis, provide an illustrative account of the methodologies employed in TMT experimentation, and present experimental findings that offer generous empirical support for Ernest Becker's theories.

2.2.1 *Mortality Salience Hypothesis*

The *mortality salience* (MS) hypothesis, which is the most widely researched in TMT studies, states that "if a psychological structure functions to buffer awareness of death, inducing people to think of their death should increase their need for this psychological structure" (Hayes, Schimel, Arndt, & Faucher, 2010:701). More generally, reminding people of their mortality should increase the need for self-esteem and faith in their cultural worldview. In support of this notion, a multitude of studies have been conducted that operationalize MS in a variety of ways.

Typical MS inductions involve completing a survey ostensibly related to personality[3], which includes a number of standard personality assessments and two open-ended questions designed to engage the participant with thoughts of death (a 'death prime'): (1) "Please briefly describe the emotions that the thought of your own death arouse in you", and (2) "Jot down, as specifically as you can, what you think will happen to *you* as you physically die" (Arndt, Solomon, & Kasser, 2004:200). A control condition is simultaneously ongoing where participants answer the same questions related to a neutral topic (eating, watching television) or aversive topic such as experiencing physical pain, loss of limb, or social exclusion. In addition to the above survey which features open-ended responses about mortality, common death primes used in TMT experimentation include fear of death scales (Mandel and Heine, 1999), fatal accident footage (Nelson et al., 1997), interviews in close proximity to a funeral home (Pyszczynski, Wicklund et al., 1996), and subliminal exposure to the word 'death' presented on a computer screen at speeds undetected by the conscious mind (Arndt et al., 1997). After this initial exposure to death thoughts, participants engage in a neutral distraction-oriented task such as a puzzle or a filler survey in order to provide time to engage the distal, unconscious defences (Arndt, Greenberg, Solomon, Pyszczynski, & Simon, 1997). The purpose of this distraction and shift in consciousness will be

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[3] Deliberate methods to mislead participants are essential aspects of TMT's experimental design, raising important ethical questions not explored in this paper.

discussed further in section 2.3. Finally, participants are usually asked to engage in a behaviour or defend a belief of cultural value.

As predicted, a multitude of studies have shown that MS "intensifies bolstering of the psychological structures posited to protect people from their mortality concerns: their worldview and their self worth" (Greenberg, Solomon and Arndt, 2008:117). The most intriguing example of TMT research involves municipal court judges in the southwestern states asked to assign bail for an alleged prostitute after half of them were primed with thoughts of death. This crime was chosen for the specific emphasis on its moral nature, and it was predicted that the judges would be particularly disciplinary after a mortality induction. Confirming this hypothesis, judges primed with death set the bail at an average of $455 (USD), nine times higher than the control condition which set the bail at an average of $50 (Rosenblatt et al., 1989). Intimations of mortality have also been found to: impel risky driving among individuals who perceive driving as relevant to their self-esteem (Taubman-Ben-Ari, Florian, & Mikulincer, 1999); increase support for extreme military interventions among politically conservative individuals (Pyszczynski, Abdollahi, et al., 2006); influence the purchase and consumption of higher quantities of food products among low self-esteem participants (Mandel & Smeesters, 2008); influence high-risk decision-making (Landau & Greenberg, 2006); and, increase favourable evaluations of, and votes for, a charismatic political candidate compared to an egalitarian relationship-oriented candidate (Cohen, Solomon, Maxfield, Pyszczynski, & Greenberg, 2004).

In addition to the above examples which are oriented towards self-esteem striving, MS inductions also led to the defence of a participant's overarching worldview. Reminders of death have been found to impact social allegiances and intergroup conflicts founded in cultural divisions including religion (Greenberg et al., 1990; Vail et al., 2010), political affiliation (Castano, Leidner, Bonacossa, & Nikkah, 2011), race (Greenberg, Schimel, Martens, Solomon, & Pyszcznyski, 2001), ethnicity (Castano, Yzerbyt, Paladino, & Sacchi, 2002; Motyl, Hart, & Pyszczynski, 2010), gender (Fritsche, Jonas, & Fankhänel, 2008), and nationality (Arndt & Greenberg, 1999; Castano & Dechesne, 2005; Jonas, Fritsche, & Greenberg, 2005).

Responses to these allegiances and divisions have included: especially positive evaluations of those who validate one's belief system (*in-group*) and negative evaluations of those who challenge it (*out-group*) (Greenberg et al., 1990); brought about

a perceived consensus among fellow participants' beliefs (Pyszczynski et al., 1996); and provoked derogation and even aggression towards those that violate values and beliefs of cultural significance. For example, politically conservative and liberal participants were asked to contemplate their death, read an essay that challenged either the worldview of liberals or conservatives, and were then instructed to allocate a sample of hot sauce to the essay's author for them to consume. Participants were specifically made aware that the author did not like spicy foods, providing an opportunity to engage in physically harmful behaviour. As predicted, those under the MS induction who read a worldview-conflicting essay allocated a significantly greater amount of hot sauce to a world-threatening target: 26.31 grams compared to 11.86 grams in the control condition, demonstrating that the MS induction can encourage actual physical aggression (McGregor et al., 1998). These and a number of other various responses to the MS prime are employed to "undermine the impact of threats to and increase the impact of support of one's worldview" (Vail, Arndt, Motyl, & Pyszczynski, 2012:6).

To further test the efficacy of the MS hypothesis, Arndt, Greenberg, & Cook, (2002) conducted a study demonstrating that death thoughts can spontaneously increase the accessibility of worldview-relevant constructs such as nationalism, "suggesting that over the course of socialization, death becomes intimately associated in memory with security-providing aspects of the worldview" (Greenberg et al., 2003:516). This finding suggests an anticipatory rather than experiential affect in TMT experimentation. Greenberg, Martens, Jonas et al. (2003) expanded upon this research by demonstrating that participants given an 'anxiety-blocking' placebo did not experience the usual worldview defence in response to an MS prime compared to a condition group. This empirical observation supports the TMT assertion that "cultural worldview defense serves to avert the experience of anxiety rather than to ameliorate actually experienced anxiety" (Landau, 2007:485). Furthermore, to demonstrate the culturally contextual role in MS responses, Kashima et al. (2004) found that while Australian participants with low self-esteem became increasingly individualistic in their behaviour following an MS prime, Japanese participants with low self-esteem became decreasingly individualistic. This study illustrates the essential role that prescribed values of a particular culture play in the response to death primes, and that self-esteem striving reactions take place in both collectivistic and individualistic cultures (Kashima, Halloran, Yuki, & Kashima, 2004).

Although some studies have demonstrated that aversive topics and events can elicit similar responses to the MS induction such as meaninglessness (van den Bos, Poortvliet, Maas, Miedema, & van den Ham, 2005), uncertainty (Sorrentino, Ye, & Szeto, 2009), and social anxiety (Mikulincer, Florian, & Hirschberger, 2003), TM theorists find that "the preponderance of evidence indicates that the effects of MS cannot be explained by elicitations of other aversive experiences" (Hayes et al., 2010:701). A recent meta-analysis examining 277 TMT experiments on the MS hypothesis (Burke, Martens, & Faucher, 2010) suggests that the effects of an MS induction "follow a unique, signature time course, consistent with the process model… that is not parallel to that of the effects produced by meaning-related threats" (Hayes et al., 2010:701). Burke et al.'s (2010) meta-analysis included a funnel plot of inverse variance measuring study sample size, which they conclude does not suggest publication bias. Research also indicates that MS inductions have no considerable impact on physiological arousal or mood (Arndt, Allen, & Greenberg, 2001; Arndt et al., 1997; Landau et al., 2004). The results generated thus far from the MS hypothesis suggest that mortality reminders facilitate a unique psychological threat, and that concerns about death are integral to the enhancement of self-esteem and maintenance of cultural worldviews.

2.2.2   *Anxiety Buffer Hypothesis*

The anxiety buffer hypothesis states, "if self-esteem provides protection against anxiety, augmenting one's sense of self-worth should reduce anxiety in response to subsequent threats" (Hayes et al., 2008:601). TMT is largely focused on the anxiety-buffering capacity of self-esteem as this mechanism is central to the maintenance of cultural worldviews. In support of this notion, Greenberg et al. (1992) conducted three studies to directly assess whether self-esteem buffers anxiety. In Study 1, participants received either highly positive or neutral feedback on a personality test to experimentally manipulate self-esteem, and then were exposed to scenes selected from the documentary video 'Faces of Death, Volume I'. Scenes selected for Study 1 included actual footage of an autopsy and the electrocution of an inmate on death row for the threat condition, and neutral scenes from the same video for the nonthreat condition. Results from anxiety and self-esteem measures demonstrated a clear increase in anxiety in participants who received neutral self-esteem feedback but resulted in no

effect on participants whose self-esteem was experimentally enhanced (Greenberg et al., 1992).

Study 2 was conducted to determine whether self-esteem was the conceptual variable affecting anxiety by exploring the capacity of self-esteem to reduce anxiety related to the threat of painful electric shocks. Participants were led to believe this study was concerned with the relationship between mood, cognitive and physical stimulation, and physiological responses. Using a skin conductance measure, which is reliably less prone to reporting bias, self-esteem was experimentally manipulated (increased or neutral) with a supposed test of verbal intelligence. Physiological responses were measured with Beckman skin resistance electrodes both in the absence of physical stimulation and in the presence of physical stimulation, either with the threat of electric shock (no actual shocks administered) or supposed light waves (no threat). The physiological data resulting from Study 2 showed that bolstering self-esteem reduced participants' susceptibility to anxiety in response to the threat of an electric shock, while participants in the neutral self-esteem condition experienced clear increases in anxious arousal. Study 2 provides converging evidence for the anxiety-buffer hypothesis by demonstrating a different self-esteem manipulation on an alternative type of threat (Greenberg et al., 1992).

Study 3 followed the basic design of Study 2 but the anxiety measure was replaced with the Positive and Negative Affect Schedule (PANAS) to assess the possible role of positive affect in mediating self-esteem and anxiety. Findings from Study 3 replicated those of Study 2 by showing that the anxiety-buffering mechanism of self-esteem functions beyond threats explicitly linked to death. Furthermore, a multiple regression analysis with arousal as the dependent variable showed no indication that the observations in Study 3 resulted from the manipulation on positive affect. Studies 1-3 present converging evidence of the anxiety-buffering function that self-esteem serves by showing that bolstering self-esteem through positive feedback and success reduced both physiological indicators and self-reports of anxiety in response to a graphic video and the threat of electric shock. The experimenters conclude that "by using two operationalizations of self-esteem and finding effects on two indicators of anxiety, the present research provides converging support for the anxiety-buffer proposition" (Greenberg et al., 1992:920).

Other correlational studies exploring the capacity of self-esteem to buffer death anxiety have shown that participants with both manipulated and dispositional high self-esteem did not respond to MS primes with an intensified worldview defence compared to individuals with moderate self-esteem (Harmon-Jones, Simon, Greenberg, & Pyszczynski, 1997), while Arndt and Greenberg (1999) showed that participants with experimentally enhanced self-esteem did not negatively evaluate targets who threatened their beliefs unless the target threatened the particular dimension that the self-esteem boost was predicated on.

2.2.3 *Death-thought Accessibility Hypothesis*

The *death-thought accessibility* (DTA) hypothesis states: "if a psychological structure provides protection from thoughts of death, then weakening this structure should render death thoughts more accessible to consciousness" (Hayes et al., 2008:601). TMT maintains that faith in one's cultural worldview and striving for culturally sanctioned self-esteem are essential to the mitigation of existential anxiety. The DTA hypothesis, essentially the inverse of the MS hypothesis, suggests that threats to either of these psychological mechanisms will make thoughts of death more accessible.

Schimel et al. (2007) tested DTA in response to worldview threat over a series of five experiments. In Study 1, Canadian participants were exposed to either an anti-Canadian or anti-Australian webpage featuring two parallel essays that derogated either Canadian or Australian values. Participants were recruited on the basis of their responses to a mass-testing survey designed to assess investment in Canadian culture. Once participants read the webpage, they were asked to complete a packet of questionnaires. Within this packet was a word-fragment completion task which served as the experiment's measure of DTA, a method used in past research of this nature (Greenberg, Pyszczynski, Solomon, Simon, & Breus, 1994; Harmon-Jones et al., 1997). Six of the 20 word fragments were designed so they could be completed either with a neutral or death-related word such as COFF_ _ (coffee; coffin). The other death-related words were *buried, dead, killed, grave,* and *skull*, and the remaining 14 words were neutral. Canadian participants exposed to the anti-Canadian essay had higher overall levels of DTA compared to those exposed to the anti-Australian essay, supporting the DTA hypothesis (Schimel, Hayes, Williams, & Jahrig, 2007). To test for alternative accounts of these results, Study 2 exposed Canadian participants to only the anti-

Canada webpage but this time offered a disclaimer about the page's content prior to reading it. In line with Pyszczynski and Greenberg's (1987) claim that rationalizations are an effective defence against threatening information when consistent with available information, participants were either given a disclaimer suggesting the author's views were biased, unfounded, and irrelevant or a neutral disclaimer with no mention of the author's biases. In further support of the DTA hypothesis, participants who were able to discount the threatening anti-Canadian essay due to the biased author disclaimer had lower DTA than those given the neutral disclaimer.

Study 3 replicated the results from Study 1, but DTA was measured using a lexical decision task to offer an alternate method of construct accessibility. Moreover, Study 3 measured the accessibility of death, negative, and neutral words to explore whether the DTA effect observed was the result of a more general increase in negative thoughts. The lexical decision task involves participants distinguishing between words and non-words that are quickly presented across a computer screen, a method used because "if someone consistently makes quicker judgments toward a specific category of words, then it is reasonable to infer that the category construct is highly accessible for that person" (Schimel et al., 2007:794; also see Bargh & Chartrand, 2000). The trial included 70 non-words, 18 neutral words (i.e. *tea, chair, restaurant*), 6 negative words (*suffer, wrong, jerk, fight, fail,* and *punish*), and 6 death words (those used in Studies 1 and 2). The experimenters attempted to control word frequency and length making these factors comparable across all three categories. Participants who reviewed the anti-Canadian website had higher levels of DTA and additionally had increased accessibility of death thoughts relative to negative and neutral thoughts (Schimel et al., 2007). Furthermore, accessibility to negative thoughts was no more significant than accessibility to neutral thoughts, while the anti-Australian condition indicated no difference across all three word types. Study 3 provides further support for the DTA hypothesis, and indicates that the heightened accessibility of death thoughts in Studies 1 and 2 were not due to a general increase in negativity. The results from Studies 1-3 offer "considerable support to TMT's primary assumption that faith in the cultural worldview functions specifically to keep thoughts about death subdued" (Schimel et al., 2007:796).

Study 4 repeated the webpage exposure and death-related word-fragment test, but added additional dependent variables throughout the experiment to test whether the anti-Canada webpage actually threatened participants' cultural values and whether DTA

was dependent on feelings of anger. Participants in the anti-Canada condition reported the derogating essay made them angrier, was more offensive, trivialized the importance of their Canadian values, and increased their desire to dispute against it compared to those exposed to the anti-Australian webpage. Moreover, analyses demonstrated that feelings of anger did not mediate the effect of worldview threat on DTA. One final study was conducted by Schimel et al. (2007) in order to challenge the generalizability of the first four studies which were conducted on a population highly invested in Canada using the same Canada/Australia webpages. In Study 5, a group of participants who held either a pro-creation or pro-evolution worldview were asked to review a scientific paper in favour of evolution, as well as a third group of creationists that read a neutral essay. Afterwards, DTA was assessed using the word-fragment test. Results for Study 5 supported the DTA hypothesis that exposure to worldview-threatening information causes greater accessibility to thoughts of death. Pro-creationist participants who read the pro-evolution paper displayed significantly higher DTA compared to evolutionists and the neutral condition. The authors conclude that the five studies conducted "converge on the notion that threatening an individual's cultural worldview subsequently increases that person's unconscious accessibility of death-related thoughts" (Schimel et al., 2007:801).

The most extensive investigation of the DTA hypothesis has focused on the role of relationships. Mikulincer, Florian and Hirschberger (2003) claim that close relationships serve an essential existential function by offering an important resource for psychological functioning (intimacy, attachment, affiliation), practical functions including security from danger and the potential to procreate, and the provision of a symbolic group identity that can extend spatially and temporally beyond the lifespan of any one person. In three studies, a linear association was observed between the length of separation from a close relationship partner and the number of completed death-related words (Mikulincer, Florian, Birnbaum, & Malishkevich, 2002). It was found that only when a sustained or irreversible disruption of a close relationship was implied did the cognitive accessibility of death thoughts become strengthened. DTA was also increased when participants were asked to think about problems in their current relationships (Florian et al., 2002). Extant TMT research has additionally demonstrated an increase in DTA resulting from undermining one's self-esteem (Ogilvie, Cohen, and Solomon, 2008; Hayes et al., 2008), reading about inconsistencies in the Bible (among religious

fundamentalists) (Friedman and Rholes, 2007), and terrorism-related stimuli (Das, Bushman, Bezemer, Kerkhof, & Vermeulen, 2009; Landau et al., 2004; Vail et al., 2012).

2.2.4 *Neuropsychological Processes of TMT*

In a pioneering study on neural sensitivity to mortality threats by Quirin et al. (2012), German participants were scanned by a functional magnetic resonance imaging (fMRI) while responding to questions arranged in trial blocks related to fear of death or fear of dental pain. Significantly greater activation was observed regarding death-related thoughts in the right amygdala, left anterior cingulate cortex (ACC), and right caudate nucleus (CN). The authors note that significant activity in limbic system areas is consistent with the notion put forward by TM theorists that mortality threat functions as potential rather than experienced anxiety (Greenberg et al., 2003). Quirin et al. walk through the typical functions of both the amygdala (attending to threatening stimuli and socially relevant stimuli) and rostral ACC (associated with anxiety and anticipating aversive stimuli) concluding that "consequently, albeit not specifically, amygdala and rostral ACC activity may represent non-conscious, latent markers of threat aroused by mortality salience" (Quirin et al., 2012:195).

The authors also highlight the particularly curious activation in the CN after reminders of death, an area of the brain associated with habitual behaviour, automatic thought and most recently with the experience of love, rather than threat processing. Although these initial interpretations are highly speculative, Quirin et al. note how "activation in this region may point to a complimentary clue to understanding the neural processes underlying the ways in which people manage existential fear" (ibid:196). TMT claims cultural worldviews offer unconscious defences to relieve existential anxiety by identifying with values prescribed by a larger social group "that developmentally come to be associated with existential security. Therefore, finding a region active that is engaged in habitual behaviors may be worth further consideration" (ibid:196).

Other research indicates that MS primes activate defensive reactions by demonstrating a greater activation of the right prefrontal cortex, compared to uncertainty concerns which motivate proactive responses found in greater left-hemisphere activation (Kosloff, Greenberg et al., 2011; McGregor, Nash, Mann & Phills, 2010). Kosloff, Greenberg, and Allen (2011) asked participants to engage in a difficult decision-making task that ostensibly measured intelligence and career success, and was designed to

provoke performance errors. Error-related negativity (ERN) is associated with behavioural changes to avoid future errors (Gehring et al., 1993), and was found to increase in response to MS primes indicating an elaborated sensitivity to esteem-related failure. Furthermore, "Larger ERN due to MS predicted intensified behavioural efforts to improve self-esteem-relevant task performance; and in the MS condition, such behavioural compensation correlated with attenuations in death-thought accessibility" (Greenberg, 2012:23). Findings from these studies suggest that "defensive and anxiety-related brain processes are instigated by death-related thought" (ibid:24). The neuroscience research behind TMT processes is still in its early stages, but existing work helps to inform brain activity that initiates terror management mechanisms.

2.3   Dual-Process Model of Defence: Proximal and Distal

TM theorists propose a dual-process model of defence in managing existential fears. Conscious thoughts of death are addressed with *proximal* defences, where the individual either actively suppresses such thoughts or denies one's vulnerability to them. These are rational, threat-focused defences that are activated when thoughts of death are in current focal attention. Nonconscious thoughts are responded to with *distal* defences, symbolic conceptions of reality specified by one's culture and one's role in that culture that explicitly functions to control the potential for anxiety resulting from the inevitability of death. From a TMT perspective, these experiential "defensive reactions shield individuals from fears surrounding death by enabling them to view themselves as valuable members of an eternal cultural reality that persists beyond the point of their own physical death" (Pyszczynski, Greenberg, & Solomon, 1999:838). The delay that takes place in TMT experiments is specifically implemented to allow for death thoughts triggered by an MS prime to shift from the conscious to unconscious realm, thus invoking the distal response. When an MS prime is invoked, cognitive efforts push these thoughts out of consciousness where an increased need for terror-management is provoked (i.e. the bolstering of worldviews and striving of self-esteem). Figure 1 below provides a visual of this dual-process defence model.
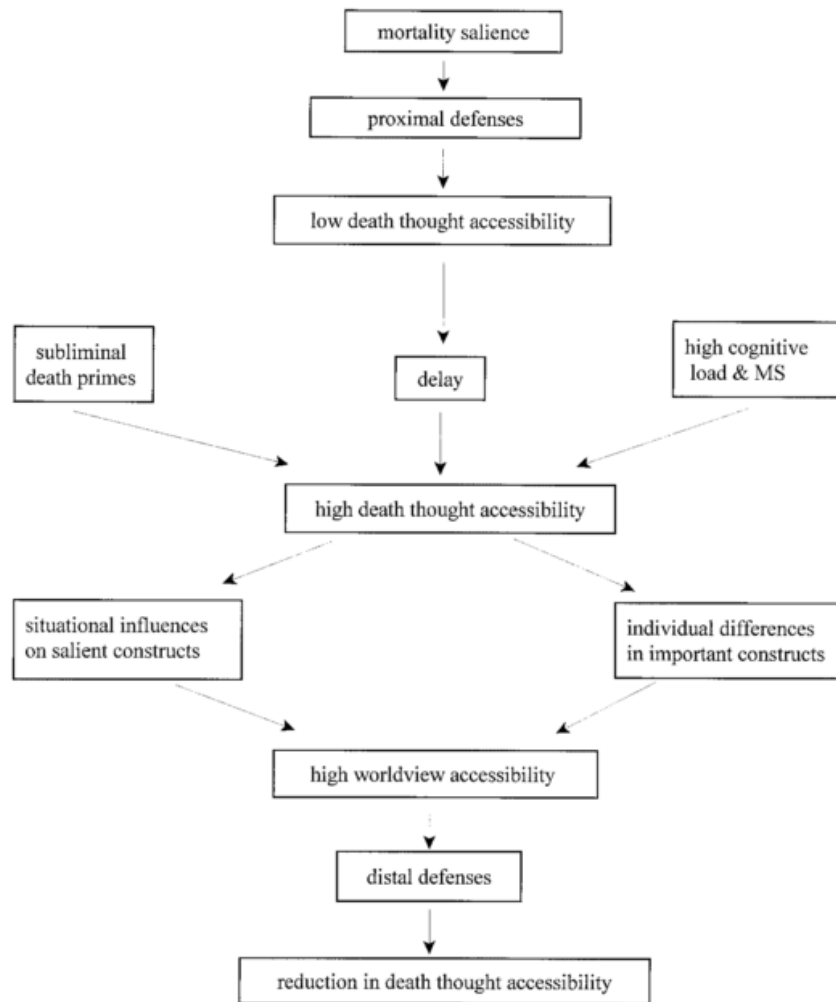
Figure 1. *Processes activated by mortality salience (MS)* (Arndt et al., 2002:321)

Routledge et al. (2004) offer an illustrative empirical example of the dual-process model relating to sun tanning behaviour. Since sun tanning can increase one's vulnerability to cancer, proximal defences can increase the intention to protect one's skin from the sun in an attempt to subdue thoughts of personal vulnerability from consciousness. This suggestion was empirically supported in an experiment by Routledge, Arndt, and Goldenberg (2004), where immediate reactions to death primes led to an increased interest in purchasing sunscreen products. Immediately after writing about death, individuals also reported that they planned to exercise more and occasional smokers reported an intention to cut back on cigarettes (Arndt, Schimel, & Goldenberg, 2003; Arndt et al., 2013). These proximal defences are explicitly conscious attempts by the individual to decrease their perceived vulnerability to death.

However, when there is a temporal delay between the mortality salience induction and measuring death thought accessibility, distal defences are activated which TM theorists claim powerfully encourage adherence to cultural worldviews and related self-esteem striving. In some cases, these behaviours undermine an individual's health and safety. Routledge et al. (2004) found that if participants completed a puzzle task following the death prime as a method of temporal delay, subjects showed a decreased interest in sunscreen products as such products presumably inhibit one's ability to get a tan. Tanned skin can be an important attribute of self-esteem, and in a secondary experiment participants primed with the association between tanned skin and physical attractiveness responded to death primes with an increased interest in tanning products and services which can ironically directly undermine physical health (Routledge, Arndt, & Goldenberg, 2004). These experiments provide empirical support for the distinct nature of proximal and distal defences in relation to mortality salience, and also offer interesting insight into motivations behind decisions to protect or endanger personal health.

The *terror-management system* of defence (see Appendix B) imposes a hierarchical organization of values and standards "through which an individual acquires meaning in life and value in himself or herself" (Pyszczynski, Greenberg, & Solomon, 1999:839).

> From this perspective, a biologically based drive for self-preservation and continued life is seen as a superordinate goal toward which a diverse array of more circumscribed psychological motives are ultimately oriented. Most of the biological systems of the body (e.g., heart, lungs, kidneys; other biological systems function to facilitate reproduction) serve the superordinate goal of continued life in a direct way by keeping the animal alive and functioning. The highly abstract psychological goals of maintaining a benign and comforting conception of reality (cultural worldview) and maintaining a positive conception of oneself (self-esteem) serve the superordinate goal of continued life in an indirect and symbolic manner by assuaging the potential for terror created by awareness of death, thus making ongoing pursuit of important life goals possible (ibid:839).

In a set of four experiments, Greenberg et al. (1994) empirically demonstrated that the effects of mortality salience "emerge most clearly when death-related thoughts are highly accessible but are currently outside of focal attention" (p.635). Following an MS prime, Greenberg et al. (1994) measured DTA before and after a distraction task and found that participants distracted after the death prime exhibited higher levels of death-thought accessibility than both the participants in the control condition and participants whose DTA was measured immediately after the prime. TM theorists assert that participants will initially suppress death-related thoughts when first exposed to an MS prime, but this

suppression is relaxed when participants are asked to engage in a distracting task, and death thoughts are subsequently increasingly accessible to the unconscious realm. Becker remarks: "when the awareness dawns that has always been blotted out by frenetic, ready-made activity, we see the transmutation of repression redistilled, so to speak, and the fear of death emerges in pure essence" (Becker, 1973:23). A substantial body of evidence indicates that, compared to conscious reflections, death thoughts outside of focal consciousness have extremely "potent effects on interpersonal judgment and behaviour" (Greenberg et al., 1994:636).

2.4   Implications of TMT Claims

TMT's claims above have several important implications. Firstly, although self-esteem in this capacity is advanced as a universal human need, the social roles and standards by which an individual acquires and maintains this defence mechanism are both historically and culturally relative (Solomon et al., 1998). For example, an observable shift took place in the ethics regarding usury from mortal sin to free market-given right in Western culture, though usury maintains sin-status in other cultural views such as the Islamic faith (Zaman, 2008). With self-esteem as an ultimately cultural construct, there are "consequently no absolute and transcendental standards by which human beings can ever differentiate between good and evil" (Solomon et al., 1998:15).

Moreover, since "there is no way to unambiguously confirm the veracity of any cultural conception of reality" (ibid:15), individuals are ultimately reliant on faith in order to sustain belief in culturally prescribed visions of reality. This leads to the claim by TM theorists that "all cultural worldviews are fundamentally religious in nature" (ibid:15). The supernatural dimension of culture is reiterated in Becker's remarks regarding the conception of cultural worldviews: "It doesn't matter whether the cultural hero-system is frankly magical, religious, and primitive or secular, scientific, and civilized. It is still a mythical hero-system in which people serve in order to earn a feeling of primary value, of cosmic specialness, of ultimate usefulness to creation, of unshakable meaning" (Becker, 1973:5). For Becker, cultural conceptions of reality are by nature symbolic fabrications of meaning created within the mind and therefore have no grounds in physical reality. Symbolic death-transcending narratives offered by cultural worldviews provide security and meaning for the human mind and its unfortunate realization of our finite duration. "The real world is simply too terrible to admit; it tells man that he is a small, trembling

animal who will decay and die. Illusion changes all this, makes man seem important, vital to the universe, immortal in some way" (Becker, 1973:133).

Finally, TM theorists emphasize the importance of maintaining a broad social consensus in supporting a specific worldview. If worldviews are constructed to provide psychological equanimity, they are required to be "accepted by its adherents as absolutely and unequivocally true" (Solomon et al., 1998:17). Confidence in one's worldview and its ability to protect the mind from anxiety highly depends on consensual validation from others (Pyszczynski, Greenberg, Solomon, & Maxfield, 2006). However, the "mere existence of divergent worldviews undermines this consensus, and therefore threatens faith in the absolute validity of one's worldview and reduces its anxiety-buffering effectiveness" (ibid:329). Admitting legitimacy of an alternative conception of reality necessarily undermines faith in one's own belief system, exposing oneself to the very anxiety these cultural meaning systems are constructed to mitigate. In order to defuse this potential threat, TM theorists propose the instigation of compensatory responses in order to restore confidence in one's worldview including derogation, assimilation, and annihilation (Greenberg, 2012:24). From a TMT perspective, "the ongoing ethnic strife pervading human history is in large part the result of humans' inability to tolerate those with different death-denying visions of reality" (Solomon, Greenberg, & Pysczynski, 2000:201).

Indeed, Hayes et al. (2008) found that Christian participants from the University of Alberta experienced greater DTA and worldview defence in response to a worldview-threatening article (i.e. Muslims are gaining dominance in Nazareth), unless that article also specified that worldview-threatening others had died (in this particular case, Muslims). This study indicates that "the annihilation of worldview violators can serve a worldview-defensive function" (Hayes, Schimel, & Williams, 2008:504). In three studies investigating the impact of mortality salience on conformity, Renkema, Stapel and Van Yperen (2008) found that participants primed with thoughts of death were motivated to conform to the opinions of the general public. The majority's (fictional) opinion influenced death-primed participants on the judgment of art and their attitudes towards immigration policy. Furthermore, death-primed participants did not conform to the opinions of out-group members. These findings indicate the pivotal anxiety-buffering role of conformity in managing existential fears. In a paper on existential threat and intergroup conflict, Jonas and Fritsche remark that "cultural worldviews consist largely of ingroup norms,

and people are specifically prone under threat to act as ingroup members (instead of acting as individuals)" (Jonas & Fritsche, 2013:554).

This proposal amiably aligns with the work of Leon Festinger, a psychologist who developed the idea of cognitive dissonance. In the book *When Prophecy Fails* (1956), Festinger and team follow a small UFO cult in Chicago that depicted an imminent apocalypse on December 21, 1954. The group believers left their homes, jobs, and partners in order to prepare for a flying saucer that was expected to rescue them from a great flood. Festinger and colleagues infiltrated themselves into the cult to test their theory of cognitive dissonance, which proposes that conflicting beliefs are not rationally evaluated against objective facts. Rather, human beings will "reduce the conflict by reinterpreting facts that challenge the beliefs to which they are most attached" (Gray, 2013:72). As predicted, "the cultists refused to accept that their system of beliefs was mistaken. Instead, they interpreted the failure of doomsday to arrive as evidence that by waiting and praying throughout the night they had succeeded in preventing it" (ibid:73). Festinger (1956:259) observes:

> Suppose an individual believes something with his whole heart; suppose further that he has a commitment to this belief, that he has taken irrevocable actions because of it; finally, suppose that he is presented with evidence, unequivocal and undeniable evidence, that his belief is wrong; what will happen? The individual will frequently emerge, not only unshaken, but even more convinced of the truth of his beliefs than ever before. Indeed, he may even show a new fervour about convincing and converting other people to his view.

TMT provides a strong empirical basis for better understanding the dynamics behind in-group loyalty. The role of social identification in managing existential concerns is founded not only in group-derived self-esteem, Castano and Dechesne (2005) claim that "[b]ecoming part of collective entities… allow[s] individuals to extend their selves in space and time to overcome the inherent limitations of their individual identity, an identity inextricably linked to a perishable body" (p.233). Thus, as demonstrated in TMT research, threats to personal or group identity are often met with distal defences that feature the bolstering of in-group norms. Rather than inspiring rational behaviours that positively impact a person's health or lifestyle, reactions to subliminal death primes are seemingly irrational culturally prescribed standards of conduct that, if respected and followed, bring about a sense of symbolic immortality through the membership of an ever-lasting social entity. These claims are consistent with earlier work on in-group entitativity, a term coined by Campbell (1958) referring to "the extent to which a group is

(perceived to be) a real entity, an entity possessing a real existence" (Castano & Dechesne, 2005:232). This concept has been used in social psychology to understand stereotyping, and the mechanics of both in-group and out-group relations.

2.5   Section 2.0 Overview of TMT

This section has provided an extensive overview of TMT's origins and central thesis, and discussed existing research and the outcomes of the theory's empirical studies. Inspired by the works of cultural anthropologist Ernest Becker, TMT asserts that human behaviour is unconsciously motivated by psychological mechanisms that aid to assuage the unfortunate awareness of our inevitable demise via the creation and maintenance of cultural worldviews. By providing a testable empirical framework, TMT has shown that reminders of one's mortality can provoke an exaggerated form of a belief or behaviour of cultural value; threatening a value of cultural significance increases death awareness; and reinforcing a belief or value of cultural importance temporarily eliminates existential anxiety. Furthermore, TMT demonstrates the elaborate mechanisms of unconscious psychological thought and its important role in values, beliefs, and decision-making. Most importantly, "what terror management work has seemed to do is legitimize the existential realm, once maligned as beyond the scope of scientific scrutiny, as a viable avenue of empirical psychological inquiry" (Arndt & Vess, 2008:910; See also Koole, Greenberg, & Pyszczynski, 2006).

3.0   Critical Reflections: Interrogating the Need to "Manage" Terror

Section 2.0 provided an extensive review of existing TMT literature offering supporting empirical evidence for many of the theory's claims. However, there is a vibrant discourse outside of this literature that maintains a strong scepticism towards some of the major assumptions held by TMT, as well as particular aspects of the theory's implications. This section of the paper will critically examine Terror Management Theory through the lens of available analytical literature.

3.1   Aligning TMT with Darwin's Theory of Evolution

Fundamental to TMT's claims is the Darwinian assumption that humans share with all life-forms an instinctive drive for self-preservation (Greenberg, Pyszczynski, Solomon, Simon, & Breus, 1994; Greenberg et al., 1995; Greenberg, Simon, Pyszczynski, Solomon, & Chatel, 1992; Landau et al., 2004; Solomon, Greenberg, & Pyszczynski, 1998). In the service of individual survival, it is this drive that enhances reproductive success and fitness of the species, and which is juxtaposed with the presumed uniquely human awareness of death creating the potential for debilitating terror. Otto Rank (1936/1945) referred to this innate drive as the "life force", a commonality among all living organisms to strive "for continued and prosperous existence" (Schimel et al., 2007:789). Becker identifies this drive as self-perpetuation, the "basic motive of man, without which nothing vital can be understood" (Becker, 1973:231). A lively dialogue has persisted in response to TMT literature expressing a number of concerns regarding this integral assumption by noting the many inconsistencies with contemporary evolutionary biology and the implausibility behind many of TMT's major tenets in this context.

3.1.1   *Survival vs. Reproduction*

Kirkpatrick and Navarrete (2006:288) note that "Any theory of human nature must be, at some level, an *evolutionary* one" but find TMT "is entirely out of step with contemporary understandings of evolution by natural selection" in several crucial ways.

> Modern evolutionary biology is premised on the supposition that, when in their natural environment, individual organisms generally function in ways which increase the likelihood that their genes will be favorably represented in future generations… sometimes organisms avoid situations that cause bodily harm, sometimes they are indifferent to such situations, and sometimes they actively seek them out, depending on

the ultimate consequences of a given action for reproductive success (Navarrete and Fessler, 2005:300).

Buss (1997), Kirkpatrick and Navarrete (2006) point to the wide recognition in evolutionary biology that reproduction of genetic information, rather than survival, "is the engine that drives the evolutionary process" (Buss, 1997:23; See: Darwin 1871; Hamilton, 1964; Williams, 1966). Crucial developments in evolutionary biology occurred during the 1960's which drastically changed the notion and understandings of natural selection, leading Kirkpatrick and Navarrete (2006) to concede that "any psychological theory about human nature developed prior to the 1960s is, a *priori*, suspect" (p.288). Moreover, Hamilton's theory of 'inclusive fitness', which offers a mechanism for the evolution of altruism, directly conflicts with TMT's notion of a survival instinct. In addition to one's own reproduction, Hamilton (1964) claims the reproductive success of close kin is an additional method for the transmission of one's genes to future generations. The theory of inclusive fitness helps to explain the myriad of examples where individual security is sacrificed for the sake of another, such as parents incurring personal sacrifices for the safety and survival of their offspring, or particular species such as bees or ants that are prepared to sacrifice their life for the colony in addition to sacrificing their ability to reproduce.

3.1.2 *Contemplating a Predisposition for Survival*

The critical role of differential reproductive success can be further highlighted by the many mechanisms observed in nature that can potentially lower the probability of a species' survival for the sake of reproductive promotion. Buss (1997) points to a peacock's plumage which is both energetically costly and enticing to predators, but remains a powerful attractor of mates and thus supports reproductive efforts. Navarrete and Fessler (2005) discuss the Alaskan salmon's journey upstream from the ocean, risking predation and injury in order to spawn in the precise pool in which they hatched. Survival of the individual is therefore contingent on the successful reproduction of genetic information, an insight now broadly accepted in the research and writings on biological evolution (Dawkins, 1976; Wilson, 1975). Organisms that cannot successfully attract mates, or that produce helpless offspring with no genetic recipe to care or nurture, will be disfavoured relative to reproductively successful organisms or genetic recipes that establish nurturing parents. Kirkpatrick and Navarrete (2006) consequently

determine that a survival instinct may in fact be potentially maladaptive for many species, since natural selection has encouraged adaptive functions to place many goals above personal survival in order to replicate genetic information in addition to maintaining individual health (Sober and Wilson, 1998).

Even in entertaining the discredited idea that individual survival is the main criteria for natural selection, Kirkpatrick and Navarrete (2006) assert that a survival instinct would be of no adaptive value, contrasting this notion to a chess-playing computer program encoded to "make good moves". A specific species evolves psychological and behavioural mechanisms that have been perfected over time to interact with particular environments and achieve certain goals. A chess program is equipped with a multitude of specialized mechanisms while the ultimate goal of the game is implicit within the program. "Similarly, a psychological mechanism containing the instruction "avoid death" would provide no guidance in determining how to behave to accomplish this goal" (Kirkpatrick & Navarrete, 2006: 290; See also Paulhus & Trapnell, 1997). Navarrete and Fessler (2005) concur, and carry this argument forward by exploring the notion of a survival instinct from a broader theoretical level. A predisposition towards self-preservation remains insufficient in terms of providing behavioural adaptations, "since strategies for staying alive are contingent on the nature of the challenge confronting the organism at a given time" (Navarrete and Fessler, 2005:301). The authors surmise that the survival instinct referred to in TMT is most likely an "emergent property of a collection of discrete mechanisms, each designed to protect the organism from particular kinds of dangers, a goal achieved in part through the generation of anxiety in reaction to specific classes of proximate cues" (Navarrete & Fessler, 2005:302).

3.1.3 *Contrasting Evolutionary Realities*

Furthermore, Navarrete and Fessler (2005) assert that "the relationship between survival maximization and reproduction is precisely opposite that entailed by the claim that differential reproductive success favors the existence of a survival instinct" (p.302). TM theorists argue that reproductive success is predicated on survival since one must live long enough to successfully reproduce (Pyszczynski, Greenberg, & Solomon, 1997), and while this sentiment is objectively true, Navarrete and Fessler (2005) contend that it does not justify survival as the primary motivating force behind behaviour. By extending

TMT's assertion, "successful reproduction should have an exacerbating effect on the frequency of behaviors that entail risk of injury or death" while "the demographic patterns of bodily risk-taking should reflect the demographic patterns of reproduction" (Navarrete and Fessler, 2005:302). However, the opposite pattern of behaviour is observed for example in the youth-oriented proneness for risky behaviour and the drastic reduction in risk-taking from middle-age forward (i.e. marriage which greatly reduces risk compared to divorce and widowhood (Wilson and Daly, 1985; Daly and Wilson, 2001).

Navarrete and Fessler (2005) also bring attention to the fact that a survival instinct necessarily entails awareness about the results of an event that has yet to happen in the wake of death awareness and avoidance. In concluding the extension of TMT's assertion, the authors note that "TMT notions of a survival instinct and its uniquely human consequences are not only out of step with evolutionary biology and evolutionary social science, they are self-contradictory" (ibid:302). A complementary view is found in Buss' critiques of TMT, stating that "the drive for self-preservation cannot be viewed as the master motive of humans or any other organism. The postulation of survival as the master motive is inconsistent with what is now know about the evolution of all life" (Buss, 1997:23).

3.2   Feasibility of a Terror-Management System

TMT's principal claim is death's unique psychological importance, portending "the ultimate futility of all the systems and activities we direct toward staying alive" and undermining "all other needs and desires" (Greenberg, Solomon & Arndt, 2008:121). For TMT, the awareness of death that is brought about by humanity's unique cognitive capacities creates "an omnipresent potential for anxiety that is managed by cultural worldviews" (Greenberg et al., 2003:516), providing a sense of meaning, order, and permanence to shield our minds from potentially paralyzing anxiety, and to manage the terror associated with this awareness. "This is the terror:" declares Becker, "to have emerged from nothing, to have a name, consciousness of self, deep inner feelings, an excruciating inner yearning for life and self-expression – and with all this yet to die" (Becker, 1973:87). Many scholars challenge the notion of an adaptive psychological system created and evolved specifically to reduce death anxiety. From the origins of the

terror itself, to the paralyzing capacities of said terror, TMT research has a number of unresolved logical issues that are not adequately addressed in available literature.

3.2.1 *Death as the Primary Motivator*

One of the most prominent logical difficulties with TMT is the terror-management system's true capacity to support an organism's survival. "It simply does not follow that a motive for self-preservation will lead organisms to minimize the perceived severity of threats to their survival as the theory suggests" (Leary & Schreindorfer, 1997:26). Rather, by reducing an organism's concerns about death - or any threat for that matter - the psychological mechanism TMT puts forward would be more likely to decrease its long-term viability. The proclivity for anxiety evolved due to its capacity to promote species survival by deterring particular behaviours that put an organism at risk, and allowing for the assessment of potential dangers (Fridja, 1986). "Any system that served to reduce fear or anxiety that is produced by an adaptive system would, in principle, undermine the adaptive value of that other system… Assuming that anxiety and fear systems are themselves adaptive, then selection should strongly disfavor additional systems that inhibit anxious responses" (Kirkpatrick & Navarrete, 2006:291). Buss (1997) furthers this criticism by commenting on the feasibility of a terror-management mechanism to provide an adaptive function that specifically addresses and enhances survival or reproduction:

> If so much psychological effort - the machinations of self-esteem, the manipulation of others, the management of impressions, the solidification of social identity - are devoted solely to the psychological function of forestalling the terror of our own death, one must wonder when we can find the time and energy to solve all of the adaptive problems we need to solve in order to actually survive and reproduce (ibid: 23-4).

Instead, TMT is oriented towards the regulation of death anxiety, failing to connect adaptive problems with naturally selected specialized solutions such as finding food, attracting mates, or raising children. This vague orientation "deprives TMT of a wealth of potential understandings of the possible functions of anxiety, self-esteem, and other psychological phenomena" (ibid:24).

Critics are also sceptical about the origins of the terror or anxiety that TMT refers to, and moreover how or why these thoughts would be incapacitating. Leary and Schreindorfer (1997) argue that the avoidance of death and the avoidance of the fear related to death thoughts is not always clearly distinguished in TMT literature, identifying

a major assumption regarding an organism's motivations for survival as necessitating avoidance of death and avoidance of death-related anxiety. Instead, the critics reason, "people are motivated actually to enhance their safety and survival rather than simply trying to make themselves *feel* safe" (ibid:27). Buss (1997), Kirkpatrick and Navarrete (2006) also struggle with the idea that thoughts of death could potentially be incapacitating, particularly since this awareness could provoke "a host of other phenomena, such as careful planning of one's life or a surge of hedonic sexual promiscuity" (Buss, 1997:24). Furthermore, there are many other concerns that humans have needed to address in the context of survival that are just as viable for terror-management solutions:

> …by the same logic that leads TMT researchers to posit death anxiety as emerging from new abilities confronting an innate survival instinct, it might be expected that single people should become "terrified" if they fail to attract a mate, and particularly so if they reach middle age or so childless. Such thoughts are no doubt disconcerting to many people, but rarely to such an extent that it would have been necessary for natural selection to fashion a terror-management system to ameliorate them. Thus, the assumption that death anxiety is inherently so terrifying as to be paralyzing or incapacitating seems rather less implausible in the absence of a survival instinct (Kirkpatrick & Navarrete, 2006:290).

Critics of TMT remain extremely doubtful that the very psychological systems that brought about the awareness of death thoughts "could ever evolve to the point that it paralyzed other adaptive behaviors and required the evolution of new psychological systems to preclude paralysis" (Kirkpatrick & Navarrete, 2006:291).

Finally, the notion of humankind's unique awareness of the inevitability of death and our consequent instinct to avoid such awareness is challenged by contemplating the role of the "survival instinct":

> If possessing a "survival instinct" and being aware of one's mortality causes paralyzing anxiety that is only remedied through worldview defense, then either all organisms engage in worldview defense, or else only humans possess a "survival instinct," meaning that natural selection created in humans a novel instinct which, upon its creation, instantly generated paralyzing anxiety in those who possessed it. Neither possibility is plausible (Navarrete & Fessler, 2005:302).

As discussed above, natural selection could offer much simpler and more reliable mechanisms to solve the problem of death awareness, particularly since a terror-management system would enable the evolution of an adaptive trait to a maladaptive burden. "It would be quite astonishing were natural selection to produce a psychology in which, instead of orienting the organism to pressing adaptive challenges and motivating

behavior that addressed them, anxiety regularly produced a paralytic state that could only be relieved through time-and attention-consuming mental gymnastics" (Navarrete and Fessler, 2005:303).

3.2.2 *The Adaptive Role of Worldview Defence*

Another major criticism of TMT lies in the "centrality of the putative mechanism-maintenance and defense of shared worldviews-as a fundamental, species-wide feature of human psychology" (Kirkpatrick & Navarrete, 2006:293). The particular challenge to this centrality is the myriad of belief systems that have existed and their varying degrees and abilities in combating existential terror. Kirkpatrick and Navarrete (2006) list a number of belief systems that are teeming with themes of pain, suffering and even death itself, including the Old-Testament God, the Fang people of Gabon, and the Azande of the Sudan. "The ethnographic and historical corpora reveal that worldviews are as likely to be terror-inducing as anxiety-reducing" (Navarrete and Fesler, 2005:304). Critics conclude that the TMT perspective of worldviews "is one developed in the context of a 20th Century post-war milieu where ideological beliefs of the White North American middle class have become sanitized, egoistic, and much more comforting than was true in the past, or is true in most cultures outside of the U.S. today" (Kirkpatrick and Navarrete, 2006:293).

Furthermore, in establishing a clear vision of a worldview one must establish a clear self-concept in order to attain a personal sense of value and meaning within the context of the belief system prescribed. However, according to TMT literature, death primes foster greater avoidance of self-awareness (Arndt, Greenberg, Simon, Pyszczynski, & Solomon, 1998), indicating that separateness of self promotes existential anxiety. "To experience anxiety over the certain prospect of a dead self, however, one must first have a clear representation of the self" (Paulhus & Trapnell, 1997). TMT fails to explain the dynamics between establishing a sense of self within the context of a worldview, within the context of a death prime, and the apparent need to avoid the self-concept in order to manage the death anxiety the worldviews were built to mitigate.

3.2.3 *The Conceptual Problem of Suicide*

From a TMT perspective, suicide "stands as one glaring exception" that challenges "virtually any motivational perspective" (Greenberg, Solomon & Arndt, 2008:

120). Suicide represents a particularly problematic concept for TMT, because it involves the "deliberate infliction of death on oneself, and so it directly contradicts the assertion of TMT that all behavior is aimed at preserving life" (Muraven & Baumeister, 1997:37). TM theorists identify a number of examples in the literature where suicide is an appropriate act within the context of particular worldviews, such as death primes provoking greater support for and willingness to become a suicide bomber to defend one's beliefs (Pyszczynski, Abdollahi, et al., 2006). Other examples include traditional Japanese hari-kiri, Middle Eastern suicide bombers, and an increase in British participants willingness to self-sacrifice for England in response to a death prime (Routledge & Arndt, 2008; Greenberg, Solomon & Arndt, 2008). "There is nothing inconsistent with a desire for continued existence and the termination of one's physical life if one firmly believes that life continues after death, and that one's heroic death insures a blissful continuation of that life into eternity" (Solomon, Greenberg, & Pyszczynski, 1997:64)

However, TM theorists acknowledge that emotionally-driven suicides are beyond the theory's explanatory capacities, and may in fact override the fear of death. "To commit suicide as an escape from emotional distress only makes sense if the root of that distress is something other than the fear of death" (Muraven & Baumeister, 1997:37). While suicide certainly represents the most extreme counterexample concerning humanity's relationship with death, it certainly provides sufficient grounds for questioning the major tenants of TMT regarding self-preservation and the central role of death awareness and avoidance. "People do choose death when other options are available, and so sometimes other motives take precedence over self-preservation. Moreover, these other motives clearly are not derived from the fear of death, because they lead the person to choose death" (ibid:37).

3.2.4 *Contradictory Standards and the Role of Salient Norms*

Another major critique of TMT concerns the conflicting prescriptions of values and behaviour offered by a particular cultural worldview. For example, a death prime has been found to increase both charitable giving (Jonas, Schimel, Greenberg, and Pyszczynski, 2002) as well as materialism (Arndt et al., 2004) for American participants, indicating that both selfless and selfish acts can mitigate existential anxiety. Additionally, while a large body of TMT research is concerned with prejudice and aggression related to differing worldviews (Das et al., 2009; Pyszczynski, Greenberg, et al., 2006; Solomon

et al., 2000), a study by Rogers (2011) found that if Christian participants were primed to consider their death in a worldview consistent manner (i.e. "dying peacefully in the presence of family members, friends, or religious guides, performing some act of individual heroism, or dying for a specific ideology or cause" (ibid:109)), the need to derogate out-group members (Jewish targets) was eliminated.

These observed contradictions relate to the difficulty in TMT research in predicting behaviour once mortality is salient, as cultural values and self-esteem strivings are extremely varied at individual and societal bases, and can even be conflicting as demonstrated above. The variance in predictability was exhibited in experiments conducted by Jonas et al. (2008) which investigated the role of salient norms in behaviours prompted by death primes. Across four experiments, death primes were found to elicit pro-self and pro-social attitudes, decreased and increased pacifistic attitudes, provoke support for harsher and weaker punishments in the face of security/ conservatism and benevolence/ universalism, and increased willingness to help in the face of a helpfulness prime. These empirical findings indicate that "the content and direction of cultural worldview defense depend on which specific cultural norms people subscribe to or which social norm is salient in a given situation" (Jonas & Fritsche, 2013:554). While this research certainly expands TMT by demonstrating the important role that salient norms play in behavioural responses to death primes, and the role of death primes in adhering to salient norms, it also presents an issue regarding the predictability and consistency of responses in TMT research – specifically since contradicting behaviours can quell existential anxiety.

3.2.5 *Criticisms of an Imposed Hierarchy*

Finally, critics take issue with the imposed hierarchical structure that TMT demands of both social motives and interspecies relations. For TMT, the "notion of non-conscious motivational forces is a fundamental assumption" (Greenberg et al., 1994:630) upon which TMT and many other psychodynamic theories are based. The hierarchy of social motivations is particularly vital for TMT's concept of proximal and distal defences and the behavioural responses to mortality salience. Paulhus and Trapnell (1997) problematize this imposed structure, claiming it "conflates the notion of a goal hierarchy with the notion of a conscious-pre-conscious-unconscious hierarchy" (p.41). Paulhus and Trapnell question how this kind of model would operate should a

conflict arise between conscious and unconscious levels of thought, and the authors also express great "difficulty conceiving of an innate fear of death" (ibid:42).

> Somewhat easier for us to believe is the notion that we are born with a sensitivity for certain equivalence classes, including one for death. However, rather than assume that death anxiety is innate, we prefer the idea that the equivalence class takes on negative affect as various personal experiences with death are lumped into it (ibid:42).

Furthermore, TM theorists boldly proclaim that humankind's advanced cognitive capacities, bringing about an ability to ponder alternative responses to various situations and consider their consequences, make humans "the only truly creative species" (Solomon et al., 1998:12). This is reiterated by Pyszczynski and Kesebir (2012:76) who state that "Although ants, bees, and chimpanzees are all social animals, only human beings are cultural animals. Only human beings are meaning-making animals that live their lives embedded in a universe of symbols, ideas, and values created by other humans". The ideology behind this statement is maintained in much of TMT's published works, and particularly contingent on the notion that human beings are the sole species burdened with the knowledge of our eventual, inevitable demise.

This anthropocentric, reductionist view of the planet's creative and integrated life system is criticized by many (Jensen, 2016; Evernden, 1985; Merchant, 1980; Haraway, 2008). In his 2016 book *The Myth of Human Supremacy*, Derrick Jensen brilliantly challenges the notion of human superiority, a claim the author labels as tautological, by presenting a number of examples of complexity in nonhuman life that demonstrate the intelligence, creativity, and intricacy of Earth's interconnected life forms. By investigating animal, plant, and microorganism activity, and discussing themes of language, community, cooperation, and communication, Jensen demonstrates various examples of complex adaptive behaviour that nullifies any claim of human supremacy. Most intriguing is Jensen's exploration of plant life and its surprisingly sophisticated capacities for intelligent behaviour. In a 2010 Ted Talk, Italian botanist Stefano Mancuso demonstrates acts of play in young saplings, claims plants can distinguish between kin and non-kin, and asserts that plants communicate with other species of plants and animals in order to successfully pollinate. In examining a root apex growing along a slope, Mancuso highlights the 'transition zone' which, at less than 1mm in length, contains the highest consumption of oxygen in plants and gives off signals of action potential - "the same signals that the neurons of my brain, of our brain, is used to exchange information" (Mancuso, 2010).

Anthony Trewavas (2005) concurs in an opinion piece that assesses the capacity of plants to solve problems, concluding that the complex molecular network found in all plants "exhibit the simple forms of behaviour that neuroscientists describe as basic intelligence" (p.413). Specifically, Trewavas points to branch and leaf polarity in canopy gaps which "have been observed eventually to align with the primary orientation of diffuse light, thus optimizing future resource capture. The internal decisions that resulted in the growth of some branches rather than others were found to be based on the speculatively expected future return of food resources rather than on an assessment of present environmental conditions" (Trewavas, 2005:415). Indeed, Charles Darwin himself concludes his 1880 *The Power of Movement in Plants* by stating: "It is hardly an exaggeration to say that the tip of the radicle thus endowed, and having the power of directing the movements of the adjoining parts, acts like the brain of one of the lower animals" (Darwin, 1880:573).

TMT takes an extremely reductionist, anthropocentric view of intelligence and creativity, a weakness that stems from Becker's insistence on unique human capacities (Rowe, 2014). Although the human experience of life and mortality may be different than that of other animals, "the lines of distinction are not as sharp as Becker's work suggests" (Rowe, 2014:2; see King, 2013).

3.3   An Alternate Account of TMT: Coalitional Psychology

In developing an alternative hypothesis for terror management research outcomes, Navarrete and colleagues (2004;2005) assert that humans possess psychological mechanisms that serve to facilitate the formation of coalitions in order to enhance personal fitness and survival. Rather than constantly striving to avoid threatening thoughts of death, "increases in adherence to ingroup ideology, intolerance of opposing views, and derogation of dissimilar others can be interpreted as behavioral manifestations of normative mental representations emanating from psychological systems designed to enhance individual acceptance in, and coordination with, social groups" (Navarrete & Fessler, 2005:298). Navarrete and colleagues illustrate the importance of strong, dynamic social groups and consequent ideologies in advancing human survival, proposing that the psychology of social coalitions can adequately address and even replace the proposals put forward by TMT.

3.3.1 *The Adaptive Function of Normative Bias*

According to De Waal and Harcourt (1992), a diverse range of organisms have demonstrated the ability to form coalitions in order to tackle adaptive challenges, and it remains a particularly crucial skill for the development and evolution of social behaviour in primates. Indeed, the "patterns of coalition and alliances found in related primate species suggest that such strategic social structures are likely to be far more ancient than the hominid lineage itself" (Navarrete & Fessler,2005:308; see De Waal, 1982). However, the complexity and efficiency demonstrated by present-day human societies remain unparalleled in contrast to non-human animals (Boyd & Richardson, 1990). Conforming to social norms not only enhances the efficiency of a coordinated effort among self-interested actors (McElreath, Boyd & Richerson, 2003), the norms themselves which stem from particular cultural belief systems provide helpful solutions to various issues that may arise within these dynamic social structures such as conflict, power, and resource distribution (van Dijk, 1998). Sherif and Sherif (1953) assert that adopting group ideologies is a necessity for an individual to effectively function in the social group, and remains a "main anchorage for regulating experience and behaviour" (ibid:251).

Through a relational approach to the psychology of coalitions, cultural worldviews can be viewed as "mental representations that facilitate the creation and maintenance of social relationships" (Navarrete & Fessler, 2005:307). Navarrete and Fessler claim that aligning one's social cognitions to in-group ideologies is thus an adaptive mechanism used to enhance an individual's fitness. This is particularly feasible when considering an individual will personally benefit from coordinating their behaviour with others, an endeavour founded in cultural worldviews. The authors propose that the "mortality-salience phenomena documented by terror management researchers are best explained as the social-cognitive output of a system of adaptive mechanisms that facilitate the formation of social networks, interpersonal attachments, and coalitions" (Navarrete & Fessler, 2005:307). In line with this proposal, Navarrete and colleagues predict that exposing people to aversive stimuli that pose adaptive problems will increase their adherence to normative attitudes of relevant social groups. Six experiments were consequently conducted with American and Costa Rican participants to investigate the dynamics of in-group ideology.

3.3.2 *Supporting Evidence*

In the first study investigating the dynamics of worldview defence outside the realm of TMT, Navarrete et al. (2004) conducted four experiments that included the mortality salience manipulation but added two additional conditions that pertained to social assistance. The first additional prime focused on threats to personal property, a theft-salience prime, chosen because such a threat "indicates an immediate increase in the need for resources, indexes inadequate social assistance in the protection of one's resources to date, and signals the need for allies in seeking vengeance on thieves, actions that will deter future fitness-reducing transgressions" (Navarrete, Kurzban, Fessler, & Kirkpatrick, 2004:374-5). The second prime chosen in addition to mortality salience was social isolation because the authors posited that "the mechanisms of the adaptive system for creating or reaffirming beneficial social bonds in times of social exclusion or marginalization should give rise to the pro-normative, ingroup-affiliative sentiments necessary to obtain needed social support" (Navarrete et al., 2004:375).

Consistent with the authors' predictions, two studies on American university students found that an increase in in-group ideology could be elicited without a death prime, and furthermore found that death-thought accessibility was not increased when participants contemplated theft or isolation, indicating the cognitive consequences were not explicable terms of death-thought elicitation. Two additional studies were conducted with participants from rural Costa Rica, chosen to test the generalizability of the Coalitional Psychology theory with a population that was more open to death anxiety, remained outside the North American university context, but maintained a strong nationalist identity. In these studies, Costa Rican participants increased intergroup bias after exposure to the mortality, theft, and isolation salience primes compared to the neutral condition prime, responses that were furthermore indistinguishable from the mortality salience prime. The four studies by Navarrete et al. (2004) provide compelling evidence that the effects observed in mortality salience primes conducted by TMT researchers can be replicated using fitness-relevant primes unrelated to death. The experiments present support for the authors' claims regarding in-group ideological bias as a fitness-related defence mechanism, adjusting "behaviour as a function of the need to improve one's chances of receiving coalitional support, generating output that is shaped by the culture of the group with which one identifies" (Navarrete et al., 2004:392).

In an additional study aimed to provide further support for a relational approach, Navarrete (2005) conducted two experiments with Costa Rican and American participants who were asked to contemplate death, social isolation, or solicit help for a cooperative task to observe which primes increased normative bias. In the Costa Rican sample, participants increased in-group ideology for coalition-relevant primes (social isolation and cooperation), but not for mortality salience. In the American sample, confronting self-relevant adaptive challenges increased pro-normative ideology and was not exclusive to death primes. However, mortality salience engendered greater normative bias than social isolation for the American sample, supporting the notion that differences in normative bias is attributable to cultural differences. Cultures that emphasize individualism versus interdependence, such as American versus Costa Rican, may not view social isolation as a fitness challenge to the same extent as other adaptive problems. A multiple regression analysis was conducted determining that the "observed main effect differences in normative bias between rural Costa Ricans and urban North American undergraduates with regard to the threat of social isolation or death anxiety is attributable to cultural differences in interdependent self-construals between these two populations" (Navarrete, 2005:421).

For Navarrete and colleagues, the observed effects of TMT experimentation can be better explained as distinct evolutionary mechanisms that improve individual fitness and survival through the cohesive dynamics of inter-group relations. The proposed approach of Coalitional Psychology provides "direction in accounting for both the corpus of results so impressively documented in terror management research and the growing body of findings inconsistent with the predictions of terror management theory in its present form" (Navarrete and Fessler, 2005:317).

3.4   TMT Responses

TM theorists have not remained silent on these criticisms, publishing many responses addressing a range of issues pertaining to the theory (see Arndt & Vess, 2008; Castano & Dechesne, 2005; Hayes, Schimel, & Williams, 2008; Landau, 2007; Solomon et al., 1997). The following two subsections will address many of the concerns and criticisms raised above primarily using a published work by Landau (2007) that

summarizes the TMT perspective that directly responds to Navarrete and Fessler (2005).

3.4.1 *Compatibility of TMT and Evolution*

For TMT researchers, the critique that the theory is inconsistent with contemporary evolutionary theory is found to be "devoid of merit" for a number of reasons (Landau 2007:495). Firstly, Becker's ideas, which were the foundations for TMT's empirical framework, were grounded in Charles Darwin's "original depiction of evolution by natural selection where the individual is the primary unit of selection" (ibid:486). These groundings are the inspiration for TMT's assertion of a self-preservation instinct, which intended to "highlight the general orientation toward continued life that is expressed in many of the organism's bodily systems (e.g., heart, liver, lungs, etc.) and its diverse approach and avoidance tendencies (some of which qualify as instincts) that promote its survival and reproduction, ultimately leading to genes being passed on to future generations" (ibid:487). This assertion aligns with many psychoanalytic theorists of influence to Becker, including Rank (1936/1945), Zilboorg (1943), and Freud (1920/1989), and TMT researchers emphasize "it is uncontroversial to assume that with few interesting exceptions, organisms are predisposed to approach things that facilitate continued existence and to avoid things that would likely cut life short" (ibid:487). Moreover, in response to the objection that a self-preservation instinct as a hypothetical construct would be a maladaptive adaptation, TMT researchers point to behaviour characterization through hypothetical construct as extremely useful, such as a dog's barking or a fish attacking another fish as territorial.

Furthermore, the anxiety experienced from the knowledge of a terminal illness or a gun pointed to one's head demonstrate from a TMT perspective that "humans are susceptible to anxiety due to events and stimuli that are not immediately present, or for which no innate fear or defense response exists" (ibid:488). TMT asserts that humans are profoundly impacted by the knowledge that results from self-reflective consciousness, including the unfortunate realization that life will inevitably be thwarted, and thus the theory "views existential anxiety as an unfortunate byproduct of these two highly adaptive human proclivities rather than as an adaptation that was selected for because of its advantages" (Solomon et al., 1997:64). Although TMT is the first to claim in academic psychology that the uniquely human awareness of death creates the

potential for anxiety that is ultimately managed by cultural worldviews, a number of evolutionary perspectives unite on this front including Terrence Deacon (1997), Scott Atran (2002), Tooby and Cosmides (1992), and David Premak (Wilson, 1978).

Finally, TMT researchers suggest that Navarrete and colleagues adopt a narrow conception of evolutionary thinking that relies "solely on domain-specific adaptations [that] are unable to account for uniquely human forms of creative cognition, including metaphor and analogical reasoning" (Landau, 2007:491). Thus, in light of humankind's continual evolutionary success, Landau concludes that "the fact that death is not tied to any specific situation in no way disqualifies it from exerting significant selection pressures on the human animal" (p.491).

3.4.2 *Defence of a TMT System*

In response to the argument that an anxiety-reducing capacity would be maladaptive, Landau (2007) asserts that "TMT does not predict worldview-defence in instances of fear aroused in response to imminent threats, nor does it claim that terror management defences afford any protection from immediate threats to life or reproductive capacity" (p.491). Instead, cultural worldviews and subsequent self-esteem strivings are crucial to the management of potential anxiety resulting from the human mind's capacity to realize death is inevitable. The dynamics between proximal and distal defences (section 2.3, see Pyszczynski et al., 1999) directly applies to this argument, since it explicitly demonstrates the inability of conscious death thoughts to produce mortality salience effects normally observed in TMT experimentation. Landau emphasizes that "*These reminders affect people because they remind them of a perpetual psychological problem, not because they pose a clear and present danger to their immediate survival*" (Landau, 2007:492). TMT researchers assert that "death is a very specific and universal problem for a self-conscious animal" and thus "anxiety regarding the inevitability of death is unique because it refers to an existential circumstance that cannot be avoided" (ibid:491-2). Furthermore, fear as an exclusively adaptive trait is incompatible with people who suffer from minimal to extreme anxiety disorders.

In response to the criticism that many worldviews feature elements of fear and anxiety, TMT asserts that "faith in worldviews in concert with sustained perception of personal worth and significance (self-esteem) buffers the anxiety associated with the

awareness of the inevitability of death" (Landau, 2007:493). The ability to buffer anxiety is not necessarily aligned with the ability to make people feel good, rather "Worldviews control death-related fear by conferring meaning and significance to the universe, explaining tragedy (including death itself), and providing the individual with some hope of transcending death" (ibid:495). The awareness of death provides strong motivations to maintain faith in the worldview and live up to the cultural standards prescribed, no matter the content within. The dynamics at play are at times rather curious, as will be demonstrated in section 4.0 of this paper.

3.4.3   *Theoretical Limitations of Coalitional Psychology*

Landau (2007) asserts that Coalitional Psychology is not an empirically viable alternative to TMT for a number of reasons. Coalitional Psychology makes no effort to explain why all cultures have a supernatural element, particularly if their sole purpose is to maintain group coherence.

> Although one might argue that concerns with inheritance, generativity, and future generations reflect evolved concerns for one's offspring that emerged because this facilitates gene perpetuation – and we agree that this most likely does play a role in these behaviors – such concerns necessarily entail a response to an abstract awareness of death and a desire to pass something of oneself on to these future generation" (ibid:499).

TMT asserts that humans have an inherent desire to have one's beliefs, values, and memories preserved, a desire Coalitional Psychology does not address.

Furthermore, if the purpose of cultural worldviews were merely for group cohesion, the elaborate symbolic meaning systems that TMT empirically investigates would not be necessary. "Rather than buying into elaborate counter-intuitive beliefs and values, it would seem more adaptive for maintaining coalitions to invest more energy into helping members of one's group in as many practical ways as possible and generally being a reliable member of one's group" (ibid:499). Indeed, based on Navarrete and colleague's work thus far, Coalitional Psychology "offers no explanation for why people are so concerned with symbolic manifestations of their belief systems over and above the practical means of addressing everyday adaptive challenges" (ibid: 499) or furthermore why thoughts of death arouse intensified concern for these symbolic mechanisms.

In concluding the response to TMT criticisms, Landau and many other TMT researchers "question the virtue of disposing of a viable theoretical framework (TMT)

with a proven track record of generating a host of diverse, often complex hypotheses (sometimes predicting four-way interactions) yielding supportive findings in favor of a rudimentary coalitional psychology (CP) that is theoretically under-developed and empirically undistinguishable from any number of other perspectives on affiliative behavior, is unable to account for very basic universal characteristics of culture or a large empirical literature of research findings in accord with hypotheses derived from TMT, and has yet to produce any empirical findings that unequivocally undermine TMT and support CP" (ibid:509).

3.5   Section 3.0 Summary of Critical Reflections

In the above section, critical analytical literature was reviewed that problematizes many of TMT's implicit assumptions. This included TMT's ability to align with evolutionary biology, the viability of a death-anxiety managing system, and the proposal of an alternative explanation for TMT research findings via Coalitional Psychology. A short review of responses to these criticisms from TM theorists was also provided. In light of the criticisms reviewed in section 3.0, the following section will review contemporary applications of TMT concerning human-economy-environment relations.

4.0 Contemporary Applications of TMT:
On Human-Nature Relations & Economic Behaviour

This section of the paper will review and summarize empirical findings from TMT research regarding human-nature relations and economic behaviour. These two concepts are foundational to a peaceful and prosperous existence for humankind on planet earth, and were thus chosen to expose the psychodynamic forces inherent within. Following this review, supplementary scholarship will be discussed that directly parallels TMT's claims, and the implications of these parallels will be considered within the context of the impending climate crisis.

4.1 Human-Nature Relations

According to Becker, humans are trapped in an existential paradox, desperate to justify their presence and significance – particularly in contrast to the rest of the animal kingdom: "The prison of one's character is painstakingly built to deny one thing and one thing alone: one's creatureliness. The creatureliness is the terror…the anxiety that results from the human paradox that man is an animal who is conscious of his animal limitation" (Becker, 1973:87). For Becker, the inescapable reality of death is a centrepiece to the construct of culture, which he claims is a "fabricated protest against natural reality, a denial of truth of the human condition, and an attempt to forget the pathetic creature that man is" (Becker, 1973:33). The advanced cognitive capacities that allowed for the awareness of death and creation of culture are pivotal characteristics for Becker that distinguish the human being from all other animals. Through culture, humans are able to participate in meaningful endeavours that transcend mere instinctual existence which all other animals experience.

> The lower animals are, of course, spared this painful contradiction, as they lack a symbolic identity and the self-consciousness that goes with it. They merely act and move reflexively as they are driven by their instincts. If they pause at all, it is only a physical pause; inside they are anonymous, and even their faces have no name. They live in a world without time, pulsating, as it were, in a state of dumb being" (Becker, 1973:26-7).

The above quote illuminates Becker's strong views on the non-human animal community, which he constantly refers to as the "lower animals" (see Becker 1973:18,22,26,69). For Becker, the entire non-human animal community is driven by mechanical instinct, and thus at the mercy of the universe's forces. Humans, however, are able to acknowledge and surpass their animal limitations through the psychological

mechanism of cultural worldviews, a defining feature of human superiority according to Becker.

In line with these assertions, TM theorists propose that the sense of limitation the human body imposes on the mind is considered an "inviolable contract with death" (Landau et al., 2006:131) that perpetuates an "inherent existential need to distance themselves from their animal nature, and further, that they do so by devaluing and denying their most creaturely aspects" (Goldenberg and Roberts, 2004:74). To maintain psychological equanimity in the face of existential terror, TMT posits that cultural worldviews offer symbolic conceptions of reality that expressly enlarge the gap between humans and nature in order for people to "implicitly affirm their beliefs that they are symbolic beings, which are not subject to the natural laws of death and decay" (Koole & Van den Berg, 2005:1015). *Terror-management processes* are thus a central element in human-nature relations, which includes attitudes towards nature and animals, and perceptions of both the mind and physical body. The following subsections will review empirical research within the TMT framework that explores the repercussions of the existential dilemma Becker proposes, with a particular emphasis on wilderness, animals, sexuality, gender, and the self.

4.1.1   *Wild Nature*

Nothing makes men so mutually hostile, nothing has a power to arouse them and to bring them into conflict, nothing renders them so callous and inexorable, as the preternatural violence of the forest. In the forest man rediscovers his primordial instincts. His most primitive animal impulses return to the surface, break through the delicate tracery of his nerves, reappear outside his veneer of civilized conventions and inhibitions in all their exquisite and squalid virginity.

- Curzio Malaparte quoted in J. Gray, 2013:25

For TMT, nature [4] itself is a threatening concept particularly due to its uncontrollability, and its implicit and explicit reminders of finitude. Accordingly, existential concerns may influence attitudes and behaviours related to the natural environment. An initial study in 1999 was conducted and found in support of this assertion, demonstrating a negative correlation between personal safety and preference for wild over cultivated landscapes (Van den Berg, 1999). Multiple experiments have been conducted within the realm of TMT to further explore this correlation.

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[4] Humans are not encompassed in TMT's definition of *'nature'*.

Koole and Van den Berg (2005) conducted a study with Dutch participants to investigate the relationship between death and wilderness, and the role of terror management concerns. In the first experiment, participants reported that they were more inclined to think of death in the wilderness than cultivated nature – a natural environment with high human influence such as a grain field, and were more inclined to think of death in the wilderness than in a city – an environment such as an industrial complex or downtown core where nature is not highly visible. Furthermore, participants reported they were more inclined to think about freedom in the wilderness rather than in a city or cultivated nature. In a second experiment, participants reminded of death responded more positively to cultivated landscapes and less positively to wild landscapes indicating that death can impact the perceived beauty of wilderness. The effects of death reminders and cultivation were found to be independent of conscious feelings of threat or unfamiliarity which can arise when encountering nature (Koole & Van den Berg, 2005). The results from these studies indicate that existential concerns facilitate an increased desire for control over nature.

The focus on freedom was used in the above study because of two conflicting existential motives defined within human-nature relations. "Close encounters with nature involve a confrontation with deeply rooted existential fears, which fuel defensive motives to distance oneself from or control the wild forces of nature. Nevertheless, nature also provides an ideal setting for exploration and personal growth" (Koole and Van den Berg, 2004:91). While both motives are certainly important determinants of human-nature relations, "self-defense may be the more basic system, in that defensive needs must be met before the growth/enrichment system may become activated" (ibid:91). In order for human groups to prosper, openness to new experiences and landscapes, and the development of new behavioural capacities are essential adaptive traits. If defensive instincts were constantly obeyed, people would not be equipped to engage in such risk-taking endeavours. Self-regulation has been identified as a crucial mechanism for overcoming defensive reactions (Baumeister, Heatherton, & Tice, 1994), including for example the control of negative emotions. Kuhl (1981) refers to action-oriented individuals as those with strong self-regulation skills, and state-oriented individuals as those with less developed self-regulation. Action-orientation is a volitional approach characterized by self-determined, autonomous goal striving – two basic elements of personal growth (Deci & Ryan, 2000).

To explore the defensive-growth paradigm in terror management concerns related to nature, three additional experiments were conducted by Koole and Van den Berg which replicated the previous studies but also included the assessment of participants' growth-motivation system. As predicted, participants with high action-orientation expressed greater preference for wild nature than state-oriented participants, and were furthermore able to suppress associations between wilderness and death when exposed to photographs of wilderness. State-oriented individuals contrasted this result by activating an association with death and wilderness after viewing a series of wilderness photographs, suggesting that "encounters with wilderness serve to potentiate automatic associations between wilderness and death among state-oriented participants" (Koole & Van den Berg, 2005:1023). The association between wilderness and death was subdued for state-oriented participants if they were exposed to photographs of cultivated settings, presumably providing these individuals with "symbolic assurance that the wild forces of nature can be controlled by human civilization" (ibid: 1023). In a final study, subliminal death primes were found to inhibit the influence of action orientation on nature evaluation, while state-oriented individuals displayed relatively low nature evaluations regardless of a death prime. Neutral and aversive control conditions were implemented to demonstrate the specific influence of death concerns, and mood ratings were found to be uncorrelated to nature ratings.

Since the studies above demonstrate the influence of wilderness on accessibility to and suppression of death-related thoughts, terror management concerns can be viewed as extremely important aspects of a person's attitudes towards the environment. But the explicit relationship between existential concerns and environmental behaviour have yet to be explored. Past TMT research has shown that "existential threat can have positive effects on proenvironmental behavior if environmentalism serves either self-esteem or the validation of people's cultural worldviews" (Fritsche & Hafner, 2012:573; see also Fritsche, Jonas, Kayser, & Koranyi, 2010; Vess & Arndt, 2008). Thus, pro-environmental action (i.e. recycling) can serve as a terror management function, but the drives behind these motivations are complex and dynamic. Fritsche and Hafner (2012) identify two main motives for engaging in pro-environmental behaviour: biocentric motivation (i.e. protect nature for its intrinsic value) and anthropocentric motivation (i.e. environmental action that directly serves human needs). In two studies, German participants demonstrated a reduced biocentric motivation for environmental protection,

and a reduced concern for biospheric consequences of environmental change in the wake of a death prime. Thus, existential threat can change personal motivation for positive environmental action and general environmental concern (Fritsche & Hafner, 2012). While biocentric motivation had greater scores in the condition group (i.e. greater agreement with statements such as "*I wish for that kind of proenvironmental action that brings humans back to harmony with nature*"), following a death prime this motivation was decreased (ibid:575). However, MS had no effect on anthropocentric motivation (i.e. agreement with statements such as "*We do not know which resources or genomes humankind will need one day: This is exactly why we have to protect the environment*") (ibid:575). The results from this study confirm the experimenters' hypothesis that "people are inclined to discount consequences of the environmental crisis for nonhuman nature as a consequence of terror-management processes" (ibid:578).

Finally, in a set of experiments exploring the shared human threat of global climate change, Pyszczynski et al. (2012) demonstrated that by increasing the awareness of the shared threat of climate change (see Appendix B), death primes influenced a reduced support for war and encouraged support for peace and international cooperation. In Study 1, an MS prime encouraged support for peace-building among Americans that imagined the shared consequences of global climate change. A focus on global climate change also eliminated support for war usually encouraged by a death-prime (Study 2). Finally, in Study 3 which was conducted during the Israeli invasion of Gaza in January 2009, Muslim Palestinian participants primed with death who had high perceptions of common humanity (i.e. "*All people are linked to each other in a shared human bond*," and "*When one member of a community suffers, the whole community suffers*"), responded with greater support for peaceful coexistence with Israeli Jews when reminded of global climate change. These three studies demonstrate that "a shared global threat can eliminate the effect of death reminders —likely a frequent occurrence within the context of current geopolitical strife— on support for wars, and increase support for peaceful solutions to conflict" (Pyszczynski et al., 2012:363).

4.1.2   *[Non-Human] Animals*

TMT posits that the human body is a persistent reminder of vulnerability and physicality that people purposefully regulate through culture in order to "psychologically distance themselves from their animal nature and thereby deny mortality concerns"

(Cox, Goldenberg, Pyszczynski, & Weise, 2007:495). This sentiment is supported by Becker who claimed that through its existential struggles, "the human creature has to oppose itself to the rest of nature" (Becker, 1973:153) through the creation of culture and psychological individuation via self-esteem. One method for transcending the physical limits of humanity's biological reality is to deny or minimize its ties to the animal kingdom through a social norms. TMT asserts that "cultures promote norms that help people to distinguish themselves from animals, because this distinction serves the very important psychological function of providing protection from deeply rooted concerns about mortality" (Goldenberg et al., 2001:427). Several empirical studies have explored the relationship between attitudes towards animals and existential concerns.

Initial empirical support was derived in two experiments examining the role of existential concerns in the need to distinguish humans from animals. Goldenberg et al. (2001) proposed that reminding people of their mortality would increase the need to distance themselves from animals and thus defend against the anxiety associated with death awareness. Moreover, the study builds upon Rozin and colleagues' cross-cultural research on the emotion of disgust (Rozin et al., 1993,1999; Haidt et al., 1997) which defines disgust as an ideological response to an offensive experience, particularly in response to reminders of our animal nature, rather than a strictly sensorial response. The experimenters predicted an increased disgust reaction to the death prime since disgust can be "viewed as an emotional response that enables humans to elevate themselves above other animals and thereby defend against death" (Goldenberg et al., 2001:429). As predicted, a subliminal death prime increased disgust sensitivity to body products (i.e. vomit, feces) and to 'disgusting' animals (i.e. cockroaches, maggots). In a second experiment, death primes increased participants' preference for an essay discussing the dynamics of human uniqueness (i.e. "*we are not simple selfish creatures driven by hunger and lust, but complex individuals with a will of our own, capable of making choices, and creating our own destinies*") over an essay discussing human-animal similarity (i.e. "*what appears to be the result of complex thought and free will is really just the result of our biological programming and simple learning experiences*") (ibid:432). Furthermore, the results suggest this reaction is motivated explicitly by death thoughts and not thoughts of another unpleasant event (i.e. dental pain). This study provides additional direct evidence that existential concerns motivate humans to distance themselves from other animals.

To further investigate this correlation, a number of studies have been conducted to explore links between existential concerns and attitudes towards animals. TMT has recently developed some interesting propositions regarding how people respond to the knowledge of their animal nature, or *creatureliness*. Awareness of this knowledge "constitutes a reminder of our biological nature and physical vulnerability" (Beatson & Halloran, 2007:621), for which TM theorists propose should facilitate negative responses in the wake of a death prime. Simply put, since people are motivated to deny their physical vulnerabilities and similarity to animals, reminders of these thoughts should provoke negative reactions. In the first study to investigate this link, Beatson and Halloran (2007) found participants low in self-esteem evaluated animals more negatively in response to a death prime when reminded of their creatureliness. The significant three-way interaction observed is illustrated in Figure 2 below. Reminders of human-animal similarity thus increase negative attitudes towards animals as a response to death awareness.
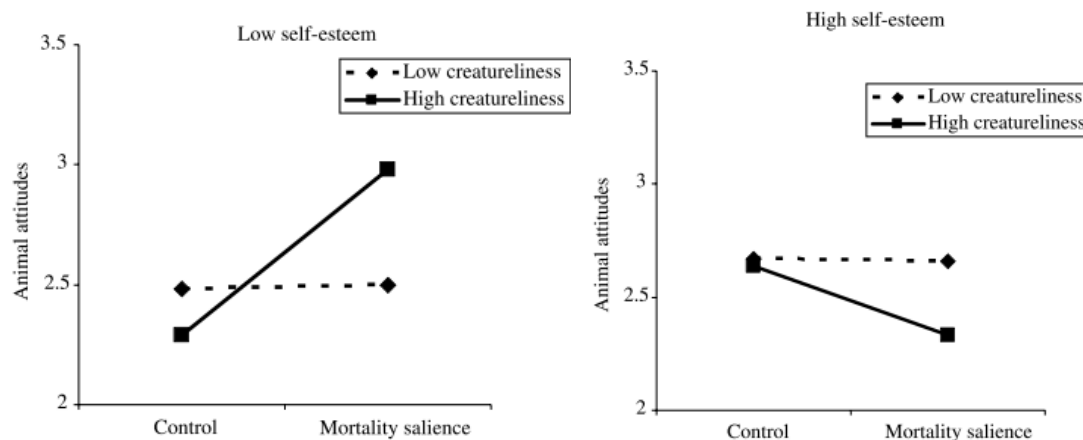
Figure 2. *Estimates of animal attitudes as a function of MS and creatureliness conditions for low and high self-esteem participants. Higher scores indicate more negative attitudes towards animals* (Beatson & Holloran, 2007:627).

In a follow-up study, pet owners recruited from a university participant registry were exposed to a subliminal death prime and then asked to read an essay on human-animal similarities (Beatson, Loughnan, & Halloran, 2009). As predicted, pet owners under the MS prime who read the creatureliness essay reacted with relatively negative attitudes towards the average pet, and additionally expressed less positive attitudes towards the special treatment of pets (see Appendix C). The findings from this study are particularly noteworthy since the participants were pet owners, and because the predicted effects were extended to "a highly valorized sub-group of animals" (Beatson et

al., 2009:84). This outcome is complemented by a study that found an MS prime to influence disagreement with the idea that dolphins are smarter than humans, an idea that also led to increased DTA (Soenke et al., *in press*).

The above studies demonstrate empirical support for the TMT assertion that existential concerns motivate people to deny their animal nature and express negative attitudes towards animals in a culturally sanctioned method of death denial. Through a series of five experiments, Lifshin et al. (2017) assessed whether existential concerns could increase support for killing animals, proposing this might serve an existential function by making "people feel superior to animals and therefore more than just mortal creatures" (Lifshin, Greenberg, Zestcott, & Sullivan, 2017:2). In Study 1, participants exposed to a subliminal death prime supported the killing of animals more so than the control condition. Support for killing animals was determined by a questionnaire consisting of 16 statements that participants had to agree or disagree with along a 9 point scale (1 = strongly disagree, 9 = strongly agree). Examples of the statements include: "*It is often necessary to control for animal overpopulation through different means, such as hunting, or euthanasia*" and "*An experiment should never cause the killing of animals*" (ibid:3).

Study 2 aimed to replicate the results of Study 1, but changed the control word ('fail' instead of 'pain') and included an additional questionnaire that measured support for policies regarding the killing of humans (i.e. abortion; police and unarmed suspects) to determine whether the death prime effect was due to terror management, or simply an increase in accessibility to the concept of killing. The authors proposed that the subliminal death primes should only increase support for types of killing that bolster peoples' bases of terror management and should not increase support for killing in general. Study 2 replicated the results of Study 1 further supporting the idea that killing animals functions to manage existential concerns. The death prime had no effect on support for policies related to killing humans. Study 3 was conducted to replicate Study 2, but the dependent measure was changed to a questionnaire that assessed support for killing animals or humans during an experiment. Subliminal death primes influenced an increase in support for the killing of animals but not humans, providing further support for the notion that the death prime effects observed are specifically related to terror-management processes.

To further investigate the role of terror management in support for animal killing, Study 4 experimentally enhanced participants' self-esteem which, in line with evidence demonstrated by past TMT studies, temporarily relieves existential anxiety and should thus eliminate the increase in support for killing animals. Consistent with past results, participants in the death prime condition supported killing animals more than the control condition only if they did not receive positive feedback to boost their self-esteem (see Figure 3 below).
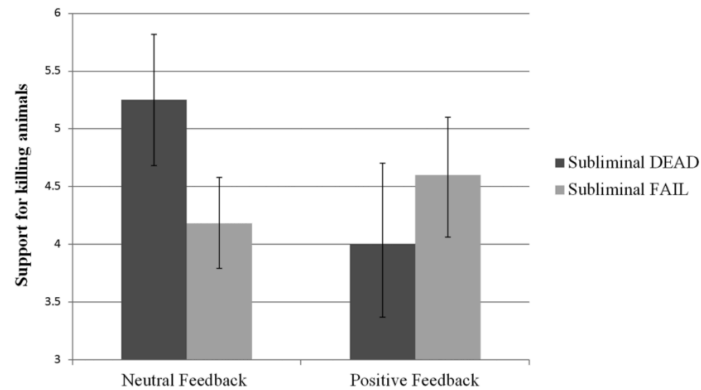
Figure 3. *Mean support for killing animals, according to the type of subliminal prime* ("DEAD" or "FAIL") *and the feedback condition* (positive/self-esteem boost vs. neutral/no boost) *in Study 4* (N = 80) (Lifshin et al., 2017:8).

In the final experiment, Study 5 measured support for a more specific killing scenario – the egg industry's annual slaughter of 200 million male chicks. Death primed participants expressed greater support for the killing of male chicks, and an indirect effect analysis (depicted in Figure 4) showed that death-primed participants' increased support for killing animals was associated with an increased sense of power and invulnerability.
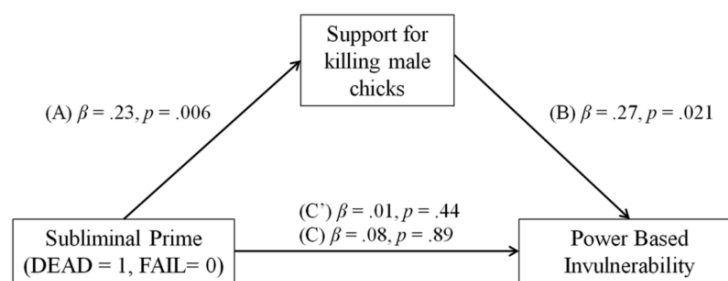
Figure 4. *Model depicting the indirect effect of the subliminal prime* (DEAD = 1, FAIL= 0), *on feelings of invulnerability and power* (PBI factor) *through support for killing* (N = 104) (Lifshin et al., 2017:11).

The results presented in Lifshin et al.'s five studies "provide the first direct empirical evidence that support for killing animals is in part caused by the psychological

need to manage the awareness of mortality" (Lifshin et al., 2017:12). Death primes influenced an increase in support for the killing of animals, an effect that was not moderated by gender, religiosity, political attitudes, ATAR, or by the justification of the killing. Findings were also specific to the killing of animals rather than fellow humans, and were reduced when self-esteem was bolstered as a way to temporarily meet terror management needs. "These findings, using multiple methods and measures, converge in supporting the view that the increased favorability toward killing animals after death primes served a psychological function, rather than being a mere product of cognitive activation" (ibid:12).

The above review of TMT studies provides generous support that distancing oneself from the animal kingdom, or maintaining superiority over animals, serves a psychological function rather than just a practical one. Attitudes towards animals are at least in part negatively impacted by people's knowledge of their evolutionary heritage and biological nature. The unconscious, psychological drives studied in TMT may in fact bias decision-making with regards to animal welfare, and should be taken into consideration by policy makers. But there is a much more concerning outcome that these empirical realities reveal. Leyens et al. (2000; 2001) claim that out-group members can be conceptualized as lacking a 'human essence', or what is referred to as *infrahumanization*, and research "has shown that people attribute less uniquely-human emotions to out-groups than in-groups" (Beatson & Halloran, 2007:629). Since exposure to subliminal death primes can influence greater derogation towards out-groups, including the evaluation of animals as discussed above, these two lines of research demonstrate a link between the views of out-group members and views of animals. Indeed, empirical links have been established between "violent attitudes toward animals and prejudice, aggression, and genocide via the process of dehumanization and infrahumanization" (Lifshin et al., 2017:12; See: Arluke et al., 1999; Costello & Hodson, 2010; Haslam & Loughnan, 2014).

By dehumanizing a human target, the killing of fellow human beings can become justified, even viewed as a necessity (i.e. criminal deviants, foreign enemies, and particular ethnic groups). Furthermore, Vaes, Heflick and Goldenberg (2010) found that Italian and American participants humanized their own (nationalistic) group more when primed with thoughts of death, illustrating the terror management function of humanizing the in-group. However, and most intriguing, a study that emphasized the similarities

between infrahumanizing violence and animal aggression (or creatureliness) observed that in the wake of a death prime, participants particularly high in right-wing authoritarianism expressed a reduced support for war. This empirical study shows that "by portraying violence as something instinctual and creaturely, it may be possible to reduce inter-group hostility and aggression among individuals who tend to be more dispositionally aggressive, particularly in the context of the death awareness that often exacerbates inter-group conflict" (Motyl et al., 2010:200).

4.1.3 *Sexual Ambivalence*

As discussed above, from a TMT perspective the human body presents a particularly frustrating problem because it "serves as a perpetual reminder of the inevitability of death" (Goldenberg, Pyszczynski, et al., 2000:200). Cultural standards concerning the body separate the human from the rest of the animal kingdom, elevating "our bodies from their flesh and bones reality to a higher plane as objects of beauty, dignity, and even spirituality" (ibid:201). TM theorists suggest that sex poses a unique set of problems for self-aware creatures that must defend themselves against existential terror because of its direct link to instinctual animalistic tendencies and thus finitude. In the words of Becker (1973), "sex is of the body, and the body is of death" (p.162). TMT research asserts that "the consequent regulation of sexuality stems, at least in part, from the anxiety associated with the fear of death" (Goldenberg et al., 2000:201). As Becker explains:

> If sex is a fulfillment of his role as an animal in the species, it reminds him that he is nothing himself but a link in the chain of being, exchangeable with any other and completely expendable in himself. Sex represents, then, species consciousness and, as such, the defeat of individuality, of personality… From the very beginning then, the sexual act represents a double negation: by physical death and of distinctive personal gifts. This point is crucial because it explains why sexual taboos have been at the heart of human society since the very beginning. They affirm the triumph of human personality over animal sameness (Becker, 1973:163).

A number of TMT studies have explored the role of existential concerns in approaching or avoiding bodily activities.

Goldenberg et al. (2002) primed American university students either with thoughts of creatureliness or human uniqueness. Participants then completed a measure that highlighted either the physical or romantic aspects of sex, followed by a death-thought accessibility measure. Participants that were reminded of their creatureliness

exhibited an increase in DTA when exposed to thoughts of physical but not romantic aspects of sex. In a second study, participants were again exposed to the creatureliness/uniqueness prime, an MS prime, and finally a measure of the appeal of physical or romantic aspects of sex. Under the creatureliness prime, MS reduced appeal of the physical aspects of sex, but under the uniqueness prime MS had no effect, reporting no greater appeal of physical sex than the condition group (i.e. failing an exam). Romantic aspects of sex, which imbues the act of sex in culturally sanctioned symbolic meaning, were not effected by the creatureliness or death primes (Goldenberg, Cox, Pyszczynski, Greenberg, & Solomon, 2002). The findings from this study support TMT's assertion that the awareness of one's physicality plays a pivotal role in the threat associated with the physical aspects of sex, a threat evidently rooted in existential concerns. Moreover, by elevating humans above the animal kingdom through a human uniqueness prime, neither thoughts of physical sex nor a death prime could produce the same effects as the creatureliness prime.

Goldenberg et al. (2006) conducted three experiments to further investigate the association of the physical body with death and subsequent ambivalent reactions to the body, with a particular focus on individuals high in neuroticism. Neurosis stems from difficulty controlling anxiety or arousal (Adler 1954; Horney 1964; Freud 1920/1989), and are at an increased risk of anxiety disorders, suicide, and substance abuse. Researchers and theorists assert that "neurotics are predisposed to these difficulties because they are emotionally hyperre-active and therefore unstable" (Goldenberg, 2006). These qualities suggest that terror management mechanisms may be more difficult for individuals high in neuroticism, and indeed research shows a negative correlation between neuroticism and perceptions of the world as meaningful (Gibson & Cook, 1996), self-esteem (Roberts & Kendler, 1999), and greater anxiety about death (Loo, 1984).

Goldenberg et al. (2006) propose that "neurotics should be particularly likely to have problems with their physical bodies because the symbolic modes of defense (meaning and value) that function to obscure the threatening link between the body and death are more tenuous for such persons" (ibid:1266). In a past study, Goldenberg et al. (2001) demonstrated that thoughts of physical sex increased DTA for individuals high in neuroticism unless sex was associated with love, although it was unclear whether the discomfort was derived from the physical nature of the body or cultural impositions. From

a TMT perspective, discomfort from the body is founded in existential concerns. Thus, mortality reminders should alter people's reactions to physical experiences for which there are no taboos.

In Study 1 of Goldenberg et al. (2006), following a subliminal death prime participants were asked to submerge their arm up to the elbow in 15 litres of cold water for at least 3 seconds. The experimenter measured the duration of submersion with a concealed stopwatch. The study demonstrated that individuals high in neuroticism were led to avoid the physical sensation of the cold water in the wake of a death prime, while individuals low in neuroticism were not significantly affected. In contrast to previous findings where cultural norms may have played a role, Study 1 showed that neurotic discomfort with the human body may be directly rooted in existential concerns. Study 2 attempted to replicate the findings of Study 1, but used the pleasurable physical sensation of a foot massager. After being told they could remove their feet any time after at least 15 seconds, individuals high in neuroticism spent less time using the foot massager than those low in neuroticism under the MS prime.

Study 3 was designed to assess the influence of tactile and other sensations that are less likely to bring attention to the physical body. Half the participants in this experiment were asked to listen to music, while the other half were asked to use a foot massager. Following a death prime, individuals high in neuroticism spent a significantly more amount of time listening to music than time spent on the foot massager (Figure 5).
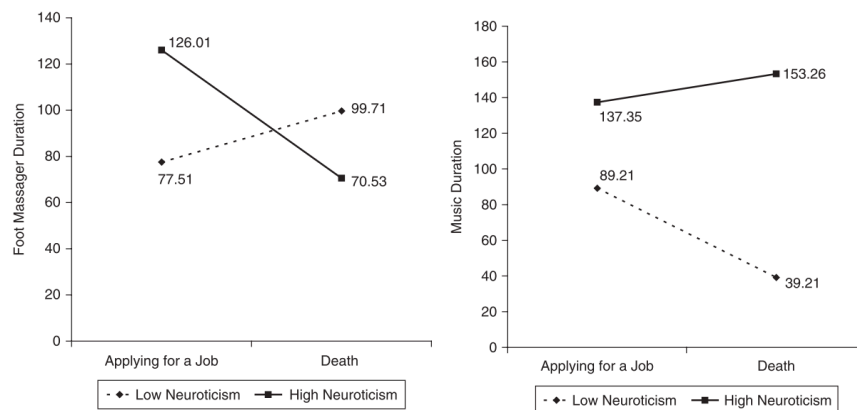
Figure 5. *Foot massager (LEFT) and music duration (RIGHT) as a function of mortality salience and neuroticism* (Goldenberg et al., 2006:1272).

This final study provides converging evidence that an avoidance to tactile sensations is a direct response to death reminders for individuals high in neuroticism, and additionally found no effect of social desirability indicating that the results were not related to social norms.

Birnbaum, Hirschberger and Goldenberg (2011) examined the relationship between existential concerns and sexual motivations. Based on a Person X Situation perspective, the authors offer a theoretical framework for predicting how sexual motivations are influenced by existential concerns by considering gender, attachment orientation and contextual variables. Although the above research indicates that mortality reminders decrease the appeal of the physical aspects of sex, death reminders have also been found to increase the sense of commitment to a significant other as discussed in section 2.2.3 of this paper (Florian, Mikulincer, & Hirschberger, 2002; Mikulincer et al., 2003). Therefore, reminders of one's mortality could increase the desire for sex in the context of a romantic relationship, or if self-esteem can be derived from the act of sex for example through sexual conquests. Indeed, a mortality salience prime was previously found to increase the appeal of physical aspects of sex for individuals high in body esteem and to also intensify identification with their physical body (Goldenberg, Mccoy, et al., 2000).

Birnbaum et al. (2011) assert that the effects of a death prime on sexual motivations is not uniform, and may in fact depend on context, gender, and meaning. Four studies examined the effects of MS on sexual motivation, priming participants with subliminal death thoughts who then completed a measure to assess their willingness to engage in sex in different contexts. Study 1 examined the effects of MS on the desire to have a one-night stand for Israeli participants, hypothesizing that MS would facilitate an increased desire for sex with a stranger, but only among men. This hypothesis was based on TMT research suggesting MS increases self-esteem strivings, and that "men typically receive positive reinforcement for engaging in casual sex during their socialization history, whereas women receive positive reinforcement for restricting their sexual expression to affectionate relationships (DeLamater, 1987; Sprecher, McKinney, & Orbuch, 1987), sexual conquests should bolster men's self-esteem, but not women's" (Birnbaum, Hirschberger, & Goldenberg, 2011:4). As expected, Study 1 indicated that a death prime increased men's but not women's motivation to have a one-night stand.

In Study 2, American participants expressed an increased desire for sex in the context of a short-term romantic fling in the wake of a death prime, regardless of gender. By placing sex within a romantic context, the act is imbued with symbolic meaning and becomes more appealing and uniformly desirable when death is salient. Study 3 asked Israeli participants to imagine either a romantic sexual interaction or recreational-instrumental sex with their current or former partner and rate the desirability of each scenario. As predicted, a subliminal death prime increased the desirability of romantic sex within the context of an ongoing relationship. Study 4 included the completion of a scale measuring the motives for engaging in sexual activities among Israeli participants. Subliminal death primes decreased the desire for sex among less anxious people, while increasing the desire for casual sex among more avoidant men. Birnbaum et al.'s (2011) four experiments provide support for the important role of meaning attached to sexual motivations within the context of a death prime, and also emphasize the complex role of sex in terror-management processes. This emphasis is elaborated by Goldenberg et al. (2001) who suggest that "human sexuality, in particular, is transformed from animal to symbolic by embedding it in a system of meaning (e.g., love and marriage) and value or self-esteem" (ibid:428).

The empirical studies reviewed above provide support for the TMT assertion that existential concerns play a significant role in sexuality and maintaining the human body. TM theorists remark that "underlying existential concerns with mortality may fuel an approach of the bodily activities because of its association with positive life-affirming properties, or an avoidance of bodily activities because of its undesirable association with human vulnerability and death" (Goldenberg, Kosloff, & Greenberg, 2006:127).

4.1.4 *Gender*

If feminist psychology is correct, the very concept of scientific "objectivity" as a disciplined withdrawal of sympathy by the knower from the known, is a male separation anxiety writ large. Written, in fact, upon the entire universe.

– Theodore Roszak

Contemplations of gender dynamics have been addressed and discussed from evolutionary (Symons, 1979), feminist (Tavris & Wade, 1984) and sociocultural perspectives (Bar-Tal & Saxe, 1976; Pomeroy, 1975). From an existential psychodynamic perspective, the female body poses a particularly troubling challenge for a self-aware creature inherently oriented toward denying their animal nature. TMT posits

two additional reasons for the seemingly diametrically opposed conceptualizations of the female gender; i.e. an inferior sex seen as less than human and yet seemingly simultaneously, a revered goddess. Firstly, due to the female's role in reproduction (pregnancy, lactation) and the natural cycles of menstruation, women's bodies emphasize a particular corporeal state of being that is at the mercy of biology, nature, and thus precisely what TMT proposes humans are driven to deny. Secondly, men's sexual arousal itself is proposed to fuel hostility towards women because of its instinctual and uncontrollable characteristics - again reminders of animality and thus finitude. However, as TMT asserts, symbolic meaning systems can be imposed upon existential threats in order to obscure their ability to remind humans of death. Thus, when women are "stripped of their natural qualities - adorned, sanitized, deodorized, and denuded", the female sex becomes an object "of beauty and even worship" (Goldenberg & Roberts, 2004:71).

From this perspective, women are "targets of hostile and seemingly benevolent reactions, both of which are likely rooted in *men's power* to protect themselves from the threat of women" (Goldenberg & Roberts, 2004:82; see also Chrisler, 2011; Glick & Fiske, 2001; Landau et al., 2006). TM theorists assert there is a "reason to believe that the psychological threat posed by the physicality of the body may be especially relevant in response to women's bodies" (Goldenberg, Goplen, Cox, & Arndt, 2007:213). The following two subsections, Beast and Beauty, review research that discuss the terror-management processes associated with reactions to the female body, and routes to transcend these bodily restrictions, respectively.

4.1.4.1 Beast

In a set of studies investigating whether the concept of breast-feeding could encourage thoughts of humanity's animal nature (Cox, Goldenberg, Arndt, & Pyszczynski, 2007), participants primed with MS were led to more negative reactions to a woman breast-feeding in public and awarded her harsher punishment compared to participants primed with public speaking. In Study 2, MS participants expressed greater negative reactions to a woman who had purportedly been breast-feeding in the other room before joining in on the experiment compared to a woman who had bottle-fed. Moreover, the participants were asked to set up chairs for themselves and the purported female task partner, and results indicate that individuals under the death prime put the

chairs further apart for the breast-feeding woman compared to a dental pain condition. Study 3 determined that death primed participants exhibited higher accessibility to creaturely-related cognitions observed via a word fragment task (i.e. *creature v. creative; mucus v. focus; animal v. formal*) when informed about the breast-feeding woman in the adjacent room. Finally, participants in Study 4 that were primed with creatureliness expressed amplified negativity towards a magazine cover featuring a breast-feeding woman. Cox et al.'s (2007) four experiments "provide support for the idea that ambivalent reactions to breast-feeding occur, at least in part, because of existential concerns associated with the potential for breast-feeding to make salient human creatureliness" (ibid:119). Furthermore, this set of studies were the first to empirically demonstrate a direct role between existential concerns and reactions to female body functions.

Goldenberg et al. (2007) investigated the effect of creatureliness on pregnancy. In the first study, participants primed with the human-animal similarity essay perceived a photo of a pregnant Demi Moore less favourably compared to participants under a human uniqueness prime. In the second study, a magazine cover featuring Gwyneth Paltrow was rated more negatively if she was pregnant in the wake of a creatureliness prime. Moreover, Paltrow was deemed less competent and less intelligent after reading the creaturely essay regardless of pregnancy (see Figure 6). In both studies, a causal influence was observed between concerns related to creatureliness and reactions to pregnant women.
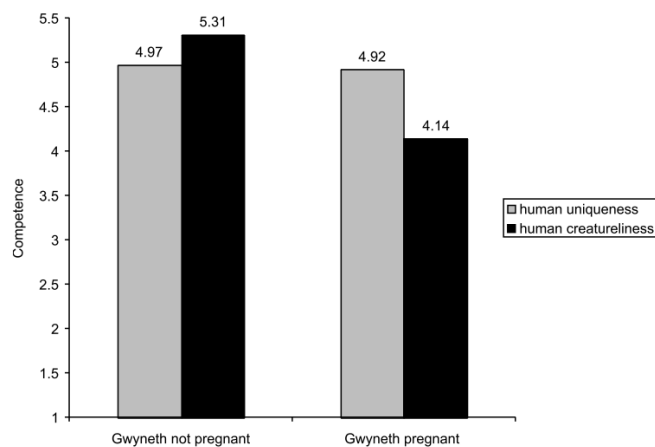
Figure 6. *Perceived competence of Gwyneth Paltrow as a function of pregnancy and creatureliness* (Goldenberg et al. 2007:224).

In a set of three experiments by Goldenberg, Arndt, Hart and Routledge (2008), an investigation was conducted to explore the role of existential concerns in women's intentions to perform breast self-examinations (BSE). The overarching hypothesis was that concerns about the body's physicality would interact with existential concerns to create resistance to BSE's independent of health concerns relating to cancer. In Study 1, death primed participants that read the human-animal similarity essay reported reduced intentions to conduct BSEs compared to the human uniqueness condition. These effects were found to be independent of self-reported concerns about breast cancer. Study 2 exposed participants to either a creatureliness, human uniqueness, or neutral prime and then asked the participants to conduct a thorough breast exam on a replica of a woman's torso by following an instructional flyer. An initial pilot study was conducted demonstrating an increase in DTA after asking women to conduct a breast exam on the model, which indicates that the act of BSEs alone can facilitate thoughts of death. Women exposed to the creatureliness prime in Study 2 spent a considerably shorter amount of time examining the breast compared to the other two conditions. The findings from Study 2 show firstly that breast-exam behaviour can be negatively impacted by thoughts of human-animal similarity, and secondly that concerns about creatureliness can impact body-oriented behaviour in addition to self-reported attitudes or intentions.

In Study 3, an older sample population was recruited and asked to perform a BSE on themselves in a private exam room. Additionally, half the participants were given a placebo in the form of 'energy water' which the experimenters expected would provide individuals "with an alternative attribution for the source of the arousal" and thus "reduce or eliminate psychological and behavioral reactions" (Goldenberg, Arndt, Hart, & Routledge, 2008:266). BSE behaviour for women under the creatureliness prime remained unaffected if given an excuse for feelings of distress with the energy water, while women without the placebo conducted much shorter BSEs under the creatureliness prime. This final study extends the generalizability of the observed effects because of the wider age range of the participants which contrasts much of TMT research on attitudinal outcomes of college students. The three studies by Goldenberg et al. (2008) provide converging evidence that existential concerns can undermine breast screening behaviour, and also extend the applicability of TMT to a health-relevant domain which is a critical gap in this line of research.

Roberts et al. (2002) conducted an experiment investigating the role of menstruation on societal attitudes towards women. During the experiment, participants interacted with a female confederate who inadvertently dropped either a hair barrette or tampon out of her handbag. In the tampon condition, participants viewed the woman as less competent, less likeable, and displayed a marginal tendency to avoid sitting near her; effects that were equally apparent among both male and female participants. Most interestingly, the negative reaction stimulated by the tampon condition was generalized beyond the confederate to woman in general. One measure included in the questionnaire packet was a scale used to "determine how strongly participants adhere to objectifying standards in evaluating females in general" (Roberts, Goldenberg, Power, & Pyszczynski, 2002:135). The scale featured 10 body attributes – 5 related to attractiveness and 5 related to competence – from which participants ranked from least to most important pertaining to the evaluation of women's bodies. In the tampon condition, male and female participants rated women's physical appearance as particularly important. Thus "when reminded of a women's more creaturely nature by the tampon, both men and women endorsed a less "physical", more appearance-oriented standard for women's bodies" (Goldenberg & Roberts, 2004:78).

4.1.4.2 <u>Beauty</u>

The above studies highlight the important role of mortality concerns in the conceptualization of women's bodies and bodily functions. Since the female body is more directly associated with physicality and corporeality, a greater discriminatory, stigmatized burden is placed on women. However, as aforementioned, features and conceptions of the female body can also be revered through culturally sanctioned symbols of beauty and desire. *Self-objectification* is a term coined by Fredrickson and Roberts (1997) to encompass the phenomenon of internalizing an objectifying observer's perspective where third-party observable bodily attributes (i.e. looks) become more valued than first-person non-observable body attributes (i.e. capabilities). Sexual objectification "occurs whenever people's bodies, body parts, or sexual functions are separated out from their identity, reduced to the status of mere instruments, or regarded as if they were capable of representing them…individuals are treated as bodies and, in particular, as bodies that exist for the use and pleasure of others" (Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998:269).

Much feminist analysis and empirical testing show that women are targets and victims of sexual objectification more so than men (de Beauvoir, 1952; Tavris & Wade, 1984; Lackoff, 1987; Wolf, 1991; Tavris, 1992; Tauna 1993; Kitzinger & Wilkinson, 1996; Gilmore, 2001).

> A woman must continually watch herself. She is almost continually accompanied by her own image of herself. Whilst she is walking across a room or whilst she is weeping at the death of her father, she can scarcely avoid envisioning herself walking or weeping . . . Her own sense of being in herself is supplanted by a sense of being appreciated as herself by another (Berger, 1972:46).

For example, both print media and artwork tend to emphasize the head and face of a male body, while placing a greater emphasis on the bodies of females, often with no head or face whatsoever. Five studies were analysed for relative facial prominence, or "the degree to which the face dominates the images of men and women" (Archer, Iritani, Kimes, & Barrios, 1983:726). In Studies 1-3, a greater facial prominence was found in depictions of men, spanning American periodicals, publications in 11 cultures, and six centuries worth of art work. Study 4 replicated these findings among a group of university undergraduates asked to draw a man or woman for an experiment ostensibly about drawing styles. In Study 5, participants were provided photographs of people taken in varying degrees of 'face-ism' which subsequently affected their ratings of intelligence, ambition, and physical appearance. The photograph subject's gender affected ratings of physical appearance and warmth. The experimenters concluded that "perceived intellectual (and other) qualities may be significantly and favorably affected by something as simple as the relative prominence of the person's face" (ibid:732). These studies indicate that women are portrayed more often than men as though "their bodies were capable of representing them" (Fredrickson et al., 1998:270).

Moreover, Goldenberg & Roberts (2004:78) observe that "there are obvious and tangible rewards offered to women who conform to cultural standards for appropriate and desirable women's bodies. Women who are deemed attractive receive a host of positive interpersonal and even economic outcomes, relative to those considered more homely". Women who have experienced ageism in the work place, for example, have reported a greater use of cosmetic changes such as hair dye, surgeries, and make-up in response to a negative experience of economic threat (Clarke & Griffin, 2008). Objectifying the female body is thus a widespread, culturally sanctioned phenomenon that is engaged in by both men and women alike. In the context of managing existential

concerns, TM theorists assert that "sexual objectification of women serves to strip women of their connection to nature" (Goldenberg & Roberts, 2004:76). In this regard, the objectification of women is argued to be a deliberate method for managing existential anxiety.

In a study that explored the consequences of self-objectification, Fredrickson et al. (1998) experimentally induced self-objectification by having participants try on a swimsuit or a sweater. Study 1 consisted strictly of female participants and demonstrated that self-objectification increased body shame which in turn predicted restrained eating. In Study 2 both men and women participated, and the effects of body shame and restrained eating were found to only be replicated by the female participants. Furthermore, the female participants in the swimsuit condition performed significantly worse on a math test compared to the sweater condition, while men's performance was unaffected (see Figure 7).
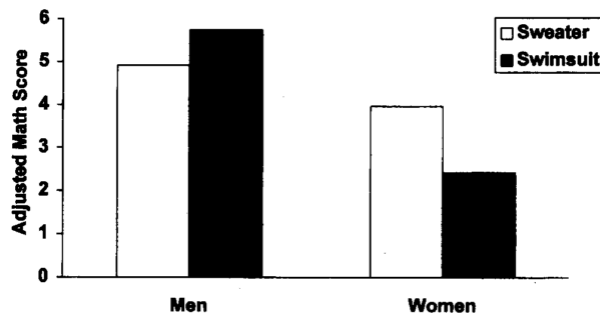
Figure 7. *Math performance by experimental condition and sex in Experiment 2.* (Means represent math scores corrected for guessing and adjusted for past performance on standardized math tests). (Fredrickson et al., 1998:279).

This result illustrates the pivotal finding that self-objectification occupies mental resources (Fredrickson et al., 1998). However, the theory of self-objectification was more generalized in a follow-up study by Hebl et al. (2004) which involved men and women wearing either a one-piece speedo or a sweater and found self-objectification (i.e. the speedo condition) to negatively impact self-esteem, body shame, and math performance for both genders and a variety of ethnicities. Contrary to the experimenters' predictions, no significant interactions were found for eating behaviour, though this may have been due to a generic brand of candy chosen for the experiment (Hebl, King, & Lin, 2004). This study's findings expand upon self-objectification theory by demonstrating the psychological and behavioural impacts of self objectification among males, females, and a diverse range of ethnicities. In this study, female participants still tended to have lower

levels of self-esteem and body image than male participants. Furthermore, all participants performed worse on the math test demonstrating the harmful outcomes of self-objectification.

In an experiment investigating whether female body objectification serves as a terror management defence, Grabe et al. (2005) primed both men and women with subliminal death thoughts and then asked the participants to complete an objectification questionnaire for their own body and for women's bodies. Interestingly, while both male and female participants self-objectified in response to an MS prime if their body was a source of self-esteem, females only objectified other women after the death prime. However, males tended to objectify women at consistent levels regardless of the prime. Within the dental pain control condition, male participants objectified women almost twice as much as female participants suggesting that men may tend to do so on a consistent basis. The results from this study indicate that in the context of terror management, when either men or women feel psychologically threatened the tendency to objectify women increases (Grabe, Routledge, Cook, Andersen, & Arndt, 2005). Furthermore, male participants asked to focus on a woman's appearance, both positives and negatives, were led to perceive the target women as less competent and, through an objectifying lens, less fully human (Heflick & Goldenberg, 2009).

Goldenberg et al. (2005) conducted a set of three studies investigating existential concerns and restricted eating. In the first study, male and female participants were primed with death and asked to sample a fatty but nutritious snack. As expected, women in the MS prime ate significantly less than men, while men did not greatly later their eating in response to the prime. No difference in consumption was observed in the dental pain condition, and results of this study occurred regardless of body esteem or size. Study 2 replicated the previous study's procedures but restricted participants to only females and conducted the study in a group setting to observe the influences of social comparison. The thought of breaking a bone was used as an alternative condition. In a group context, only women heavier than their peers restricted the amount of snack food they sampled in response to an MS prime. This interaction between body mass index (BMI: height/weight ratio) and MS is suggested to result from "social comparison processes instigated by the group context" (Goldenberg, Arndt, Hart, & Brown, 2005:1406).

To directly test the assumptions made in Study 2, Study 3 replicated the previous study's procedures (i.e. maintaining a female-only group setting) but also asked the participants to assess perceptions of their own body figure and perceptions of societal standards on the female body. The experimenters hypothesized that since MS increases conformity to cultural standards, then "MS should cause high BMI participants to perceive their bodies as more discrepant from what they perceive to be an ideal body size, and this perceived failure should mediate the effects of MS on how much food the high compared to low BMI participants consume" (ibid:1406). Results from Study 3 indicate that in a public context, MS influenced restricted eating only among women high in BMI, while women low in BMI and women in the control condition were not affected (see Figure 8).
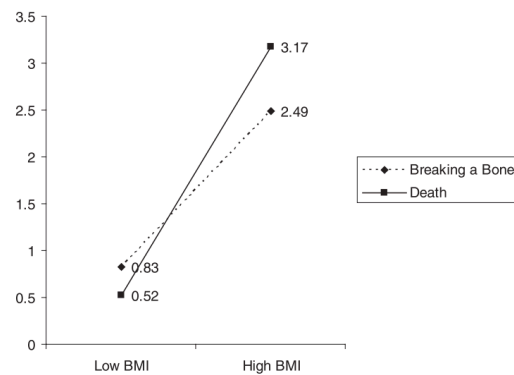
Figure 8. *Perceived failure to meet internalized societal ideal for thinness as a function of mortality salience and body mass index* (BMI) (Goldenberg et al., 2005:1407, Study 3)

Furthermore, a mediation analysis revealed "perceptions of failure to attain one's ideal thinness mediated the effects of MS and BMI on how much food women consumed" (ibid:1408) (see Figure 9).
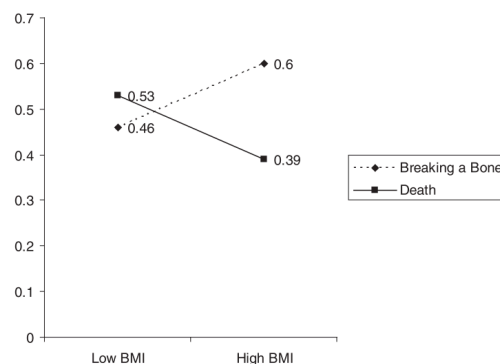
Figure 9. *Grams of snack food consumed in Study 3 as a function of mortality salience and body mass index* (BMI) (Goldenberg et al., 2005: 1407).

The results from Studies 1-3 support the notion that mortality concerns can influence women's motivations to attain a thinner body in attempt to meet culturally imposed body standards. Moreover, the observations made in Goldenberg et al.'s (2005) experiments significantly advance TMT research by providing direct evidence for some of the mechanisms that might be responsible for terror-management processes. In Study 3, MS effects on food consumption were directly mediated by internalized social standards of the female body. While women low in BMI were presumably able to find security looking around the room, women high in BMI were influenced to intensify their need to conform due to the MS prime and actively pursued this need via restricted eating.

In a set of studies testing the influence of female sexuality on male sexual ambivalence, five experiments conducted by Landau et al. (2006) explored the hypothesis that the threat of sexual allure is derived in part from "the power of attraction to undermine the man's sustained avoidance of mortality concerns" transforming "the individual from something unique and special to an impulsive, animalistic, material, and finite piece of biological protoplasm" (Landau et al., 2006:132). In Study 1, a subliminal death prime decreased men's but not women's objective ratings of women's physical and sexual attractiveness. This result supports the claim that men's sexual ambivalence stems in part from the existential threat of sexual attraction since no effect was observed for death-primed women. Study 2 had male participants individually enter a lab setting and interact with an attractive female confederate. As predicted, the male participants exposed to a death prime expressed lower self-perceived sexual intent compared to the dental pain condition. These two studies show that existential concerns can impact both sexual attraction and intent.

In Study 3, following an MS prime men were asked to express their attraction to and interest in a woman that was presented in either a 'wholesome' (conservatively dressed) or 'seductive' (seductively dressed) manner. Those under the death prime condition expressed a decreased attraction to the same woman only when she was dressed seductively, but MS had no effect on ratings for the wholesome woman condition. In fact, in the dental pain condition a nonsignificant trend for greater attraction to the seductive woman was observed and participants reported less interest in the wholesome woman. Including relationship status as a covariate did not affect the results, and the decreased attraction to seductive women influenced by MS complements past research demonstrating that sex is less threatening when perceived as culturally meaningful. The

data presented by this study demonstrate that existential concerns associated with sexuality are extremely influential in "men's dichotomized attitudes towards women" (Landau et al., 2006:137).

Study 4 expands upon strictly men's judgments by including women and having both genders express their interest in a sexually provocative person of the opposite sex. The experimenters note that they are "not claiming that women don't experience strong sexual attraction or that women are unthreatened by confrontations with their own corporeality" (ibid: 137). Rather, the experimenters suspect that women's sexual attraction to men is less likely to be focused on the physicality of sex and thus not as strong of an existential threat. If this assumption is correct, women should not deny their attraction to the provocative target following an MS prime. This hypothesis was confirmed, as a death prime decreased only men's attraction to and interest in a sexually seductive opposite-sex target. In the final study by Landau et al. (2006), experimenters found that heterosexual men primed with death and thoughts of carnal lust recommended a more lenient sentencing for a perpetrator of male-female violence relative to male-male violence. This disturbing finding offers "the first evidence that death-related thought combined with the experience of provoked sexual interest contribute to aggressive tendencies against women" (Landau et al., 2006:141).

4.1.5 *Mind over Matter*

In addition to symbolic immortality strivings, TMT asserts that some cultural worldviews – particularly though not strictly found in religious teachings – offer means to attain literal immortality by providing the hope that "one's soul or some other remnant of the self will survive beyond the point of physical death" (Pyszczynski et al., 1999:844). Though much philosophical and religious thought emphasize the ""mind" and the "soul" as the defining characteristics that elevate humans above the status of animals" (Roberts et al., 2002:132; see Plato trans. 1952; Descartes trans. 1973), TMT provides the empirical framework for demonstrating the importance and purpose of this emphasis. Indeed, the fundamental human paradox posited by Kierkegaard (1957/1844) of a finite creature capable of pondering the infinite "set the stage for the development of modern existential philosophy" (Goldenberg, Pyszczynski, et al., 2000:203). Furthermore, consciousness itself is what Rank (1932/1950) claims "mediated man's knowledge, if not his recognition of sexual processes and death" (ibid:191). If humans are haunted by the

inevitable fact of death, then "believing ourselves to be spiritual beings with the potential of becoming part of an eternal dimension free of natural laws is perhaps the most straightforward way of escaping our mortal and corporeal nature" (Vail et al., 2010:86).

After reminding people of death, participants who believe in an afterlife were found to become more confident of its existence compared to participants anticipating painful shocks and participants in a neutral condition (Osarchuk & Tatz, 1973). In a set of studies examining death awareness and belief in supernatural agents (Norenzayan & Hansen, 2006), MS was found to increase religiosity and belief in a higher power (Study 1&2) and also increased supernatural agent beliefs among predominantly Christian participants, even when presented in a culturally foreign context (Study 3: divine Buddha, Study 4: Shamanic spirits). In three experiments investigating the role of literal immortality on self-esteem, death-primed individuals exposed to an essay arguing against the existence of an afterlife (Appendix D) responded with increased self-esteem striving and worldview defence – an effect eliminated if death-primed participants read an essay supporting the existence of an afterlife (Dechesne et al., 2003).

In a terror management analysis of the psychological functions of religion, Vail et al. (2010) assert that literal immortality strivings have "greater defensive utility" than symbolic immortality. Although secular belief systems (i.e. nationality, political affiliation) are useful for managing existential concerns, "concepts such as eternal life and spiritual realms serve their death-denying function and enhance social solidarity, in part, *because* they are removed from the realm of rational argument and empirical evidence" (ibid: 88). Heflick and Goldenberg (2012) conducted experimental research to directly assess this claim, and was also the first to examine MS effects on atheists.

Religious, agnostic, atheistic, and 'spiritual but not religious' (American) participants were asked to read an article (replicated from Dechesne et al., 2003, see Appendix D) ostensibly written by a Harvard Medical School professor which either argued that near-death experiences prove the existence of an afterlife (i.e. due to a consistency in reported experiences) or that near-death experiences are not proof but rather consequences of oxygen deprivation. Following a death prime, participants were asked to engage in worldview defence by reading an essay that criticized the U.S. and reporting the extent to which they agreed with the anti-U.S. author's views.

All participants, regardless of beliefs, intensified worldview defence in response to the MS prime unless the idea of an afterlife was affirmed. The essay arguing for the

existence of an afterlife eliminated the need in participants to defend their worldview (i.e. derogate the anti-U.S. author) in response to a death prime. This finding was particularly surprising since a portion of the participants self-identified as atheists. The results from this study demonstrate that "atheists' mortality concerns were assuaged by literal immortality, but not by their atheistic worldview" (Heflick & Goldenberg, 2012:389) This study is the first to provide direct evidence that literal immortality provides a stronger existential anxiety buffer than symbolic immortality, and moreover one of few studies testing terror management defences against one another. The experimenters conclude that "when it comes to a choice between one's beliefs and the possibility of life after death, this research supports the old adage that (at least implicitly) there are no atheists in foxholes" (ibid: 391).

4.2   Economic Behaviour

An economic structure is an "important and defining element of any culture" that is central to the shaping of its sociocultural dynamics (Richter & Kruglanski, 2004:116). Terror management theorists claim that, in the context of a globalized industrial society predicated on Western values, today's primary immortality ideology rests on the conspicuous consumption of money and material goods. This echoes Becker's declaration that ""civilized" society is a hopeful belief and protest that science, money and goods *make man count* for more than any other animal" (Becker, 1973:5). The following subsections will review TMT research in relation to economic behaviour and its critical influence in managing existential concerns with a particular emphasis on money, materialism, brands, charitable giving, and the concept of progress.

4.2.1   *Money*

In a set of studies investigating the capacity of money to manage existential concerns, four experiments with Polish participants found that subliminal death primes amplified the value attributed to money, increased the appeal of and desire for money, and participants also experienced a reduced self-reported fear of death simply by counting money in their hands (Zaleskiewicz, Gasiorowska, Kesebir, & Luszczynska, 2013) (see Figure 10 for an example).
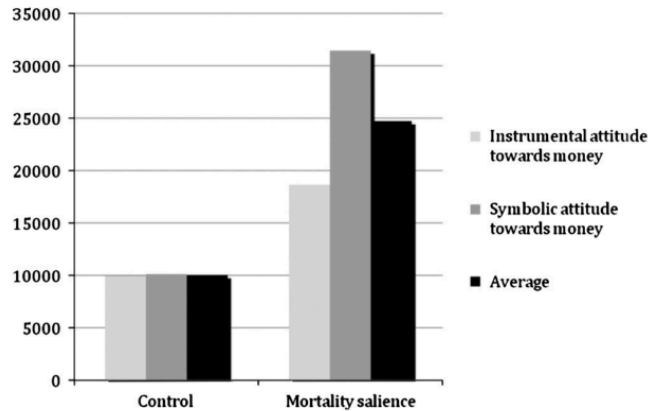
Figure 10. *Death-primed participants express higher money standards to be considered rich for a fictitious four-person family compared to a control condition* (Zaleskiewicz et al., 2013:62).

Money therefore serves an explicit existential function, a finding that contributes to investigations of money's capacity to buffer feelings of social exclusion and even physical pain primarily by simulating a sense of power (Zhou, Vohs, & Baumeister, 2009). Moreover, participants with predominantly emotional or symbolic attitudes towards money were more strongly impacted by the MS manipulation than those with instrumental or pragmatic attitudes. This implies that the "effects were more due to the symbolic aspects of money, such as the meaning and self-esteem that people connect with it, rather than the pragmatic utility of money for buying better health care and therefore literally delaying physical death" (Zaleskiewicz et al., 2013:65). The symbolic immortality facilitated by money that the experiments above observed was described by Becker as the power "to increase oneself, to change one's natural situation from one of smallness, helplessness, finitude, to one of bigness, control, durability, importance… Most of all, it can be accumulated and passed on, and so radiates its powers even after one's death" (Becker, 1975:81).

Jonas et al. (2005) conducted an investigation during the summer of 2001 on the German public's reaction to the introduction of the Euro in place of the German Mark (replaced January 2002). From a Terror Management perspective, cultural icons such as currencies can be viewed as "concrete manifestations of the more abstract meanings and values of the cultural worldview" (Jonas et al., 2005:133). Two studies found that in the wake of a death prime, participants had significantly less favourable attitudes towards the Euro. Interestingly, only among older participants (age range 19-40) did the death prime also trigger an increased positive attitude towards the German Mark, which may be due to the shorter history younger participants had with this currency (Jonas et

al., 2005). The study also included other aspects of German culture to determine if the effects extended beyond economic features of German identity including German cooking, travel, and automobiles. After confirming these suspicions, the authors suggest that the preference for the German currency over the Euro is a particular example of a more general intensified desire for aspects of one's own culture. Furthermore, with such a complex and traumatic history, the citizens of Germany are generally uncomfortable with patriotism and nationalistic attitudes yet resolutely preferred the German currency, accordingly extending the cross-cultural generalizability of terror management research.

4.2.2 *Materialism and Commercial Branding*

In the context of modernity, a "consumption ethos" relentlessly promotes an association between the purchase of material possessions and the attainment of happiness, security, and belonging, and the measurement of self-worth in relation to the size of a bank account (Watson, 2003:724; Fransen, Fennis, Pruyn, & Das, 2008; Millar & Thomas, 2009). Much of TMT research is dedicated to examining the role of existential concerns in materialism, particularly since the Western economic paradigm imposes consumption-based ideologies that emphasize financial status-oriented self-esteem.

Kasser and Sheldon (2000) found that an MS prime influenced participants to express higher financial expectations of themselves 15 years in the future, including their own and spouse's salary, personal investments, and on travel, clothing and entertainment expenditures. Moreover, after playing a forest-management game, essentially a one-time resource dilemma, MS-primed participants made significantly higher bids for harvesting timber and the feeling of greed was particularly enhanced (Kasser & Sheldon, 2000). The experimenters concluded that "death-based feelings of insecurity contributed to materialistic desires and behaviors" (ibid:350). These observed responses additionally occurred regardless of participants' pre-existing value orientations.

Christopher et al. (2006) constructed a questionnaire to examine the relationship between beliefs about death, personal insecurity, and materialistic values among a highly Christian population in Michigan. A correlational analysis revealed that individuals with negative death beliefs (i.e. death will be painful and lonely) were more personally insecure and materialistic. Furthermore, personal insecurity was positively correlated

with materialism, and found to be a mediator between negative death beliefs and materialism (Christopher, Drummond, Jones, Marek, & Therriault, 2006) (see Figure 11).
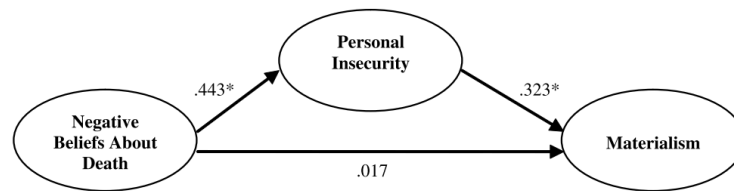
Note: * p < .01

Figure 11. *Personal insecurity as a mediator of the relationship between negative death beliefs and materialism* (Christopher et al., 2006:448).

The experimenters suggest that these findings indicate "materialistic people are more concerned with avoiding undesirable end states than with achieving desirable end states" (ibid:449). This claim was elaborated in a follow-up study by Christopher et al. (2009) involving 440 adult Americans that found when statistically controlling for external locus of control (i.e. luck or powerful others vs. skill or hard work) the relationship between materialism and negative affect was reduced significantly. These results indicate that materialism as a form of symbolic immortality provides an illusory sense of control, particularly with those high in death anxiety (Christopher, Saliba, & Deadmarsh, 2009).

Advertising for goods and services is another aspect of materialism where terror management concerns may apply. In the first experiment to investigate the role of marketing stimuli in mortality perceptions, Fransen et al. (2008) found that mere exposure (both explicit and implicit) to an insurance brand increased spending intentions, which was fully mediated by the accessibility of death-related thoughts. An insurance brand was specifically chosen due to its likely associations with illness, disaster, and even possibly mortality, and was compared to the brand of a personal care product. The insurance brand influenced greater purchase intentions for luxury items (i.e. excessive entertainment and restaurant spending for the upcoming month) and increased the amount participants were willing to donate to a charity. This finding led the experimenters to suggest that "consumers may use spending, specifically on culturally valued items, as a coping mechanism to reduce experienced terror triggered by the subtle presence of brands in the environment" (ibid:1057-8). Furthermore, the insurance brand prime led participants to rate domestic (Dutch) food products more positively and foreign food products more negatively (see Figure 12).
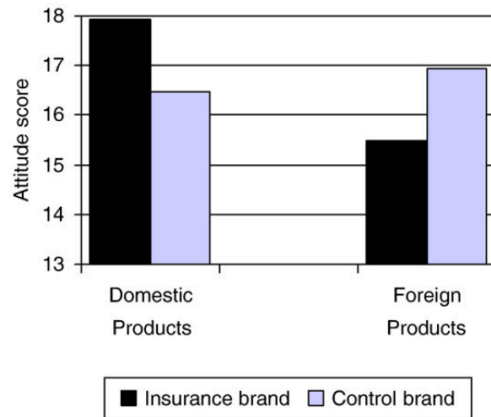
Figure 12. *Attitude scores on domestic and foreign food products as a function of brand exposure* (Fransen et al. 2008:1059).

This study was the first to demonstrate that exposure to marketing stimuli is sufficient to induce mortality salience which encouraged in-group favouritism and out-group derogation and also empirically verified that lavish consumption reduced existential anxiety (Fransen et al., 2008). Sullivan et al. (2011) complement this study with an Austrian sample population, illustrating that when participants first affirmed their worldview by reading a fabricated diary entry about a holiday in the Austrian mountains (vs. a trip abroad), they were more willing to buy foreign products, and at a higher price, in the wake of a death prime. Thus, contrasting Fransen et al.'s study (2008), in the context of worldview security, mortality salience can increase people's openness to foreign goods (Sullivan, Jonas, & Jodlbauer, 2011).

A combined survey (see Appendix E) and experimental investigation involving nearly 450 participants additionally found that brand connections can function as an existential anxiety buffer for highly materialistic individuals, serving as a symbolic replacement for security, predictability, order, and even social connection (Rindfleisch, Burroughs, & Wong, 2009). Materialistic individuals are more likely to be personally, socially, and developmentally insecure with characteristics including lower self-esteem, higher self-doubt, and greater social anxiety (Christopher, Saliba, & Deadmarsh, 2009; Rindfleisch et al., 2009). As a result of these deep insecurities, Rindfleisch et al. (2009) proposes that highly materialistic individuals seek attachment and connections with brands "as an important means of assuaging the fear of death" (ibid:2). TMT's initial consumption-oriented research posited that the acquisition and display of material goods themselves in a consumerist society represented "a culturally sanctioned symbolic testimony to one's value, with the consequent assurance of safety and security in this life

and figurative immortality thereafter" (Arndt et al., 2004:203). The findings of Rindfleisch et al. (2009) challenge this assertion, particularly since survey and experiment participants owned a range of both mass-marketed and luxury brands which "may lack active brand communities, [but] our results suggest that they have the capacity to provide consumers with a sense of communal identification" (ibid:11). Materialism is therefore not necessarily a strictly status-seeking endeavour among a consumer population, rather "existential insecurity may motivate materialistic individuals to bolster brand connections in order to solidify their sense of meaning and purpose" (ibid:11; see Micken & Roberts, 1999; Mandel & Smeeters, 2008; Sangkhawasi & Johri, 2007).

Das et al. (2014) fortify this claim by conducting three experiments to explore the impact of advertisements with death reminders on purchase intentions, thus "providing consumers with their worst fear and a potential way to decrease this fear in one single shot" (Das, Duiven, Arendsen, & Vermeulen, 2014:836). Advertisements with a death prime triggered a fear of death, which increased purchase intentions for familiar and unfamiliar brands, healthy and unhealthy products, and for products that did not offer any contribution to participants' self-esteem (see Figure 13).

Figure 13. *Mortality salience condition Experiment 3: advertisement for healthy product with tombstone* (Das et al., 2014:842).

Death reminders directly mediated the advertising stimuli's influence on purchase intentions, providing further evidence that death thoughts mediate self-esteem strivings. These findings also suggest that the act of buying a product, regardless of the product's characteristics or contributions to the person, can alleviate the existential fear assumed in TMT research. The experimenters remark that since MS had similar consequences for both familiar and unfamiliar brands, "it may be the act of buying *per se*, rather than the soothing quality of cherished brands, that increased purchase intentions in the present

case" (ibid:834).

Death anxiety and consumption-oriented desires and behaviour were also investigated by Mandel and Smeeters (2008) who found that MS-primed individuals expressed greater purchase intentions of food and drinks and increased actual food consumption compared to participants primed with thoughts of a visit to the dentist. Furthermore, the MS effects observed were directly mediated by a desire to avoid self-awareness, whereby participants chose a seat in the lab that faced a wall rather than a full-length mirror (Figure 14).
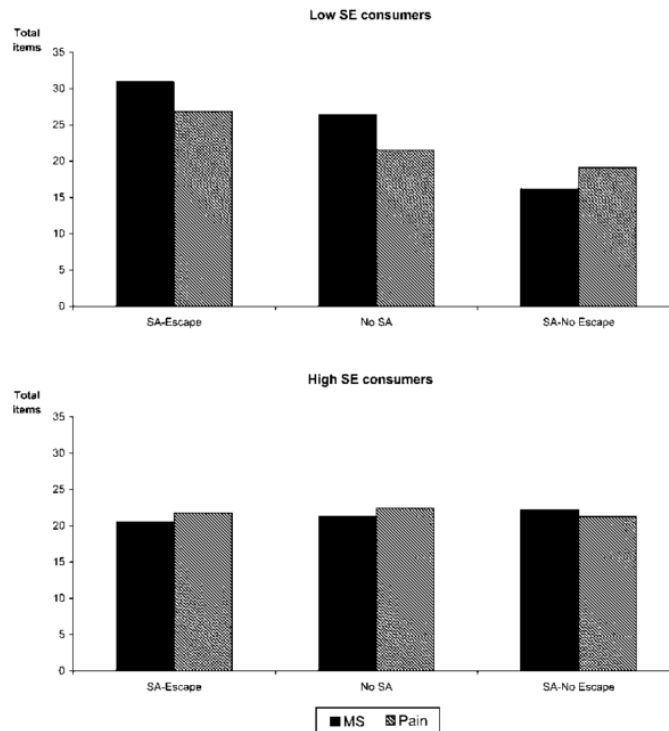
Figure 14. *Experiment 4 Results: The effects of MS and Self-Awareness on total items selected for low- and high-self-esteem consumers* (Mandel & Smeeters, 2008:319).

This finding complements past TMT research that found death-primed individuals to actively avoid stimuli that increased self-awareness (i.e. mirrors and writing stories about internal thoughts) (Arndt, Greenberg, Simon, Pyszczynski, Solomon, 1998). Mandel and Smeeters (2008) claim that escaping self-awareness is an additional mechanism to buffer existential anxiety via disinhibited consumption, which can include substance abuse, binge eating, and television watching. The experimenters remark that if individuals feel unable to meet societal standards, they may engage in disinhibited consumption as a method used "to narrow their attention to the immediate sensations resulting from eating and drinking, thereby avoiding existential thoughts" (ibid:311; see

also Heatherton and Baumeister 1991). This empirical finding directly supports Becker's remarks on consumerism, stating "Modern man is drinking and drugging himself out of awareness, or he spends his time shopping, which is the same thing. As awareness calls for types of heroic dedication that his culture no longer provides for him, society contrives to help him forget" (Becker, 1973:284).

4.2.3   *Charitable Behaviour*

Although seemingly contradictory to section 4.2.2 above, TMT research has demonstrated that selfless acts including charitable behaviour can buffer existential anxiety, but is highly contingent on the social norms at play. Since death anxiety can be assuaged by the belief that one is living up to the societal standards and values prescribed by one's cultural worldview, "To the extent that prosocial behaviors are valued by one's culture and contribute to self-esteem, acting in ways that are helpful, giving, and benevolent should serve a terror management function" (Jonas, Schimel, Greenberg, & Pyszczynski, 2002:1344).

In two studies examining the effects of MS on prosocial behaviour, Jonas et al. (2002) demonstrated that subliminal death primes increased the favourability of participants' attitudes towards charitable organizations they personally deemed beneficial and important, and furthermore increased the monetary amount participants chose to contribute to a charity. Participants (all U.S. citizens) were given the option to donate to an American or foreign cause, and in response to the MS prime results suggest a strong bias towards charitable causes that benefit one's culture (American cause), a finding consistent with past TMT research that have demonstrated favourable responses towards both people and ideas consistent with their worldview following a death prime (Greenberg et al., 1990; Rosenblatt et al., 1989). In a complementary study, Ferraro et al. (2005, Study 3) investigated the role of virtuous behaviours such as charitable donations and socially conscious consumerism, and the role of virtue as a moderator for MS effects. Among individuals high in virtue as a source of self-esteem, subliminal death primes increased participants' decision to donate to charity, the amount given, and their intentions to engage in socially conscious consumerism. The interaction observed is demonstrated in Figure 15 below.
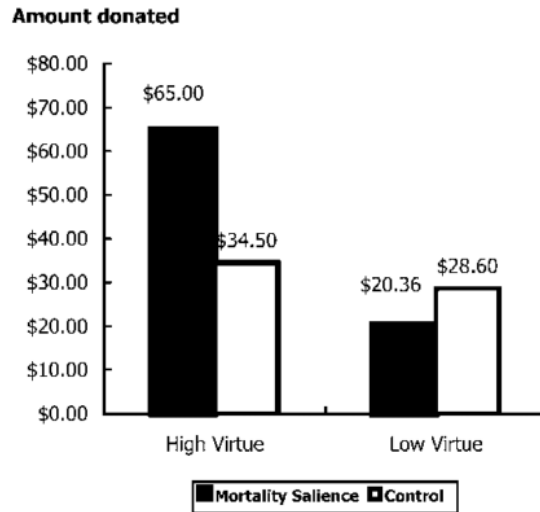
Figure 15. *Amount participants reported they would donate to charity across various conditions* (Ferraro, Shiv, & Bettman, 2005:73)

As demonstrated in the figure above, the pattern of giving was reversed for participants low on virtue as a source of self-esteem, and results indicated no main effects or interactions with gender or mood. These findings support the TMT notion that "identification with an aspect of self and positive evaluation of one's standing on that dimension are both necessary for one to derive self-esteem and thus for protection against mortality concerns" (Goldenberg, Mccoy, et al., 2000:123).

Finally, a set of studies with Israeli participants investigated whether death primes would have a differential effect on pro-social behaviour if the charitable cause itself elicited reminders of physicality and thus disrupt rather than promote terror-management processes (Hirschberger, Ein-Dor, & Almakias, 2008). In Study 1, death-primed participants demonstrated a greater willingness to contribute to a non-profit offering aid to the poor, but significantly decreased willingness to contribute to a non-profit promoting organ donations. This result is specifically due to the finding that the organ donation organization's description elicited higher DTA than the aid organization. Study 2 provided behavioural evidence of Study 1's findings, reporting a larger percentage of actual donations to the aid organization, and a smaller percentage of signed organ donation cards in the wake of a death prime (see Figure 16).
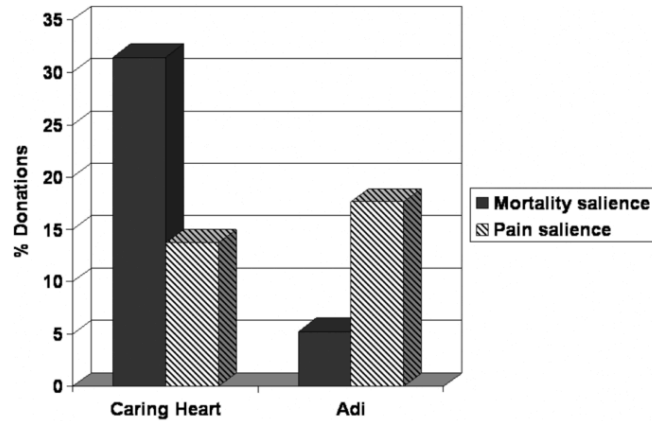
Figure 16. *The effects of mortality salience and organization type* (Caring Heart = aid; Adi = organ donations) *on the percentage of participants making a donation* (Hirschberger et al., 2008:672).

Furthermore, Study 2 was conducted as an experimental field experiment where participants were unaware they were being studied, thus increasing the ecological validity of the study (i.e. where the "research design closely simulates natural conditions under which prosocial behavior occurs" (ibid:672)). Study 3 replicated Study 2's design, but used responses to trivial requests for help to diversify the prosocial behaviours under investigation. In the TMT promotion condition, a female confederate approached participants asking them to participate in a survey. In the TMT disruption condition, the same female confederate approached the participants in a wheel chair. This condition was chosen due to previous TMT research that has demonstrated an increase in DTA to people with physical disabilities compared to nondisabled individuals (Hirschberger, 2006; Hirschberger et al., 2005). Furthermore, Study 3 expanded Study 1 and 2 by using an individual rather than an organization which could arguably induce greater compassion. As predicted, an MS prime led an increased percentage of participants to help the female confederate when she was walking, but led to a decreased percentage of people helping her when she was seated in a wheelchair compared to a muscle/back pain condition (see Figure 17).
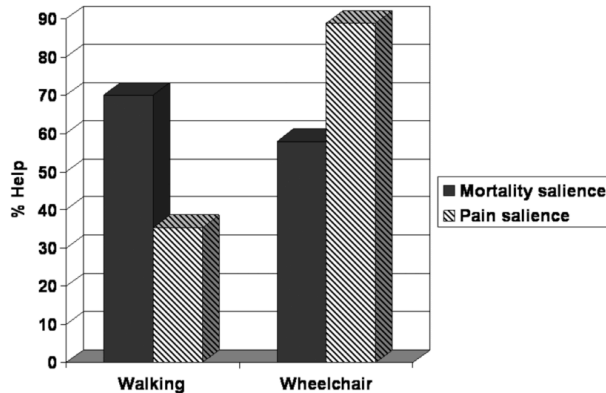
Figure 17. *The effects of mortality salience and confederate disability on the percentage of participants responding to a request for help* (Hirschberger et al., 2008:673).

The results of this study expand TMT by modifying the proximal/ distal defence system: "in the case of posthumous organ donations and help to a person with a physical disability, the target of help itself rekindles death awareness, rather than buffering against it, and the typical terror-management process is thwarted…the reduced willingness [to help]…are cognitive and behavioral manifestations of proximal defense mechanisms designed to distance one-self from reminders of personal vulnerability to death" (Hirschberger et al., 2008:675). Thus, pro-social behaviour can be encouraged under a death prime, unless the behaviour itself compromises terror management defences which causes a decreased willingness to engage in pro-social behaviour.

4.2.4 *The Qualms and Virtues of Progressive Hope*

In his great poem 'Aubade' Philip Larkin wrote of religious faith as 'that vast moth-eaten musical brocade'--a system of falsehoods contrived to shield humans from their fear of death. His description may once have had some validity, but it is better applied nowadays to the secular faith in progress.
– Gray, 2004

Progressive hope, defined as "faith in the ongoing and cumulative progress we go through as human beings" (Rutjens, van der Pligt, & van Harreveld, 2009:536), has been identified as an additional, secular version of meaning that can buffer existential anxiety. In Study 1, MS-primed Dutch individuals were found to disagree significantly more with an essay entitled "Progress is a Myth" (see Appendix F) than a control group. In Study 2, participants that were asked to read this same essay exhibited greater DTA supplementing the results in Study 1 that suggest belief in progress serves as an existential anxiety buffer. In Study 3, bolstering faith in progress via exposure to a short essay (see Appendix F) buffered the effects of mortality salience on DTA and worldview

defence reactions (see Figure 18).
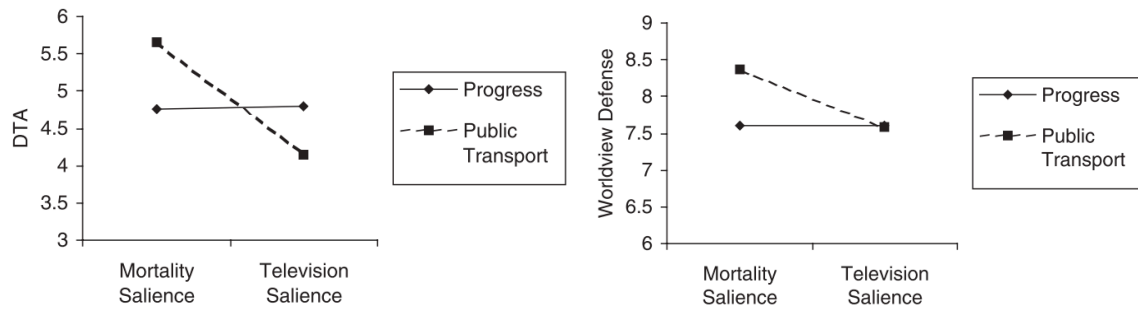
Figure 18. *Effects of bolstering a belief in progress and mortality salience on worldview defence and DTA* (Rutjens et al., 2009:539-40).

The experimenters contemplate the role of progress as a secular meaning system where one holds

> faith in the notion that history is not cyclic but progressive. A progressive unfolding of events assures us that even the extremely negative events (e.g., wars, slavery) mankind has witnessed now belong to the past and, because we have improved ourselves, will never reoccur in the future. Progress assures us that what is gained will never be lost (Gray, 2004) and what is not gained yet will be obtained in the future. Moreover, ongoing progress would ultimately lead to a utopian society. This might well be the highest goal attainable for those with a more secular faith (Rutjens et al., 2009:540).

What's more, the defensive reactions normally observed in response to worldview violators are generally related to nationalistic, ethnic, or religious cultural divisions. A belief in progressive hope, however, stands in direct contrast to these norm and group-based ideologies by requiring an openness to change and thus outright rejects the conservative defence of stable and consistent worldviews. Moreover, progressive hope has no social groups that explicitly challenge this belief, leaving no foundation available for out-group derogation or social conflict. Instead, progressive hope requires consideration of societal matters including humanistic, ethical, and political aspects of human civilization on a global scale (Rutjens et al., 2009).

Complementary TMT research has shown that mortality salience enhanced Spanish participants' perceived collective continuity, a measure that combines perceived cultural continuity (i.e. "Spanish people have passed on their traditions across different generations") and perceived historical continuity (i.e. "Major phases in Spanish history are linked to one another") (Sani, Herrera, & Bowe, 2009:243). This finding supports core TMT principles by demonstrating that existential concerns lead to group investment "*because* group membership affords a sense of permanence and transcendence" (ibid:244). Collective continuity over time is thus an important aspect of worldview

dynamics for buffering death thoughts.

The crucial association between progressive hope and psychological equanimity offer intriguing implications for TMT research. The idea of progress itself dates back only 350 years according to Sydney Pollard (1971). Progress as a concept emerged out of the scientific revolution of the 16th and 17th centuries and was soon associated with all aspects of society including "progress in wealth, in civilization, in social organization, in art and literature, even in human nature and biological make-up" (Meier, 2005:31). By the 20th and into the 21st century, a unidirectional conceptualization of human society became a widely accepted notion. Progress today, however, "identified with economic growth as measured by GDP, is seen to be moving towards a dematerialized economy" (Gare, 2013:329). The implications of the anxiety-buffering dynamics of progress within the context of an economy predicated on growth will be examined in the next section.

4.3   The Abolition of Death via Capitalism

Sections 4.1 and 4.2 demonstrate that essential pillars of the capitalist economy – i.e. the domination and exploitation of nature and non-human animals; money, materialism, brands, charity, and progress – are also essential anxiety buffers for terror-management processes in the context of the dominant Western paradigm. Capitalism as an economic system is structurally reliant on economic growth (Jackson, 2009), and thus necessitates evermore material throughput. For capitalism to prosper, the reality of biospheric limits must therefore be denied, just as the physicality of the body and the inevitability of death is denied via secular, symbolic immortality strivings. The supposition can thus be put forward that capitalism as an economic mechanism is fundamentally predicated upon the abolition of death, and presents a manifestation of the modern human's desperate attempt to attain immortality.

This assertion is precisely what Jean Baudrillard proposed in his deliberations on capitalist alienation (Baudrillard, 1993). The suppression of symbolic (differential) exchange was an integral step for monopolistic capitalism to rise and implement economic regimes based on equivalence. For Baudrillard, "capitalism rests on an obsession with the abolition of death. Capitalism tries to abolish death through accumulation… It subtly shifts the social world from an exchange of death with the Other to an eternal return of the Same" (Robinson, 2012). By viewing death as biological and material in the West, the sociality of death is ignored, and through this mechanistic view

"the social repression of death grounds the repressive socialisation of life" (Robinson, 2012). Capitalist alienation stems, for Baudrillard, directly from the deliberate social exclusion of death.

Baudrillard's claims are complemented by Gare (2013) who asserts that the mission of modernity is to immortalize the human through an ever-more dematerialized economy and society by way of 'disembodiment'.

> The quest for disembodiment that characterizes modernism and postmodernism, it is argued, echoes in a more extreme form the delusions on which medieval civilization was based where the military aristocracy and the clergy, defining themselves through the ideal forms of Neo-Platonic Christianity, despised nature, the peasantry and in the case of the clergy, women. This argument is used to expose and reveal the oppressive and ecologically destructive drive underlying the aspirations of the dominant classes in the modern/ postmodern world to disembodiment, whether this be seen as the quest to be unbounded by time and place, to be free of dependence on labour and natural resources, to be free of the humdrum of everyday life by entering 'virtual' worlds, or, as with post-humanists, to overcome the limits of the body by fusing with technology. These modern and postmodern forms of the quest for disembodiment, it is suggested, now threaten civilization, the future of humanity and most terrestrial life (Gare, 2013:327).

Disembodiment has allowed money to "escape into infinite speculation" (Baudrillard, 1993:7); legitimized the superiority of the ruling class, brought forth a mechanistic, reductionist scientific institution, and has reduced the common good to "nothing more than growth of GDP" and liberty as "nothing more than freedom to shop" (Gare, 2013:343-4). The narrative of disembodiment, of modernism, "has been characterized by the quest to not only overcome and leave behind the constraints of living processes, but to ascend to a realm of reified abstractions from the perspective of which these constraints are invisible" (Gare, 2013:328).

Immortality is a central theme in the rise of monopolistic capitalism, for which the empirical research of TMT is extremely illuminating. The observations and conclusions drawn from TMT's research on human-nature relations (section 4.1) are also particularly elucidating for a cultural ontology predicated on "the idea that the Earth is an object to be used" (Brown, 2017). Ecofeminism initially linked the domination of nature with that of the woman (Thompson, 2005), a critical dialogue that has continued to challenge the hegemony of mechanistic science and economics (Merchant, 1980; Plumwood, 1993; Sturgeon, 1997; Mellor, 1997; Salleh, 1997; Cuomo, 1998; Warren, 2000).

> Violence against women and violence against the Earth, legitimated and promoted by both patriarchal religion and science, are interconnected assaults rooted in the eroticization of domination. The gynocidal culture's image of woman as object and victim

is paralleled by contemporary representations that continually show the Earth as a toy, machine, or violated object, as well as by the religious and scientific ideology that legitimates the possession, contamination, and destruction of Mother Earth (Caputi, 1993:53).

For Carolyn Merchant, the feminization of nature was integral to the rise of an exploitative economy: "nature cast in the female gender, when stripped of activity and rendered passive, could be dominated by science, technology, and capitalist production" (Merchant, 2006:514). The "noxious" consequences for both women and nature are elaborated upon by Roach (1997) who finds "particularly fruitful and provocative how feminist analysis joins psychoanalysis to explore the significance of nature as female and as mother" (p.110). Freud's (1961) notion of castration anxiety, which addressed the fears and taboos around the female body, was challenged by Becker and reconceptualised to realize the "inherent threat associated with the mother's body. For the mother's body represents sheer physicality and dependence" (Goldenberg & Roberts, 2004:81). This fear can be extrapolated to humankind's physicality and dependence on "nature herself", which Becker claimed is the true castrator (Becker, 1973:216). The mother/nature dynamic is contemplated further by Roach:

> the ways that our passions and phantasies construct the category "nature" draw on passions and phantasies that play around the human mother. The traditional modernist concept of nature-as resource, as other, as a collection of parts to be mastered and controlled, its value extracted for human benefit in relations often described in aggressive and gendered terms replicates aspects of the paranoid-schizoid relation to the mother (Roach, 1997:111-2).

TMT provides intriguing insights into the dynamics of existential concerns and human-nature relations, particularly in the context of an economic system predicated on the exploitation and domination of nature for ever-more capital accumulation: "Capital is pitched against nature in such a way that opposition between them becomes absolute. So, accordingly, does that between death and life" (Brennan, 2000:2). For Brennan, "modernity is producing a more complete and final form of death. Its victorious economy, capitalism, is turning biodegradable life into a form in which it can generate nothing" (ibid:2). These propositions are reverberated by Becker: "modern man's defiance of accident, evil, and death takes the form of sky-rocketing production of consumer and military goods… a rage against our impotence, a defiance of our animal condition, our pathetic creature limitations. If we don't have the omnipotence of gods, we can at least destroy like gods" (Becker, 1973:85). Indeed, the collective impacts of human activity have pushed the planet into a functionally and stratigraphically distinct geological era "in

which human actions have become the main driver of global environmental change" (Rockstrom et al., 2009; Waters et al., 2016).

In a paper that discusses the link between ontological security and consumption, ecological economist Tim Jackson argues that "modern society has internalised a number of specific functions of world maintenance within the dynamics and organisation of consumerism" (Jackson, 2013:61). Research investigating the institutions and ideologies of corporate capitalism show that "to the extent nations pursue de-regulated, free-market forms of capitalism, their citizens are more likely to endorse values that concern wealth, social standing and competition between individuals" (Hurst & Dittmar, 2016:257-8; see also: Kasser et al., 2007; Schwartz, 2007). It becomes clear that so long as the globalized market infrastructure is predicated on materialistic tendencies, so too will the methods for coping with personal insecurities. The opposite is true as well. So long as cultural worldviews are oriented towards collectivism, altruism, and reciprocity, so too are the culture's population and thus the death-defying immortality striving schemes (Harton & Bourgeois, 2004; Belmi & Pfeffer, 2016; Deci, & Ryan, 2000; Karabati & Cemalcilar, 2010).

4.4   Section 4.0 Summary of Contemporary Applications

Section 4.0 provided a review of TMT's empirical findings regarding human-nature relations and economic behaviour. In particular, the dynamics of existential concerns inherent in conceptions and attitudes towards nature, animals, the body, and the self were examined, as well as the mortality-denying capabilities of money, materialism, brands, charitable behaviour, and the notion of progress. Supplementary scholarship was discussed which suggest that capitalism as an economic mechanism is predicated upon the abolition of death. Ecofeminist insights were also provided, illuminating the role of dominating both nature and woman in the mechanization of Planet Earth.

5.0   Final Discussion

This paper provided an extensive literature review of Terror Management Theory's empirical research findings[5]. In Section 2.0, the origins and central thesis of TMT were described, and the methodological framework and present research outcomes were reviewed. In Section 3.0, current analytical literature was presented that problematizes many of TMT's fundamental claims and assumptions. This includes the ability of TMT to align with evolutionary biology, and the feasibility and efficacy of a terror-management system. The findings in Coalitional Psychology were proposed as an alternative to TMT, and responses to these criticisms and alternate explanations was offered by TMT experimenters. Finally, Section 4.0 discussed the virtues of human-nature relations and economic behaviour as explicit terror management mechanisms, including the creation of a globalized economic instrument predicated on the defiance of ecological limits and the exploitation of nature. This final section will advise of any limitations prevalent in this paper, describe potential opportunities for furthering TMT research identified throughout this paper's investigation, and finally offer concluding remarks.

5.1   Limitations

Although a small proportion of the studies reviewed in this paper featured collectivistic cultures such as Iran and Japan, the majority of the empirical results reviewed feature industrialized cultures that limit the applicability of this literature review. This limitation is quite prevalent in TMT research, and in psychology research more generally, and should be addressed accordingly. Another empirical weakness in TMT (and psychology) research is the high reliance on college undergraduates for population samples. Replicating TMT's findings among older populations and across a variety of geographical settings would improve the generalizability of the theory's claims. However, the majority of TMT research is reliant on Westernized cultural antidotes that may not apply to populations outside of the industrialized domain. Thus, it is prudent that TMT finds cultural norms to test relative to their sample population's culture to truly extend the theory's assertions. Nonetheless, the results from TMT research provide the opportunity to discern theoretically meaningful relationships that expand the understanding the

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[5] See **Appendix H** for a detailed table listing all TMT studies reviewed in this paper.

unconscious dynamics behind human behaviour. The diversity represented on both the gender and race spectrums is also highly limited and should provoke TMT to expand beyond this restricted view of gender, sexual orientation, and ethnicity. Finally, the graphical representation of TMT's quantitative findings (i.e. see figures used in this literature review) are often extremely distorted in the visual form. The omission of a zero-base in the graphs creates an extreme exaggeration of the differences observed and a misrepresentation of the results. Graphs reporting on quantitative data should be zero-based to avoid this problem (see Tufte, 1983).

5.2   Opportunities for Further Research

The literature reviewed in this paper present a number of intriguing avenues to further TMT's investigations. While research has been conducted to demonstrate the anxiety-buffering abilities of the notion of progress, the term's meaning was restricted in a sense to faith in the continuation of humanity. In the context of late modernity however, economist Peter Victor claims that economic growth is now "virtually synonymous with progress, [where] increases in GDP [have become] our main measure of progress" (Victor, 2008:9). No study has attempted to examine whether continuous growth compared to stagnation of national GDP of a person's nation could facilitate the anxiety-buffering effect observed with the notion of progress. Economic growth as a functional anxiety-buffer would present an intriguing predicament for an ecological economy defined by limits to growth (see Vargish, 1980).

While this literature review focused primarily on the impacts and outcomes of objectifying the female body, commodification in the era of capitalism is founded in the objectification of life in many forms (people of colour, women, animals, nature). For Raymond Rogers, the de-animating culture of modernity "is a world in which living things die to make a dead thing grow" (Rogers, 1994:12). Bastian and Loughnan (2016) point to the ways in which the objectification and dehumanization of target groups can be leveraged to facilitate and justify harm due to their perceived less-than-human qualities. These attitudes and behaviours can be embedded within individual minds, formed into habitual behaviour, and institutionalize prejudiced views in entire cultures and societies (Bastian and Loughnan, 2016). TMT provides a complementary lens for understanding

in-group and out-group dynamics and for addressing and overcoming prejudiced values and behaviours.

Jonas, Fritsche and Greenberg (2005) demonstrated that localized currencies (i.e. the German Mark) provide a unique anxiety-buffer for a specific population. Jonas and Fritsche (2013) also suggest that greater involvement in the socio-political sphere (i.e. democracy, civic engagement) could assuage existential uncertainties (see also Levine, 2011). Local currencies, governments, economies, food movements and other endeavours are critical to the sustainability movement, and their terror management potential should thus be more widely researched and understood. The notion of luxury in this context is another interesting aspect of TMT research, inviting the curious question of whether a sharing economy could deplete the anxiety-buffering effects of luxury goods normally attained via novelty and status.

The capacity of localized endeavours to assuage existential concerns and promote ontological security could also be explored within the line of resiliency (Zolli & Healy, 2012), and more broadly through a complex systems approach (Homer-Dixon et al., 2013). This is particularly prudent since community-building in the context of anthropogenic climate change is potentially "the most difficult collective action problem" humanity has ever faced (Breen, 2017). This is also an intriguing proposition since Pyszczynski et al. (2012) found global climate change to be a positive motivator for peace-building efforts during an MS prime. Other elements of systems thinking can additionally be investigated through a TMT lens, including cybernetics (Weiner, 1948) as well as systems of hierarchy and embedded social and psychological networks (Homer-Dixon et al., 2013).

The materialistic lifestyle associated with consumerist societies is both highly addictive (Lea & Webley, 2006) and socially and psychologically corrosive (Christopher et al., 2006; Rindfleisch et al., 2009). Yet the conspicuous consumption of money and material goods remains a primary immortality ideology in the context of a globalized industrial society. As the demands of material throughput generate greater and more damaging burdens on the natural environment and thus the societies reliant on those environments, a potential positive feedback loop may occur between increased anxiety from environmental damage and greater material demand (via conspicuous consumption), bringing about evermore increased environmental damage. This potential

feedback phenomenon would require a much more elaborate timescale, population sample, and detailed measuring mechanism but is nonetheless intriguing.

In line with the above observations, future TMT research could also investigate the role of consumer messaging in managing existential concerns. While existential concerns are primarily managed through materialistic desires and behaviours within the context of Western society, TMT research should examine the role of alternative messaging strategies that encourage altruism, community, and belonging to alleviate anxiety. The study by Rogers (2011) demonstrated that contemplating mortality in a meaningful and worldview-consistent manner eliminated the need in participants to intensify worldview defence. The short-lived anxiety-buffer of disinhibited consumption (see Section 4.2.2) should be replaced by life-affirming messaging schemes that highlight the importance of caring for ourselves and surrounding communities. The marketing and activity that occurs on social media websites would also be an interesting avenue to pursue within the realm of TMT, particularly in the context of social profiles as potential methods for achieving symbolic or even literal immortality, as well as the role of artificial intelligence as a potential escape from physical being altogether.

The role of creatureliness in decision-making presents additional future research opportunities. Hirschberger et al.'s (2008) study on charitable behaviour demonstrated that if the target behaviour itself facilitated death reminders, terror-management processes were ultimately thwarted. TMT should investigate whether the concept of greed or materialism expressed as animalistic, lustful desire could shift behaviour away from conspicuous consumption habits at individual levels, and away from more ecologically destructive investments at national and international levels.

Finally, Kastenbaum and Heflick (2011) made the surprising observation that the written responses to death primes are neither analysed nor reported:

> In the name of science, spring this question on somebody:
> *Briefly describe the emotions that the thought of your own death arouse in you. Jot down,*
> *as specifically as you can what you think will happen to you as you physically die and*
> *once you are physically dead*…
> Then: Collect Somebody's written response.
> And then: Discard Somebody's response (Kastenbaum & Heflick, 2011:305-6).

Kastenbaum and Heflick conducted a quantitative analysis of 209 responses and found sorrow to be quite a pervasive theme in addition to anxiety. Further analyses of written responses may expose new areas for TMT to explore and possibly enhance the conceptual framework itself for future research. As mentioned in the above subsection,

replicating TMT studies with population samples that range in age and socio-cultural context is pertinent to generalize the results of this theory.

5.3   Concluding Remarks

[U]ntil the late twentieth century, every generation throughout history lived with the tacit certainty that there would be generations to follow. Each assumed, without questioning, that its children and children's children would walk the same Earth, under the same sky… that certainty is now lost to us… that loss, unmeasured and immeasurable, is the pivotal psychological reality of our time.
- J. Macy, 1995

This paper has presented the empirical findings of Terror Management Theory within the context of human-nature relations and economic behaviour. Through an extensive review of the literature, this paper has demonstrated that ecological, economic, and social issues have extremely powerful, though unconscious, existential drivers that function beyond the abilities of conventional political approaches to address. TMT has demonstrated that psychological and behavioural norms are highly influenced by existential concerns that moreover have a direct impact on the economic and environmental elements of human society. However, these influences are directly contingent on the social or financial rewards derived from a particular behaviour and thus can be shifted accordingly (see Polanyi, 1957:262).

Most importantly, as globalization overwhelms core human needs with market imperatives, an increased sense of anxiety and social distress will result which Salzman (2001:340) predicts "will dislocate local and traditional cultures and offer psychological sustenance to a minority of the world's people". Simultaneously, anthropogenic climate change "demands that we re-evaluate our trust in many elements of our everyday lives in a way that is profoundly unsettling" (Lucas, Leith, & Davison, 2014:79). Adams (2016:112) warns that climate change narratives inherently threaten "the imperturbability of everyday psychological reality" for which Lucas et al. (2014:85) include the "implicit trust in some of the foundations of late-modern society, including consumerism, individual freedom, capitalism, and liberal democracy". Therefore, as anxiety stressors become greater and more prominent, the techniques and mechanisms presently employed to mitigate existential thoughts in Western society will no longer be accessible. TMT therefore presents both a barrier to and a facilitator of sustainable practices and social change.

The empirical realities of TMT are extremely helpful for understanding the drivers that facilitate the values and beliefs inherent in human behaviour. This paper shows that death may not be as much of a fear as it is a factor – an unconscious, irrational, but a nonetheless pivotal factor in decision-making from the scale of a single individual to a globalized economic instrument. To effectively address collective-action problems such as climate change, economic inequality, and oppression, which evidently take place on an "existential plane" (Rowe, 2014:2), responses and strategies likewise must facilitate non-conscious interactions within this death-defying context. TMT provides essential insight into strategic interventions that can shift these unconscious drivers towards behaviours that reap mutually enhancing human-earth relationships (Brown, 2015; Berry, 1999).

A vital aspect of these interventions is to introduce cultural meaning systems that embrace rather than deny personal vulnerabilities and insecurities. By embracing the human body, and embracing the circle of life as a participatory event in which we belong rather than control, human society can once again function in line with the finite limits of our planet. Rowe (2016) concurs, observing that the existential drivers that feed capitalist culture can and must be transformed in order to shift society towards a more sustainable way of life. Although Becker's approach of individual and social ceremony was restricted to the narrow assumption that all humans experience dreadful terror in the wake of the awareness of death, other theorists including N.O. Brown (1959) and Connolly (2002) find solace in the "deep earthly affirmation" of the "existential real" (Rowe, 2014:11). For Rowe, "Becker's political theory of death-denial is powerful and enabling, but the abundance and complexity of earthly reality exceeds his elegant explanatory architecture" (ibid:3).

To conclude, a quote from Rowe's 2016 article *Is a Fear of Death at the Heart of Capitalism?:* "True wealth and power are found in collectives of people working together to radiate out justice and equality. Achieving a lasting justice means, paradoxically, accepting that none of us will last forever. Even the sun's days are numbered. Impermanence is woven into the fabric of earthly life. To affirm death is to love life in all of its richness" (Rowe, 2016).

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Appendix A. List of Definitions

Annihilation Anxiety: (p.4) coined by cultural anthropologist Ernest Becker (1973) to encompass the fear associated with the uniquely human awareness, knowledge and subsequent anxiety of death

Anxiety Buffer: (p.6) a value, belief, or behaviour of cultural (political, economic, social, national, etc.) significance that functions within the cultural scheme of things to provide purpose and thus protect the mind from existential anxiety

Creatureliness: (p.47) a term used throughout TMT research describing humankind's animalistic, instinctual nature which is hypothesized to increase DTA and thus self-esteem striving and worldview defence in order to distinguish oneself from the animal kingdom

Death-thought Accessibility (DTA): (p.13) the ability of the mind to access death-related thoughts at an unconscious level in response to a subliminal death prime, measured by a number of mechanisms including a word-fragment completion task

Distal Defences: (p.17) activated when thoughts of death are in the unconscious realm, which entail maintaining self-esteem and faith in one's cultural worldview in order to control for the potential for anxiety that results from the uniquely human awareness of death

Infrahumanization: (p.51) coined by Leyens et al. (2000) referring to a tendency to attribute more 'humanness' to one's in-group than to out-groups

In-group: (p.9) members of a person's particular cultural worldview, which can be shared across a variety of cultural aspects including gender, race, nationality, brand loyalty, and religion

Mortality Salience (MS): (p.8) a condition in TMT research where participants are subliminally reminded of their death through experimental procedures such as questionnaires, fear of death scales, and in-person interviews in front of a funeral parlour

Out-group: (p.9) individuals that belong to a divergent cultural worldview and thus challenge one's own

Proximal Defences: (p.17) rational, threat-focused defences that are activated when thoughts of death are in current focal attention (particularly immediately after a death prime) where the individual suppresses death-related thoughts by denying their vulnerability (i.e. improving eating or exercise habits)

Self-objectification: (p.60) a term coined by Fredrickson and Roberts (1997) to encompass the phenomenon of internalizing an objectifying observer's perspective where third-party observable bodily attributes (i.e. looks) become more valued than first-person non-observable body attributes (i.e. capabilities)

Terror-Management System; Processes: (pp.19;43) the unconscious cognitive tools and mechanisms (self-esteem and cultural worldviews) that protect the conscious mind from experiencing what Becker coined 'annihilation anxiety', or the potential to realize the inevitability of one's demise and finitude. See Appendix B.

Appendix B. Visualization of TMT Hypotheses
Created by Sophia R. Sanniti using www.draw.io
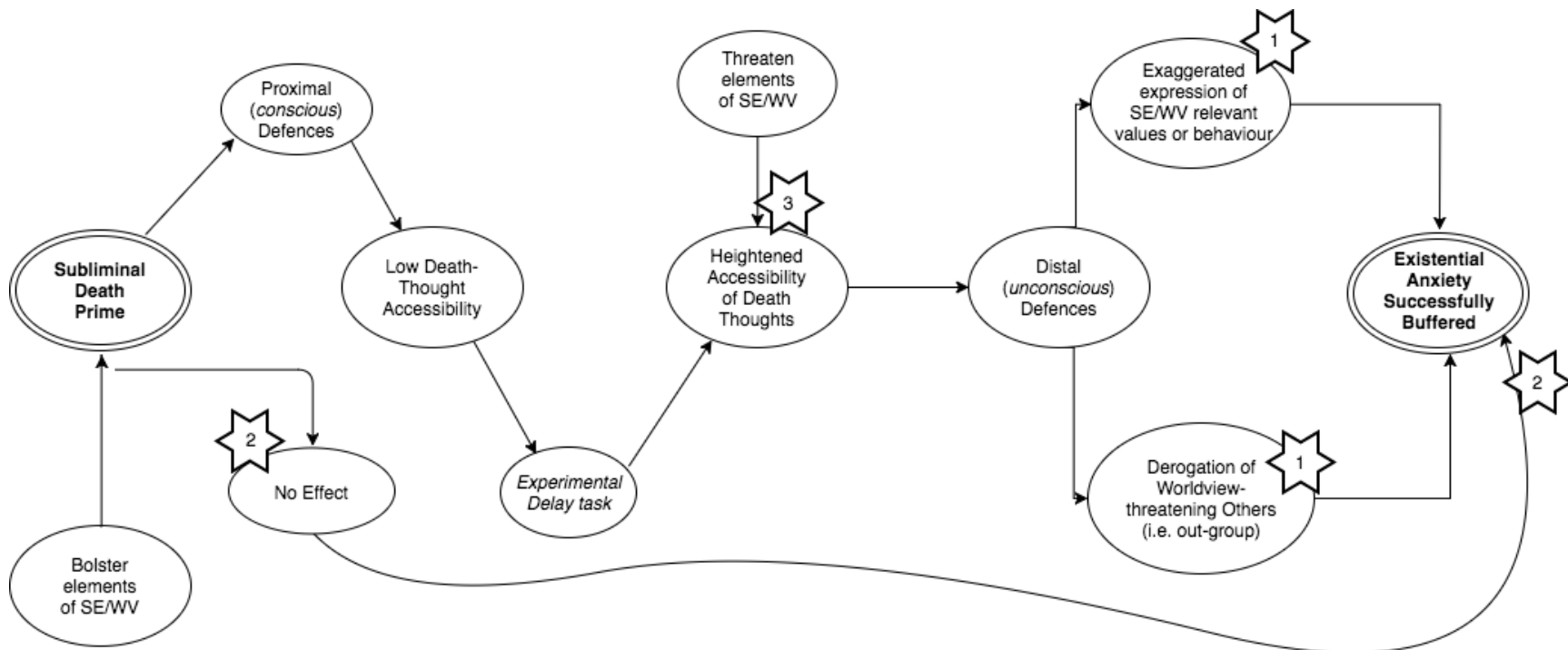
Mortality Salience Hypothesis states that reminding people of their mortality should increase the need for self-esteem and faith in their cultural worldview. This includes the derogation of and aggression towards worldview-threatening others (i.e. out-group).

Anxiety-Buffer Hypothesis states that bolstering elements of one's self-esteem or worldview should eliminate the need to defend against existential anxiety.

Death-Thought Accessibility Hypothesis states that threatening elements of one's self-esteem or worldview should render death thoughts more accessible.

Appendix C. Climate Change Imagery Task: Studies 1-3 (Pyszczynski et al., 2012:367)

This assessment is a recently developed, innovative measure of personality. Recent research suggests that the ability to imagine future events tells us a considerable amount about individuals' personality. Your response to this survey will be content-analyzed in order to assess certain dimensions of your personality. Your honest response to the following question will be appreciated.

1. There are differing viewpoints on global climate change these days. Most scientists agree that it is occurring or will occur, but nobody can predict the future. Regardless of whether global climate change is real and happening, or will happen sometime in the future, think about what it would be like IF it did happen.

For this task, set aside your personal and scientific views towards global climate change and think about what would happen IF global climate change were to occur. The following list contains some of the physical results of climate change that most scientists suggest are likely. List and describe some of the consequences global climate change would have on people living around the planet. Specifically, we are interested in the scenarios for how individual people, governments, and other groups might react if the following events that scientists say are likely to happen do actually happen.
a. If polar ice caps melted and sea levels rose:
b. If people are forced to move from their rural homes to more urban areas:
c. If rising water temperatures caused more severe storms:
d. If farmers experienced longer drought seasons:
e. If more jobs were created around the world by pursuing new, clean energy sources:

Appendix D. Attitudes towards the special treatment of pets (Beatson, Loughnan and Holloran, 2009:18).

1. I think pets deserve to be pampered every now and then by going to a pet spa.
2. I think it is important that pet owners ensure their pet has a wide variety of friends by going to pet clubs.
3. Pet owners should consider taking their pet to meditation or yoga classes to improve [the pet's] temperament.
4. I think it is silly to celebrate a pet's birthday (reversed).

Appendix E. Immortality Salience Manipulations (Dechesne et al., 2003:736-7)

(i) *Immortality Salience Condition:*
One of the most exciting scientific developments of the past decade has been the findings from rigorous scientific investigation of the near-death experience. Although scientists were initially skeptical of these reports, recent studies conducted by leading researchers at Harvard Medical School and Princeton University very strongly suggest that these experiences are very real indeed, and may suggest that some sort of existence does in fact continue after the physical death of the body. The following is a summary of the major points made in a recent summary of this research, reported by Dr. Henry Zimmerman of the Harvard Medical School. There is remarkable similarity in the reports of over 600 separate people who were declared clinically dead but were then revived and regained consciousness, including the following: (a) an out-of-body experience in which the person experiences the sensation of floating above the room and observing medical attempts to revive his or her body, (b) a feeling of moving through a tunnel of bright light toward an even greater source of light, (c) an absolute feeling of comfort and safety and an absence of fear or pain, and (d) some form of contact with previously departed loved ones or other caring persons. These same experiences were reported by virtually all people, regardless of religious background or belief. Even avowed atheists have reported this experience. In one famous case, a psychologist who had written articles critical of previous reports of this experience reported nearly identical events after nearly dying after a swimming accident; this of course led to a dramatic change in his opinions about the meaning of the near-death experience. In the cases where careful physical measurements could be taken, there were no signs of physical brain activity during this period, even when the most modern equipment was used. This shows that the body had clearly stopped its physical functioning while these experiences were occurring. Perhaps most remarkably, people have been able to report the physical details of the room in which this occurred that could be seen only from the perspective of above the room. In other cases, detailed reports of conversations had in the room by medical personnel have been made. A total of 98% of people who have this experience return absolutely convinced that death is not the end of exis- tence. Although additional research on this topic is clearly needed, the majority of medical authorities now acknowledge that these experiences provide serious evidence for the possibility that existence continues after the point of physical death.

(ii) *Immortality Critical Condition:*
One of the most misleading and often misinterpreted developments of the past decade has been the finding from rigorous scientific investigation of the so-called near-death experience. Although many people rushed to the conclusion that these "reports" were evidence of life after death, today scientists are convinced that these reports simply reflect hallucinations produced by a damaged brain that is deprived of oxygen. Recent studies conducted by leading researchers at Harvard Medical School and Princeton University very strongly suggest that these experiences are very rare and correspond with clear evidence of crisis responses in the brain of injured or ill people. These so-called experiences provide no convincing evidence that anything other than simple physical and chemical reactions occur after the death of the physical death of the body. The following is a summary of the major points made in a recent summary of this research, reported by Dr. Henry Zimmerman of the Harvard Medical School. Although there is some similarity in the reports of separate people who were declared clinically dead but were then revived and regained consciousness, the vast majority (98.3%) report no such experiences. Sup- posed out of body experiences, tunnel of light, and other reports have been shown to occur only when there is damage to specific parts of the brain that are involved in dreaming and fantasy. Oxygen deprivation

appears to play a major role in this damage. These experiences are consistently reported only among people with strong religious background or belief in an afterlife. Although 12% of religious people who are declared clinically dead but then are revived have the "near-death experience," only 1.2% of nonreligious people declared clinically dead have this experience. Only a few cases of such experiences among the nonbelievers can probably safely be attributed to oxygen deprivation combined with a desire to believe in some form of afterlife. In all cases where careful physical measure- ments could be taken, there were clear signs of low-level physical brain activity during this period. This shows that the body had clearly not stopped its physical functioning while these experiences were occurring and that some form of brain activity is responsible for the experience. People's reports of things observed while in the near-death state bear no resemblance to things that were actually occurring during this period. So-called recollections of observations from above the room have been shown to be completely inaccurate. Although many people would like to believe that the so-called near-death experience is evidence of life after death, this is clearly a result of normal psychological processes and the desire to believe in such things.

Appendix F. Measures, means, standard deviations, and correlations for brand loyalty and existential insecurities (Rindfleisch et al., 2009:12-3)

	Loading	Composite reliability
Brand loyalty (Chaudhuri and Holbrook 2001):		.95
The next time I am in the market for a vehicle, I plan to buy the same brand I currently own.	.89	
I intend to keep buying the same brand of vehicle for the foreseeable future.	.99	
I am committed to my current brand of vehicle.	. . .	
Next time I shop for a vehicle, I would be willing to pay more for my current brand than other brands.	.81	
Self-brand connection (Escalas and Bettman 2003):		.97
This brand reflects who I am.	.96	
I can identify with this brand.	.97	
I feel a personal connection to this brand.	. . .	
I (can) use this brand to communicate who I am to other people.	.91	
I consider this brand to be "me."	.95	
Communal-brand connection (Keller 2003):		.98
I really identify with people who use this brand.	.95	
I feel like I almost belong to a club with other users of this brand.	. . .	
This brand is used by people like me.	.83	
I feel a deep connection with others who use this brand.	.88	
Materialism (Richins 2004):		.90
I admire people who own expensive homes, cars, and clothes.	.68	
The things I own say a lot about how well I am doing in life.	.69	
I like to own things that impress people.	.64	
I try to keep my life simple, as far as possessions are concerned."	.25	
Buying things gives me a lot of pleasure.	.74	
I like a lot of luxury in my life.	.74	
My life would be better if I owned certain things I do not have.	.83	
I would be happier if I could afford to buy more things.	. . .	
It sometimes bothers me quite a bit that I cannot afford to buy all the things I would like.	.75	
Existential insecurity (Wittkowski 2001):		.96
I am frightened by the idea that all my thoughts and feelings will stop when I am dead.	. . .	
Thinking about my death makes me feel afraid.	.89	
The very idea that my entire personality will disappear forever with my death appalls me.	.93	
The idea that I will never be able to think and experience anything after my death disturbs me.	.96	
The thought that I will be dead someday makes me apprehensive.	.84	
The idea that my body will disappear after my death disturbs me.	.78	
Developmental insecurity (Collins and Read 1990):		.93
I often worry about being abandoned.	.86	
I often worry that important people in my life do not really care about me.	.98	
I find others are reluctant to get as close as I would like.	.90	
I often worry that if I get close to someone they will not stay with me.	. . .	
I find myself feeling indifferent toward other people in my life.	.77	
I am cautious about forming close relationships with others.	.88	
Social insecurity (Fenigstein, Sheier, and Buss 1975):		.87
I am concerned about my style of doing things.	.53	
I am concerned about the way I present myself.	.84	
I am self-conscious about the way I look.	.87	
I usually worry about making a good impression.	. . .	
One of the last things I do before I leave my house is look in the mirror.	.52	
I am concerned about what other people think of me.	.78	
I am usually aware of my appearance.	.25	
Personal insecurity (Oleson et al. 2000):		.92
When engaged in an important task, most of my thoughts turn to bad things that might happen.	.64	
For me, avoiding failure has a greater emotional impact than the emotional impact of achieving success.	.64	
More often than not, I feel unsure of my abilities.	.86	
I sometimes find myself wondering if I have the ability to succeed at important activities.	. . .	
I often wish that I felt more certain of my strengths and weaknesses.	.97	
As I begin an important activity I usually feel confident in my ability."	.34	
Sometimes I feel that I do not know why I have succeeded at something.	.52	
As I begin an important activity, I usually feel confident in the likely outcome."	.43	

Appendix G. Progressive Hope (Rutjens et al., 2009:541-2).

     (i)   Belief in Progress Essay and Task

From the late Middle Ages onward, mankind has witnessed major progress, and this has continued ever since. We have become better and better in combating diseases and improving our overall quality of life. Moreover, we keep making progress in developing energy-efficient technology as well as more environmental-friendly fuels, such as cole-seed. In sum, progress enables us to find new solutions to the problems we face, and these solutions can be either short-term or long-term. Problems that we cannot solve right now could very well be solved within 20 years from now. Progress will continue and ensure that our children will encounter a world that is better than the world we live in today. We would like you to think of four areas in which there has been human progress in the last decades. Try to imagine to what extent this progress will continue and help us to further improve our quality of life, now and in the future. Once you have selected four areas, your task is to think for a few minutes about these specific areas and then continue with the remaining part of the questionnaire.

     (ii)   "Progress is a Myth" Essay

The question of whether there is human progress is easy to answer; I think progress is definitely an illusion. We always seem to focus on progress in science and technology, but meanwhile there still exist wars and conflicts in the world. There's plenty of evidence that we haven't witnessed any real progress since the Middle Ages: we fail to find answers to environmental problems, political systems do not function better than say 100 years ago, there still is poverty in the world, and so on. We don't seem to learn from history and keep making the same mistakes over and over again. Moreover, once we have managed to control certain diseases, there will always be new ones to deal with. That's why I cannot believe that our children will encounter a world that is better than the world we live in today. People are people, and morally, politically, and socially, we simply do not make any progress. All in all, I think we have to face reality: progress is an illusion!

Appendix H. Table of TMT Studies Reviewed

This table is comprised of all TMT-related studies reviewed in this paper. The studies are listed by author in the order they are revealed, along with the page number showing where the study is referenced in the paper. The table indicates which of the three TMT premises the study tested, which behaviours or values are of interest in the study, the sample size of each experiment, the experimental manipulation or measure of mortality used, and finally, the outcome of the study.

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
				2.0 An Overview of TMT		
Rosenblatt et al. (1989)	9	Study 1: 15 male, 7 female American judges	MS	Unethical behaviour	Mortality Attitudes Personality Survey (Studies 1-5)	Reminding subjects of their mortality led them to recommend higher bonds for an accused prostitute (for those participants who believe prostitution is immoral).
		Study 2: 31 male, 47 female American undergrad students			Fear of death scale (Study 6)	
		Study 3: 13 male, 19 female American undergrad students				
		Study 4: 39 male, 44 female American undergrad students				
		Study 5: 18 female, 18 male American undergrad students				
		Study 6: 19 female, 15 male American undergrad students				
Taubman-Ben-Ari, Florian, & Mikulincer	9	Study 1: 110 male Israeli soldiers aged 18-21	MS	Driving	Mortality Attitudes Personality Survey (Study 1)	Reminding subjects of their mortality led to a higher tendency to drive recklessly for participants that indicated driving
		Study 2: 329 male Israeli			Fear of death scale (Study 2)	

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
(1999)		soldiers aged 18-21				is relevant to their self-esteem: both on a self-reported measure and behavioural measure using a car simulator.
		Study 3: 56 male Israeli soldiers aged 18-21			Mortality Attitudes Personality Survey (Study 3)	
Pyszczynski, Abdollahi, et al. (2006)	9, 31	Study 1: 14 female, 26 male Iranian undergraduate students; mean age 22.46	MS	Violence	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led to a greater appeal of martyrdom (study 1) and extreme military force among politically conservative participants (study 2).
		Study 2: 95 female 32 male American undergraduate students				
Mandel & Smeesters (2008)	9, 74	Study 1: 392 American undergraduates	MS & AB	Food and drink consumption	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led to increased food and drink consumption (self-reported and behavioural), particularly among participants low in self-esteem.
		Study 2: 70 American undergraduates				
		Study 3: 103 American undergraduates				
		Study 4: 149 American undergraduates				
Landau & Greenberg (2006)	9	Study 1: 90 female 24 male American undergraduates	MS & AB	Risk-taking behaviour	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led those high in self-esteem to become more risky unless exposed to a self-affirmation prime (bolstering self-esteem). Participants with low self-esteem became increasingly risk-averse.
		Study 2: 40 female, 35 male American undergraduates				
		Study 3: 34 female 14 male American undergraduates				
Cohen, Solomon, Maxfield, Pyszczynski, & Greenberg (2004)	9	122 female 68 male American college students (M = 21.76, 53% Caucasian, 13% African American, 12% La- tino-Hispanic,6%West Indian,4%Asian, and 12%	MS	Evaluations and Votes for election candidates	Mortality Attitudes Personality Survey	Reminding subjects of their mortality increased favourable evaluations of, and votes for, a charismatic political candidates and produced more negative evaluations of, and fewer votes

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		other)				for, a political candidate with a more egalitarian relationship-oriented leadership style.
Greenberg et al. (1990)	9	Study 1: 26 female 20 male Christian-American undergraduates	MS	Attitudes towards out-group members	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led to more positive ratings of fellow Christians and more negative ratings of Jews (study 1) .
Castano, Leidner, Bonacossa, Nikkah et al. (2011)	9	Study 1: 25 female undergraduates Study 2: 17 male 17 female undergraduates Study 3: 41 American citizens (*9 eliminated from analysis) Study 4: 33 participants Study 5: 48 American university students from New York City	MS	Attitudes towards out-group members	Fear of Death Scale (Studies 1-3,5) Mortality Attitudes Personality Survey (Study 4)	Reminding subjects of their mortality among self-defined liberals led to a rejection of strongly authoritarian views/ policies and espouse strongly liberal views/ policies (vice versa for self-defined conservatives).
Greenberg, Schimel, Martens, Solomon, & Pyszcznyski (2001)	9	Study 2: 19 male 24 female American undergraduates Study 3: 9 male 35 female American undergraduates	MS	Racism	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led White participants to view a fellow White who expressed racial pride as less racist than they otherwise would (Study 2). A White racist was judged more harshly than the Black racist in control condition, but when mortality was salient, a White racist was judged less harshly (Study 3).

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
Castano, Yzerbyt, Paladino, & Sacchi (2002)	9	26 female 22 male Italian undergraduates (University of Padua, ITA)	MS	Identification with in-group	Mortality Attitudes Personality Survey	Reminding subjects of their mortality displayed greater levels of identification with the in-group (i.e. Italians) and also increased perceptions of the in-group as more entitative.
Motyl, Hart, & Pyszczynski (2010)	9	104 female 32 male undergraduate students	MS	Violence	Mortality Attitudes Personality Survey	Reminding subjects of their mortality and infrahumanizing violence (depicting human violence as similar to animal violence) led to a reduced support for military action against Iran among those high in right-wing authoritarianism ,
Fritsche, Jonas, & Fankhänel (2008)	9	Study 1: 52 female 36 male German university students M = 19 yrs	MS	Sexism	Death primes adapted from Mortality Attitudes Personality Survey featuring 'incurable disease'	Reminding subjects of their mortality increased gender-based biases in course evaluations and social consensus estimates of study interests.
Arndt & Greenberg (1999)	9, 13	33 male 60 female American university students	MS & AB	Attitudes towards out-group members	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led to very negative evaluations of an anti-U.S. target unless their self-esteem was experimentally manipulated.
Jonas, Fritsche, & Greenberg (2005)	9	Study 1: 39 female 21 male German university students M = 23 yrs Study 2: 48 male 52 female M = 44 yrs	MS	Favourability of local vs foreign currencies	Mortality Attitudes Personality Survey	Reminding subjects of their mortality decreased the favourability of the Euro (Study 1, 2) and increased favourability of the German Mark and other aspects of German culture over aspects of foreign cultures (Study 2).
Pyszczynski et al. (1996)	10	Study 1: 34 male 32 female German pedestrians M = 40.6	MS	Perceived social consensus	Interview in proximity to funeral home	Reminding subjects of their mortality led to exaggerated estimates of social consensus.

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
McGregor et al. (1998)	10	Study 2: 49 male 75 female American pedestrians $M = 39.81$ Study 1: 38 male 36 female American undergraduates Study 2: 27 male 31 female undergraduate students (U Arizona) Study 3: 17 male 25 female (*9 excluded) Study 4: 16 male 44 female students (*9 excluded)	MS	Attitudes towards out-group members	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led to increased aggression against worldview-threatening others, an effect that was eliminated if participants were given the opportunity to derogate the target first. Mortality salience did not increase aggression towards someone who made them consume an unpleasant drink (i.e. not a worldview violator) (Study 4).
Arndt, Greenberg, & Cook (2002)	10	Study 1: 14 male 32 female undergraduates at the University of Missouri—Columbia Study 2: 27 male 28 female undergraduates at the University of Missouri—Colum- bia Study 3: 51 female undergraduates at the University of Missouri—Columbia Study 4: 26 male undergraduates at the University of Missouri—Columbia	MS	Accessibility of worldview-relevant concepts	Mortality Attitudes Personality Survey (Studies 1-3,7) Subliminal computer primes (Studies 4-6) at 28.5 milliseconds	Reminding subjects of their mortality triggered heightened accessibility of worldview relevant content (Study 1,7 i.e. nationalistic themes) which differed by gender (Study 2), and was an effect that only occurred if there was a delay between the death prime and evaluation (Study 3). This delay was proven not necessary if the death thoughts were primed outside of conscious awareness (Study 4,5,6).

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		Study 5: 23 female undergraduates at the University of Missouri—Columbia				
		Study 6: 48 female undergraduates at the University of Missouri—Columbia				
		Study 7: 81 female undergraduates at the University of Missouri—Columbia				
Greenberg, Martens, Jonas et al. (2003)	10	44 male 16 female American undergraduates with a strong belief in herbal medicines (*7 excluded from analysis)	MS	Worldview defence	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led to increased worldview defence unless participants consumed placebo they believed would block their capacity to experience anxiety.
Kashima et al. (2004)	10	33 male and 41 female Anglo-Australian students (Swinburne University of Technology Melbourne Australia; 55 male 37 female Japanese students (Hokkaido University, Sapporo Japan)	MS	Worldview defence	Mortality Attitudes Personality Survey (Personal and Collective (country) Mortality)	Reminding subjects of their mortality triggered the validation of a culturally shared worldview, particularly among those low in self-esteem. Personal mortality was more influential for Australian participants, and collective mortality was more influential for Japanese participants.
Greenberg et al. (1992)	11	Study 1: 52 male undergraduates at an American university Study 2: 44 male undergraduates at an	AB	Self-esteem and threatening stimuli	State-Trait Anxiety Inventory (Anxiety measure) (Study 1) Self-report measure of anxiety Affect Adjective Check List (Study 2)	Subjects with increased self-esteem showed less anxiety in response to threat than did neutral self-esteem subjects, an effect generalized to threats not explicitly linked to death.

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		American university				
Harmon-Jones, Simon, Greenberg, & Pyszczynski (1997)	13	Study 3: 50 male undergraduates at an American university Study 1: 34 female 15 male undergraduates at an American university Study 2: 32 female 18 male undergraduates at an American university (*4 excluded from analysis) Study 3: 37 female 11 male undergraduates at an American university (*3 excluded)	AB	Self-esteem and worldview defence	Mortality Attitudes Personality Survey	Subjects with increased self-esteem reduced pro-U.S. bias (Study 1-2), and were able to suppress death constructs (Study 3).
Schimel et al. (2007)	13	Study 1: 22 male 38 female 1 unknown Canadian undergraduates at the University of Alberta Study 2: 7 male 19 female Canadian undergraduates (U Alberta) Study 3: 16 male 22 female Canadian undergraduates (U Alberta) Study 4: 9 male 25 female 1 unknown Canadian undergraduates (U Alberta) Study 5: 30 male 30 female	DTA	Opportunities to discount worldview-threatening information	Word-fragment completion task (Studies 1,2,4) Lexical decision task (Study 3)	Canadian subjects exposed to anti-Canadian information had higher overall levels of DTA (Study 1, 3,4) unless participants were able to discount the information (Study 2). Findings were replicated in Study 5 for creationist/ evolutionists.

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
Mikulincer, Florian, Birnbaum, & Malishkevich (2002)	15	Canadian undergraduates (U Alberta) Study 1: 52 female 56 male Israeli undergraduates M = 24 yrs Study 2: 47 female 43 male Israeli undergraduates M = 23 yrs Study 3: 59 female 57 male Israeli undergraduates M =26 yrs	DTA	Close relationships	Word-fragment completion task	Threatening close relationships increased accessibility to death-related thoughts.
Florian et al. (2002)	15	Study 1: 49 female 45 male Israeli university students M = 25 yrs Study 2: 41 female 19 male Israeli university students M = 23 yrs Study 3: 55 female 45 male Israeli university students M = 24 yrs	MS, AB, DTA	Romantic partnerships	Mortality Attitudes Personality Survey	Reminding subjects of their mortality increased commitment to their romantic partner (Study 1). Thoughts of romantic commitment also reduced the need in participants to negatively react to social transgressors. Thoughts of problems in in their romantic relationship influenced a higher accessibility of death-related thoughts.
Ogilvie, Cohen, and Solomon (2008)	15	Study 2: 132 female 95 male undergraduates at Rutgers University, New Jersey	MS, DTA	Conceptualizing the self	Mortality Attitudes Personality Survey Word-fragment completion task	Reminding subjects of their mortality or contemplating their most 'undesired self' increased death-thought accessibility.
Hayes et al. (2008)	15	Study 1: 18 male 38 female 1 unknown undergraduate students at the University of Alberta Study 2: 12 male 18 female 1 unknown undergraduate	DTA, AB	Self-worth	Lexical decision task (Studies 1-2) Word-fragment completion task (Study 3)	Subjects provided with experimentally manipulated negative feedback experienced higher accessibility of death-thoughts (Studies 1-2), unless participants were given the opportunity to fortify their base of

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		students at U Alberta				self-worth (Study 3).
Friedman and Rholes, 2007	16	Study 3: 26 male 74 female undergraduate students at U Alberta 109 male 126 female self-identified Christian undergraduates at a southwestern university	DTA	Death-thought accessibility and religiosity	Word-fragment completion task	Exposing self-identified Christian subjects to information highlighting contradictions in the Bible led to higher death-thought accessibility only among fundamentalist Christians.
Das, Bushman, Bezemer, Kerkhof, & Vermeulen, 2009	16	Study 1: 40 male 60 female white European volunteers M = 35 yrs (48% of the participants were Protestant, 10% Catholic, and 42% were atheist. None Muslim)	DTA	Self-esteem and prejudice	Word-fragment completion task	Subjects exposed to terrorism-related stimuli increased death-related thoughts which led to more prejudiced attitudes towards Arabs, but only for participants low in self-esteem.
		Study 2: 39 male 62 female white European volunteers M = 29 yrs (32% were Protestant, 14% Catholic, 51% atheist, and 3% other. None were Muslim)				
		Study 3: 98 female 81 male M = 28 yrs (47.5% were Muslim, 29.6% were Christian, 9.5% were Catholic, 10.6% were atheist, and 8.2% had a different religious background)				
Landau et al., 2004	16	Study 1: 65 female 32 male undergraduates at Rutgers University New Jersey	MS, DTA	Support for political candidates and	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led to an increased support for President George W.

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		Study 2: 26 female 20 male undergraduates at an American university Study 3: 46 female 28 male Rutgers Study 4: 95 female 62 male American college students		counterterroris m		Bush and his counterterrorism policies (Study 1). Subliminal reminders of 9/11-related stimuli increased death-thought accessibility (Study 2). Reminders of mortality and 9/11 both increased support for Bush (Study 3). Reminders of mortality also led participants to become more favourable toward Bush and voting for him and less favourable toward Kerry and voting for him (Study 4).
Vail et al. (2012)	16	Study 1: 11 male 39 female undergraduate students at the University of Colorado at Colorado Springs (UCCS) M = 22.84 yrs Study 2: 14 male 35 female undergraduate students at UCCS M = 23.31 yrs Study 3: 35 male 26 female undergraduate students at at University of Missouri-Columbia M = 18.84 yrs Study 4: 10 male 16 female undergraduate students at University of Missouri-Columbia (MU) M =	DTA	Accessibility to death thoughts, dogmatic certainty and support for war	Word-fragment completion task (Studies 1-3) Lexical Decision Task (Study 4)	Subjects exposed to images of damaged buildings (following bombs, earthquakes, structural collapse) experienced higher death-thought accessibility (Study 1). Destruction-related images also triggered an increase in dogmatic certainty about one's beliefs (Study 2) and provoked greater support for war against Iran (Study 3). Study 4 found that heightened death-thought accessibility statistically mediated the relationship between visible destruction and worldview defence.
Routledge et al. (2004)	18	Study 1: 45 female undergraduate students at at the University of Missouri,	MS	Intentions and interest in sun protection vs	Mortality Attitudes Personality Survey	Thoughts of death in focal attention led to increased intentions of sun protection.

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		Columbia Study 2: 75 female undergraduate students at at the University of Missouri, Columbia		tanning products		Thoughts of death were outside focal attention subjects had a decreased interest in sun protection (Study 1). Reminding subjects of their mortality increased their interest in tanning products and services if tanned skin was associated with attractiveness.
Arndt, Schimel, & Goldenberg (2003)	18	Study 1: 29 female 16 male undergraduates at the University of Missouri-Columbia Study 2: 48 female 48 male undergraduates at the University of Arizona (*8 participants excluded)	MS	Intentions to exercise; proximal vs. distal defences	Mortality Attitudes Personality Survey	Immediately after reminding subjects of their mortality, participants reported stronger intention to exercise (Study 1). This effect occurred in Study 2, unless there was a delay task in which only participants for whom fitness was relevant to their self-esteem increased fitness intentions.
Arndt et al. (2013)	18	Study 1:106 male 64 female undergraduates $M = 18.94$ yrs Study 2: 23 male 22 female community residents recruited via university email advertisement $M = 22.94$ yrs, 40 additional undergraduates $M = 19.97$	MS	Smoking intensity	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led those with greater cigarette cravings to increase their smoking intensity (Study 1), but reduced smoking intensity among participants with especially weak cravings (Study 2).
Greenberg et al. (1994)	19	Study 1: 21 male 37 female undergraduate students at an American university Study 2: 32 male 57 female undergraduate students at an American university	MS, DTA	Preference for worldview-affirming other	Mortality Attitudes Personality Survey	Reminding subjects of their mortality increased preference for a pro-U.S. author (Study 1), an effect that only occurs after a distraction task (Studies 2-3). Study 4 found DTA to increase after distraction task from death

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
						prime.
		Study 3: 23 male 36 female undergraduate students at an American university				
		Study 4: 15 male 22 female undergraduate students at an American university				
Hayes, Schimel and Williams (2008)	21	13 male 61 female Christian undergraduate students at a Canadian university	DTA, AB	Accessibility of death thoughts & demise of worldview violator	Word-fragment completion task	Exposing subjects to a worldview threat increased death-thought accessibility unless the participants were also told that some worldview violators had died in a plane crash.
Renkema, Stapel and Van Yperen (2008)	21	Study 1: 138 Dutch psychology students Study 2: 100 Dutch psychology students Study 3: 90 Dutch students	MS	Influence of majority's opinion	Mortality Attitudes Personality Survey	Reminding subjects of their mortality increased the degree to which judgments of abstract drawings were influenced by the majority's opinion (Study 1). Mortality reminders also influenced participants to change their opinions towards societal issues, so that these fit the attitudes they think others have (Study 2), but attitudes were not conformed to the opinions of out-group members (Study 3).

3.0 Critical Reflections

Study	Page #	Population	Hypothesis	Behaviour/Value	Mortality Manipulation/Measure	Outcome
Routledge & Arndt (2008)	31	60 female 45 male students from a large British university M = 20 yrs	MS	Willingness to self-sacrifice for one's nation	Mortality Attitudes Personality Survey	Reminding subjects of their mortality increased willingness to make self-sacrifices for one's nation.
Rogers (2011)	32	43 female 59 male Christian undergraduate students from an American university M = 19.42 yrs	MS, AB	Evaluations of in-group vs out-group members	Mortality Attitudes Personality Survey & Personally ideal/ meaningful death	Reminding subjects of their mortality led to more positive impressions of a Christian target and more negative impressions

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
						of a Jewish target unless death was considered in a personally meaningful/ worldview consistent manner.
Jonas, Martens, Kayser et al. (2008)	32	Study 1: 66 female 11 male participants recruited on the campus of the Ludwig-Maximilians University in Munich, Germany (*4 excluded from analysis) Study 2: 51 female 15 male participants from the Ludwig- Maximilians University in Munich, Germany (*1 excluded from analysis) Study 3: 41 female 35 male participants recruited on university campuses in Austria Study 4: 54 female 18 male students from the University of Salzburg (Austria) (*5 excluded from analysis)	MS	The influence of activated norms	Open-ended question about death, one sentence answer (Study 1,2,3,4 Death-related word search puzzle (Study 2)	Reminding subjects of their mortality increased willingness to help following a prosocial prime, but decreased helping following a pro-self prime (Study 1) while a pacifist prime increased pacifism attitudes (Study 2). In Study 3, a conservatism/ security prime led to harsher bonds of an illegal prostitute when reminded of death while a benevolence prime eliminated this effect. A death prime increased people's helpfulness in the wake of a help prime (Study 4).

4.1 Human-Nature Relations

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
Koole and Van den Berg (2005)	44	Study 1: 33 female 57 male volunteers from a University in Amsterdam M = 23 yrs Study 2: 27 female 21 male volunteers from a university in Amsterdam M = 22 yrs	MS, DTA	Attitudes towards nature	Environments and Thoughts Questionnaire (Study 1) Dutch Fear of Death Inventory (Study 2) Action-Orientation Scale (Study 3)	Subjects reported that wilderness inspired more thoughts about death than either cultivated or urban settings (Study 1). Reminding subjects of their mortality also reduced perceived beauty of wilderness (Study 2). Action-orientation was

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		Study 3: 32 female 28 male volunteers from a university in Amsterdam			Lexical Decision Task (Study 4)	found to be positively related to perceived beauty of wilderness (Study 3), and action-oriented participants were better able to suppress the association between wilderness and death (Study 4). This effect was eliminated by subliminal direct death reminders (Study 5).
		Study 4: 29 female 19 male volunteers from a university in Amsterdam M = 21 yrs			Subliminal Death Prime presented on a computer screen for 34 milliseconds	
		Study 5: 72 female 43 male volunteers from a university in Amsterdam M = 23 yrs				
Fritsche & Hafner (2012)	45	Study 1: 33 male 36 female students at the University of Jena, Germany M = 21.3 yrs	MS	Motivations (biocentric and anthropocentric) to protect the environment	Open-ended question about death, one sentence answer	Reminding subjects of their mortality reduced motivation to protect the natural environment for its intrinsic value (Study 1) and reduced bisopheric concern (Study 2), but did not impact anthropocentric motivations or egoistic concerns.
		Study 2: 81 male 80 female students in Jena, Germany M = 29.0 yrs (had to exclude 9 participants)				

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
Fritsche, Jonas, Kayser, & Koranyi (2010)	45	Study 1: 60 female 25 male undergraduates at the University of Rochester *M* = 20.02 yrs Study 2: 55 female 49 male students from the University of Arizona Study 3: 48 male 59 female students at the University of Jena, Germany *M* = 23.3 yrs	MS	Pro-environmental attitudes, intentions and behaviour	Mortality Attitudes Personality Survey (Study 1) Subliminal death prime on computer screen for 33.4 milliseconds (Study 2) A hand-written poem 'A Funeral Fantasy' on the classroom blackboard with several death-related words circled (Study 3)	When pro-environmental norms are in focus, reminding subjects of their mortality led to increased pro-environmental attitudes (Study 1). Reminders of mortality also led to increased conservationist behaviour in a forest management game (Study 2) and pro-environmental intentions and actions (Study 3). Environmental norm salience only increased attitudes and behaviours under existential threat.
Vess & Arndt (2008)	45	32 male 28 female undergraduates at an American university (*3 excluded from analysis)	MS	Concern about environmental impact	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led to a decreased concern about environmental impact unless the participant's self-esteem was influenced by environmentalism in which case mortality reminders increased environmental concern.
Pyszczynski et al. (2012)	46	Study 1: 61 female 48 male students at an American university *M* = 21.87 yrs Study 2: 31 female 25 male students at an American university *M* = 18.54 yrs	MS	Support for international peace-building vs military action	Mortality Attitudes Personality Survey	Reminding subjects of their mortality increased their support for international peace-building after imagining the consequences of global climate change, but not after imagining a localized catastrophe (Study 1). Focus on global climate change also eliminated the effect of mortality reminders on increased support for military action.

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
Goldenberg et al. (2001)	47	Study 1: 46 female 30 male 1 unknown students at a university in Colorado Study 2: 18 female 23 male students at two American universities in Colorado	MS	Evaluations of body products and animals	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led to an increased emotional reaction of disgust to body products and animals (Study 1) and also led to a greater preference for an essay describing people as distinct from animals (Study 2).
Beatson and Halloran (2007)	48	58 female 28 male Australian students from La Trobe University $M = 21$ yrs	MS	Attitudes towards animals	Mortality Attitudes Personality Survey & Creatureliness Prime	Low self-esteem subjects primed with thoughts of death rated animals more negatively if they had been reminded of human-animal similarity (creatureliness).
Beatson, Loughnan, & Halloran (2009)	48	79 female 18 male recruited from university participant registry. 74% identified as students, $M = 25.06$ yrs	MS	Attitudes towards the average pet	Mortality Attitudes Personality Survey	Subjects primed with thoughts of death that were also reminded of human-animal similarity (creatureliness) showed relatively negative attitudes towards the average pet and the human-like treatment they are afforded.
Lifshin, Greenberg, Zestcott, & Sullivan (2017)	49	Study 1: 90 female 39 male students at the University of Arizona $M = 19.28$ yrs Study 2: 49 female 33 male students at the University of Arizona $M = 18.68$ yrs Study 3: 156 female 72 male students at the University of Arizona $M = 18.89$ yrs Study 4: 70 female 10 male students at the University of Arizona $M = 18.56$ yrs	MS, AB	Support for killing animals	Subliminal on-screen prime for 30 milliseconds (Study 1,2,4,5) Evaluation of death-related t-shirt (Study 3)	Reminding subjects of their mortality influenced greater support for the killing of animals (Studies 1-5). This effect was associated with an increased sense of power and invulnerability (Study 5) but was eliminated if self-esteem was initially elevated (Study 4).

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
Vaes, Heflick and Goldenberg (2010)	51	Study 5: 70 female 36 male students Study 1: 65 female 32 male Italian undergraduate students Study 2: 32 female 28 male Italian undergraduate students Study 3: 78 female, 15 male, 3 unknown Italian undergraduate students	MS, AB, DTA	Humanizing the in-group	Mortality Attitudes Personality Survey (Studies 1,2) Fear of Death Scale & Word-fragment completion task (Study 3)	Reminding subjects of their mortality increased their need to humanize their in-group (Study 1,2), an effect that also functioned to reduce the accessibility of death-related thoughts (Study 3).
Goldenberg, Cox, et al. (2002)	52	Study 1: 66 female 52 male undergraduates at an American university Study 2: 74 female 52 male 3 unknown undergraduates at an American university *M* = 20.09 yrs	DTA, MS	Attitudes towards physical and romantic aspects of sex	Word-fragment completion task (Study 1) Mortality Attitudes Personality Survey (Study 2)	Priming subjects with thoughts of human-animal similarity (creatureliness) led to an increase in death-thought accessibility when thinking of physical but not romantic aspects of sex (Study 1). A creatureliness prime also decreased attraction to physical but not romantic aspects of sex if subjects were also primed with death (Study 2). Priming subjects with thoughts of humans as distinct from animals eliminated the association between sex and death.
Goldenberg et al. (2006)	53	Study 1: 121 female undergraduates at a university in Colorado Study 2: 47 female 33 male undergraduates at a	MS	Enjoyment/ aversion of tactile and nontactile stimulation	Mortality Attitudes Personality Survey	Reminding subjects high in neuroticism of their mortality led to an increased aversion of physical sensation including ice-cold water (Study 1) and an electric foot-massager (Study 2)

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		university in Idaho				but did not avoid nontactile stimulation (i.e. Music) (Study 3).
		Study 3: 62 female 37 male undergraduates at a university in California (50% were Caucasian, 33% Asian, and the remaining 17% of other or mixed ethnicity)				
Birnbaum, Hirschberger and Goldenberg (2011)	55	Study 1: 36 female 40 male Israeli volunteers $M = 26.59$ yrs Study 2: 94 female 69 male undergraduates from a university in California $M = 20.58$ yrs Study 3: 51 female 38 male Israeli volunteers $M = 26.43$ Study 4: 98 female 96 male Israeli volunteers $M = 24.15$ yrs	MS	Motivations/ desire for varying aspects of sex	Mortality Attitudes Personality Survey	Reminding subjects of their mortality increased men's but not women's motivation to have a one-night stand (Study 1), increased desire for a short-term romantic fling among both genders (Study 2), and increased the desire of romantic sex within the context of ongoing relationships (Study 3). Study 4 demonstrated that the impact of a death prime on desire to have sex depends on attachment orientation and gender.
Goldenberg, Mccoy, et al. (2000)	55	Study 1: 61 female 38 male undergraduate students from two Western universities $M = 19.59$ yrs Study 2: 56 female 30 male undergraduate students $M = 24.04$ yrs Study 3: 109 female 44 male undergraduate students from three Western universities and community	MS	Identification with physical body and interest in sex	Mortality Attitudes Personality Survey (Study 1,3) Fear of Death Scale (Study 2)	Reminding subjects of their mortality led to an increased identification with their physical bodies (Study 1) and an increased interest in sex (Study 2) for participants high in body esteem. Participants low in body esteem responded to death primes with decreased appearance monitoring.

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		colleges M = 23.03 yrs				
Cox, Goldenberg, Arndt, & Pyszczynski (2007)	57	Study 1: 35 female 27 male undergraduate students Study 2: 82 female 47 male undergraduates M = 20.50 yrs Study 3: 19 female 28 male undergraduates M = 18.81 Study 4: 30 female 15 male 2 unknown undergraduates M = 20.47 yrs	MS, DTA	Attitudes towards breastfeeding	Mortality Attitudes Personality Survey Word-fragment completion task (creatureliness theme) (Study 3) Human-animal similarity prime (Creatureliness)	Reminding subjects of their mortality led to more negative reactions to a woman breastfeeding in public (Study 1) and decreased liking and increased physical avoidance of breastfeeding task partner (study 2). A death prime and breastfeeding prime led to greater accessibility of creatureliness-related thoughts (study 3) and a creatureliness prime led to increased negativity toward a woman on a magazine cover breastfeeding her child (Study 4).
Goldenberg et al. (2007)	58	Study 1: 37 female 39 male undergraduate students M = 19.32 yrs (Asian (36%) and Caucasian (35%) with 8% Hispanic, 3% Black, and the remainder identifying as "other" or "more than one" ethnicity) Study 2: 33 female 18 male undergraduate students (Caucasian (49%), with 20% Black, 20% Hispanic, 2% Asian, and the rest "other" or "more than one" ethnicity)	MS	Attitudes towards pregnancy	Human-animal similarity prime (Creatureliness)	Priming subjects with thoughts of human-animal similarity led to more negative responses to a magazine cover with a pregnant Demi Moore (Study 1) and perceptions of Gwyneth Paltrow as less competent when portrayed as pregnant (Study 2).
Goldenberg, Arndt, Hart and Routledge	59	Study 1: 93 female students at Boise State University M = 20.55 yrs (Caucasian 89.2%; 2.2% Asian	MS, DTA	Attitudes towards breast self-examinations	Human-animal similarity (Creatureliness) (Study 3) & Mortality Attitudes Personality Survey (Study 1)	Reminding subjects of their similarity to animals and priming thoughts of death reduced women's intentions to conduct

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
(2008)		American, 1.1% African American, 1.1% Latino, 3.2% other, and 3.2% reporting more than one ethnicity) Study 2: 84 female undergraduates from Boise State University M = 20.89 yrs (Caucasian 86.7%; 6% Asian American, 3.6% Latino, 1.2% other, and 2.4% reporting more than one ethnicity) Study 3: 99 females recruited through local newspaper in Boise, Idaho M = 45.22 yrs (Caucasian 91.8%; 2% Hispanic; 1% Native American; and 5.1% multi-ethnic)			Creatureliness prime (Study 2) Word-fragment completion task (Study 2)	breast self-examinations (Study 1). A human-animal similarity (creatureliness) prime reduced time spent conducting a breast exam on a breast model which was also found to increase accessibility to death thoughts (Study 2). Duration of self-examinations was unaffected if given an excuse for feelings of distress in the form of an 'energy water' placebo (Study 3).
Grabe et al. (2005)	63	57 female 60 male undergraduate students from the University of Missouri–Columbia, M = 18 yrs (88.1% Caucasian, 5.3% African American, 2.1% Asian, and 1.2% Hispanic)	MS	Objectification of the woman and the self	Mortality Attitudes Personality Survey	Reminding subjects of their mortality increased the objectification of women in general and increased self-objectification among females, as well as individuals who derived esteem from their bodies.
Goldenberg et al. (2005)	63	Study 1: 54 female 48 male undergraduate students Study 2: 58 female	MS	Food consumption	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led female but not male participants to eat less in a private situation (Study 1).

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		undergraduate students $M =$ 24.68 yrs Study 3: 61 female undergraduate students $M =$ 20.96 yrs				Studies 2 and 3 were restricted to female participants who restricted their eating only if the subjects had a higher body mass index.
Landau et al. (2006)	65	Study 1: 18 male 46 female heterosexual undergraduates Study 2: 17 male heterosexual undergraduates Study 3: 55 male heterosexual or bisexual undergraduates Study 4: 36 male 44 female heterosexual undergraduates Study 5: 54 male heterosexual undergraduates	MS	Evaluations of a woman's attractiveness	Subliminal on-screen prime for 42.8 milliseconds (Study 1) Mortality Attitudes Personality Survey (Study 2,3,4,5) Personal Experiences Questionnaire: Lust (Study 5)	Reminding subjects of their mortality reduced male but not female participants attractiveness ratings of sexually alluring women (Study 1). Mortality reminders led male subjects to downplay their sexual intent (Study 2) and decreased their interest in a seductive woman unless she appeared more 'wholesome' (Study 3). The threat of sexual attraction was found to be specific to men (Study 4), and if men were primed with thoughts of lust in addition to death, participants exhibited greater tolerance of aggression toward women (Study 5).
Norenzayan & Hansen (2006)	67	Study 1: 16 female 12 male undergraduates at the University of Michigan $M =$ 19 yrs (46% were European American, 21% Asian American, and 33% Other or did not identify their ethnicity) Study 2: 38 female 39 male undergraduates at the	MS	Religiosity	Mortality Attitudes Personality Survey (Study 1,4) Graphically and tragically eventful story facilitating thoughts of death (Study 2,3)	Reminding subjects of their mortality increased religious identification, belief in God, and belief in the efficacy of divine intervention (Study 1,2). Mortality primes also led to increased supernatural agent beliefs among predominantly Christian participants, even when presented in a culturally foreign context (Study 3,4).

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		University of Illinois, Urbana-Champaign $M = 19$ yrs (69% European American, 13% African American, 4% Hispanic, 5% Asian, and 9% Other; 74% were Christians, 19.5% reported not having a religion or being an atheist, 5% were Jewish, and 1.5% (1 participant) was Hindu)				
		Study 3: 32 female 9 male volunteers (*6 dropped from analysis) from the Urbana-Champaign area $M = 23$ yrs (51%were European American,12% African American,20%Asian, and 17% Other or did not report their ethnicity. Of the participants, 59% were Christian; 24% claimed to have no religion or claimed to be atheist, agnostic, undecided, or "nonpracticing"; and the remaining 17% claimed some other religion or spiritual/religious orientation, including one Buddhist)				
		Study 4: 101 female 41 male students from the University of British Columbia (*4 dropped from analysis) $M = 20$ yrs (46% European				

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		Canadians, 38% East Asian Canadians, and 16% Other; 57% indicated a religion (56 Christians, 25 non-Christians) and 43% explicitly indicated that they did not have a religion, were atheist, or were agnostic)				
Dechesne et al., 2003	67	Study 1: 54 students at the University of Nijmegen, Nijmegen, the Netherlands Study 2: 83 students at the University of Nijmegen Study 3: 44 female 94 male students from the University of Missouri—Columbia	MS, AB	Symbolic (worldview defence) vs. Literal (belief in afterlife) immortality striving	Open-ended question about death, one sentence answer (Study 1,2) Mortality Attitudes Personality Survey (Study 3)	Reminding subjects of their mortality and exposing them to an essay arguing against the existence of an afterlife responded with increased self-esteem striving and worldview defence. This effect was eliminated if the essay argued in favour of the existence of an afterlife.
Heflick and Goldenberg (2012)	67	87 female 52 male undergraduates	MS, AB	Symbolic (worldview defence) vs. Literal (belief in afterlife) immortality striving	Mortality Attitudes Personality Survey	Reminding subjects of their mortality resulted in worldview defence unless the idea of an afterlife was affirmed. A portion of the subjects self-identified as atheist, proving literal immortality strivings are stronger than symbolic.

4.2 Economic Behaviour

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
Zaleskie-wicz, Gasior-owska, Kesebir, & Luszczynska (2013)	68	Study 1: 123 undergraduate students at a Polish university (68% female) $M =$ 23.64 yrs Study 2: 123 undergraduates at a Polish university (62% female) $M =$ 21.47 yrs	MS, DTA	Attitudes towards money and wealth	Fear of Death Questionnaire	Reminding subjects of their mortality led participants to overestimate the size of coins and monetary notes (Study 1), think of higher monetary standards for being considered rich (Study 2), valued and desired money more, requesting higher compensation for forgoing

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		Study 3: 85 adults (70.6% female) M = 25.55 yrs				immediate payment (Study 3), and reduced self-reported fear of death (Study 4).
		Study 4: 120 Polish adults (62% female) M = 29.59 yrs				
Jonas, Fritsche and Greenberg (2005)	69	Study 1: 39 female 21 male students from the University of Munich, Germany M = 23 yrs	MS	Attitudes towards local vs foreign currencies and other cultural items	Mortality Attitudes Personality Survey (Study 1) Interview in proximity to a cemetery (Study 2)	Reminding subjects of their mortality led to a decreased liking of the new European currency (Study 1,2) and a marginal increased liking of the German Mark (Study 2). Similar preferences occurred for German items over non-German items (Study 2).
		Study 2: 48 male 52 female pedestrians in Magdeburg, Germany M = 44 yrs				
Kasser and Sheldon (2000)	70	Study 1: 21 male 39 female students at a Midwestern American college	MS	Materialism and consumption behaviour	Mortality Attitudes Personality Survey	Reminding subjects of their mortality led to higher financial expectations of themselves 15 years in the future (Study 1) and led to greedy behaviour and greater consumption in a forest-management game (Study 2).
		Study 2: 35 male 38 female undergraduates at a large Midwestern American university				
Christopher, Drummond, Jones, Marek, & Therriault (2006)	70	140 female 64 male: including 135 traditional and adult evening students from a small south-eastern Christian liberal arts college, 52 high school teachers from metropolitan Detroit, and 17 graduate students at a regional state university in Michigan (94% Christian sample) M = 24.9 yrs	N/A	Beliefs about death and materialism	Death Perspectives Questionnaire (positive or negative beliefs about death)	Concerns about one's death and personal insecurity were positively related to each other and materialism. Personal insecurity partially mediated for concerns about death and materialism.
Christopher et al. (2009)	71	230 female 208 male 2 unknown M = 39 yrs	N/A	Materialism, well-being, and	Levenson (1981) measure of feelings of control	Subjects with strong materialistic values experience lower levels of

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Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
				locus of control		well-being. This relationship was significantly reduced when statistically controlling for external locus of control (chance, powerful others) i.e. ''To a great extent my life is controlled by accidental happenings''.
Fransen et al. (2008)	71	Study 1: 23 male 20 female Dutch participants $M = 22$ yrs

Study 2: 20 male 17 female Dutch participants $M = 22$ yrs

Study 3: 22 male 55 female Dutch participants $M = 21$ yrs | MS | Consumption habits and product preferences | Insurance brand logo (Explicit, Study 1; Implicit, Study 2)

Word-fragment completion task (Study 1)

Lexical decision task (Study 3) – insurance brand logo displayed for 10 milliseconds | Exposing subjects to an insurance brand (explicit and implicit) induced mortality salience and enhanced spending on culturally-valued items (Study 1,2) and also increased preference for domestic over foreign products (Study 3). |
| Sullivan et al. (2011) | 72 | 102 female 35 male students at the University of Salzburg, adult members of Austrian work force, some German nationals | MS, AB | Consumption habits and product preferences | Open-ended question about death, one sentence answer & Worldview affirmation condition | Reminding subjects of their mortality and affirming their worldview led to a grea,ter willingness to pay for foreign products. |
| Rindfleisch, Burroughs, & Wong (2009) | 72 | 314 national survey respondents (U.S.) $M = 49$ yrs (51 % were male, 83% were white, 6% were African American, 5% were Hispanic, and 2% were Asian)

Study 2: 125 undergraduates from Georgia Institute of Technology and University of Wisconsin-Madison (57% | MS | Brand connections | Fear of Death scale (Study 1)

Mortality Attitudes Personality Survey (Study 2) | Existential anxiety encourages materialistic individuals to form strong connections with their brands. |

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		female) M = 20 yrs				
Das, Duiven, Arendsen, & Vermeulen (2014)	73	Study 1: 95 volunteers (67% female) M = 33 yrs Study 2: 95 university students (68% female) Study 3: 195 participants (60.8% female)	MS	Attitudes towards advertisements and advertised products	Advertisements with mortality reminders (Study 1,2,3) Word completion task (Study 2,3)	Subjects exposed to advertisements with a mortality reminder had more negative attitudes towards the ad but were found to be more willing to purchase the advertised product (Study 1). Purchase intentions were additionally influenced in studies 2 and 3 independent of product type or brand familiarity.
Arndt, Greenberg, Simon, Pyszczynski, Solomon (1998)	74	Study 1: 26 male 24 female undergraduates at the University of Arizona Study 2: 21 male 24 female undergraduates at the University of Maryland	MS	Acceptance or avoidance of self-awareness enhancing stimuli	Mortality Attitudes Personality Survey completed in cubicles with 4x3ft mirrors (Study 1) Fear of Death questionnaire (Study 2)	Mortality reminders led subjects to spend less time in the cubicle if a mirror was present to avoid self-awareness enhancing stimuli (Study 1). Mortality reminders also led subjects to write less if the topic was about themselves compared to someone else (Study 2).
Jonas et al. (2002)	75	Study 1: 17 male 14 female American citizens in Boulder, Colorado Study 2: 18 female 9 male undergraduates from the University of Arizona (*5 dropped from study)	MS	Attitudes and actual donations to charity	Interview in close proximity to a mortuary (Study 1) Mortality Attitudes Personality Survey (Study 2)	Reminding subjects of their mortality led to more favourable attitudes towards charities the subject deemed were important (Study 1) and donated more money to an American cause (Study 2).
Ferraro et al. (2005)	75	Study 1: 62 female 65 male participants Study 2: 119 female participants Study 3: 115 participants		Food choices, charitable donations, socially conscious consumer behaviour	Describe personal experience during/ after September 11, 2011 tragedy (Study 1, 2) Mortality Attitudes Personality Survey (Study 3)	Reminding subjects of their mortality led to more indulgent choices in food and (chocolate cake vs fruit salad) for females low in body esteem and less indulgent food choices for females high in body esteem. Males were unaffected by the

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
						mortality manipulation (Study 1,2). Subjects high in virtue as a source of self-esteem were driven to contribute higher amounts to charity and engage more in socially conscious consumer behaviours when reminded of their mortality (Study 3).
Hirschberger, Ein-Dor, & Almakias (2008)	76	Study 1: 27 male 53 female undergraduates from Bar-Ilan University M = 24 yrs Study 2: 165 male 178 female pedestrians walking through Bar-Ilan campus M = 25 yrs Study 3: 74 female participants approached approached on the Tel-Aviv University campus	MS	Charitable intentions and behaviour/ willingness to help	Mortality Attitudes Personality Survey (Study 1) Flyer for fictional organization with death-related stimuli (Study 2,3)	Reminding subjects of their mortality increased intentions (study 1) and actual charitable donations (study 2) as well as increased willingness help to a walking confederate (study 3). But mortality reminders decreased organ donation card signings (Study 1,2) and decreased willingness to help a wheelchair-bound confederate (Study 3).
Rutjens, van der Pligt, & van Harreveld (2009)	78	Study 1: 33 female Dutch participants M = 20.52 yrs Study 2: 29 female 14 male Dutch participants M = 19.65 Study 3: 71 female 20 male (*2 excluded in final analysis) college students at the University of Amsterdam M = 20.95 yrs	MS, AB, DTA	Belief in human progress	Mortality Attitudes Personality Survey (Study 1,3) Word-fragment completion task (Study 1,2,3)	Reminding subjects of their mortality led to greater faith in human progress (Study 1) while threatening belief in progress led to greater accessibility to death-related thoughts (Study 2). Mortality reminders also led to higher death-thought accessibility and increased disagreement with a worldview-violating essay unless belief in human progress was bolstered first (Study 3).
Sani,	79	17 male 71 female Spanish	MS	Investment in	Mortality Attitudes Personality	Reminding subjects of their

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
Herrera, & Bowe (2009)		students at the University of Valencia M = 21.18 yrs		social group	Survey Word-fragment completion task (manipulation check)	mortality enhanced their perceptions of group temporal endurance, or perceived collective continuity, leading to enhanced group identification.
Belmi & Pfeffer (2016)	83	Study 1: 434 male 496 female 5 unknown individuals from a third-party online panel company M = 35.08 (Blacks (14%), Whites (69%), Asian Americans/ Pacific Islanders (6%), Latino Americans (10%), and Native Americans (<1%; 11 people did not indicate their ethnicity)). Study 2a: SampleA: 62 male 98 female undergraduate and graduate students from a private West Coast university M = 22.79 yrs SampleB: 58 male 81 female working adults from a subject pool maintained by a private West Coast university M = 36.99 yrs Study 2b: 121 participants (66% female) working adults recruited through subject pool from 2a M = 33.86 yrs Study 3: 53 male 95 female 1 unknown participants from a subject pool maintained by	MS, AB, DTA	Desire for power, pro-social behaviour, feelings of power	Mortality Attitudes Personality Survey (Study 1,2ab,4 Video of an autopsy (Study 3,5) Death anxiety scale (Study 4)	Reminding subjects of their mortality led to greater feelings of fear and anxiety, led male participants to desire power more and female participants to desire power less (Study 1). Mortality reminders in Study 2a led men but not women to engage in power-seeking behaviours but led both men and women to behave more prosocially (Study 2b). In Studies 3-5, inducing subjects to feel more powerful reduced death anxiety by increasing perceived invulnerability.

Study	Page # (in this review)	Population	Hypothesis	Behaviour/ Value of Interest	Mortality Manipulation/ Measure	Outcome
		a third-party online panel company M = 38.31 yrs				
		Study 4: 126 male 165 female participants recruited online M = 38.49 yrs				
		Study 5: 87 male 169 female 4 unknown undergraduates and graduates from a private West Coast university M = 21.58 yrs (Whites (40%), Latino Americans (11%), Blacks (6%), Asian Americans/Pacific Islanders (42%), and Native Americans (<1%; 2 participants did not indicate ethnicity)				