

MIND-BODY DUALISM BUFFERS EXISTENTIAL CONCERNS

by

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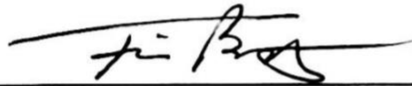
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## DUALISM AND DEATH CONCERNS

### **Introduction**

The separation of the mind and the body is a debate that has persevered across time and disciplines (e.g., philosophy, religion, psychology, etc.). Mind-body dualism is a metaphysical stance and a mindset that the two entities are distinct from one another. From a terror management perspective (TMT; Greenberg et al., 1986), the human body is problematic as it emphasizes our creaturely, and ultimate, mortal nature. Research has found that reminding people about the physical aspects of the body (e.g., sex), but not symbolic (e.g., romantic love), increased the accessibility of death-related thoughts (Goldenberg et al., 1999; 2002). The awareness of mortality has also led persons to distance themselves from their animal nature (Goldenberg et al., 2001). Integrating the two perspectives, people who see the mind as being distinct from the body (i.e., high dualism) should be better protected against mortality-related concerns stemming from the creaturely nature of humans. The current research was designed to test this across two experiments. Specifically, in Study 1, it was hypothesized that an essay emphasizing human animality would increase death-thought accessibility (DTA) for people who scored low on mind-body dualism, but not for people high on dualism. Study 2, in turn, explored the carryover effects of heightened mortality awareness from creaturely and non-dualism concerns on participants' defense of their cultural beliefs (i.e., worldview defense).

### **Terror Management Theory (TMT)**

Terror management theory (Greenberg et al., 1986; also see Pyszczynski et al., 2015) is an existential perspective focused on how thoughts, attitudes, beliefs, and motivations are shaped by mortality concerns. The theory suggests that the desire for life (i.e., self-preservation) combined with the cognitive awareness of death has the potential to create



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anxiety. To buffer this fear, people may engage in different defense mechanisms, such as cultural worldview and self-esteem. A cultural worldview is a common interpretation of reality that provides meaning, order, endurance, and a sense of safety to life. For instance, *literal immortality* can be achieved for those who believe in an afterlife or reincarnation, or *symbolic immortality* can occur by making a long-lasting contribution to society, having offspring, creating something (e.g., writing a book, art), etc. Individuals also pursue self-esteem by living up to the standards of their culture (Greenberg, et al., 1992; 1993; Solomon et al., 1991). Together, both cultural worldviews and self-esteem function to protect persons from deeply rooted fears associated with mortality awareness.

Over 36 years of research has supported TMT and its hypotheses (see e.g., Pyszczynski et al., 2015). The DTA hypothesis posits that threats to one's cultural anxiety buffer (i.e., self-esteem, worldview beliefs) should make mortality concerns more salient. (Alternatively, enhancing such defenses should decrease DTA; Hayes et al., 2008.) For instance, Friedman and Rholes (2007) found that religious fundamentalists reported heightened mortality salience when their spiritual beliefs were challenged. Similar effects have been shown when questioning science worldviews (Hayes et al., 2015) and self-esteem (Hayes et al., 2008; Ogilvie et al., 2008). The most utilized measure of death cognition is a word-fragment task (Greenberg et al., 1994). This scale is comprised of 30-word fragments (e.g., DE \_ \_), where six of them can be completed as either mortality-related (e.g., DEAD) or neutral words (e.g., DEAR). More death-related word completions are indicative of greater mortality awareness.

The mortality salience (MS) hypothesis is also relevant to the current work. This states that if cultural worldviews and self-esteem provide protection against death-related

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concerns, then people should seek these defenses when mortality is salient. A tendency in support of the MS hypothesis is that when death is made salient, people like those who share the same cultural worldview as themselves, and dislike individuals who do not. This effect is commonly referred to as *worldview defense* (e.g., Greenberg et al., 1990; McGregor et al., 1998; Schimel et al., 1999). For instance, following reminders of death, participants are more aggressive (i.e., allocate a significant amount of hot sauce) toward someone who challenges their political orientation (McGregor et al. 1998); are more punitive to persons who break the law (i.e., prostitutes; Rosenblatt et al., 1989); and go to greater lengths to validate the beliefs and values relevant to their cultural identity (e.g., Australian Aboriginals; Halloran & Kashima, 2004). Research has shown that MS effects are specific to thoughts of one's own death; having people think about other negative or anxiety-provoking topics such as failing an exam, public speaking, social exclusion, dental pain, paralysis, the death of a loved one, or uncertainty do not elicit the same defensive responses as thoughts of one's own mortality (Greenberg et al., 1994). The results of TMT are experimentally supported in more than 25 countries around the world (e.g., North America, Europe, Middle East, North Africa, Asia, & Latin America), although some of the results are inconsistent in non-western areas (Pyszczynski et al., 2015).

### **TMT and Physicality**

From the perspective of TMT, individuals can symbolically defend against the threat of death through belief validation and/or by maintaining self-esteem. The physical body, however, presents a problem as it serves as a reminder of our animal limitations (e.g., eventual death & decay; Goldenberg et al., 2000). Several studies have been conducted to support this analysis. In one experiment, Goldenberg et al. (2001) found that people who

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thought about their own death (vs. a neutral topic) expressed greater disgust toward human body products (e.g., “If I see someone vomit, it will make me sick to my stomach”) and animals (e.g., “You see maggots on a piece of meat in an outdoor garbage pail”). In another study, participants who were primed with their mortality had an increased preference for an article emphasizing human-animal differences (e.g., “although we humans have some similarities with animals, human beings are truly unique”) instead of an article emphasizing human-animal similarities (e.g., “the boundary between humans and animals is not as great as most people think;” Goldenberg et al., 2001). One question is whether people express heightened negativity because of the creaturely nature of the body, or alternatively, whether there are body-related restrictions imposed by one’s culture (e.g., physical sex). Goldenberg and colleagues (2006) demonstrated that neurotic individuals were less likely to submerge their arms in freezing water (Study 1), use an electronic foot massager (Study 2), or engage in exercise (Study 3) following an MS manipulation. Such persons, however, did not avoid stimulation when non-tactile modalities (e.g., listening to music) were introduced. This provides some evidence that it is the threat of the physical body and not societal restrictions that individuals try to avoid following reminders of death.

While many instances of human corporeality are escapable (e.g., cleaning blood or excrement), sexual intercourse is an anomalous act. Although it is highly visceral, and possibly connected to mortality concerns, sex can also be intimate and pleasurable (Birnbaum et al., 2014; Goldenberg et al., 2002). According to a TMT perspective, individuals, through their cultural beliefs, can elevate the animalist act into something more significant and meaningful (e.g., making love). In a supportive study, participants were randomly assigned to read an article about the shared creatureliness of humans and animals

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or the cultural differences between them. This was followed by an MS manipulation. Everyone then responded to statements about either physical or romantic aspects of sex (Goldenberg et al., 2002). The results showed that reminders of death, combined with reading about human-animal similarities, led to decreased interest in the physical (but not romantic – i.e., uniquely human) aspects of sex. Liking for sex was rated highly in the human uniqueness condition, as it was not associated with creatureliness. In a different experiment, Goldenberg et al. (2002) demonstrated that persons reported greater accessibility to death-related thoughts when primed with an essay emphasizing human animality and the physicality of sex. Activating instances of romantic love and/or human distinctiveness did not produce similar effects.

To the extent that priming thoughts of death lead people to want to see themselves as distinct from other animals, it makes sense that emphasizing the creaturely aspects of humans should heighten DTA. To test this, Cox et al. (2007b) utilized a word-fragment task to measure mortality awareness. In one experiment, participants were asked to read one of two essays to prime similarities or differences between humans and animals (Goldenberg et al., 2001). This was followed by looking at either disgusting (e.g., unflushed toilet) or neutral (e.g., chair) images. Persons, regardless of essay condition, experienced greater DTA after viewing disgusting pictures but not neutral ones. Utilizing a milder disgust elicitor (i.e., items taken from the Disgust Sensitivity Questionnaire; Haidt et al., 1994), a second experiment demonstrated that priming human-animal similarities led to an increase in mortality awareness as compared to the control condition (i.e., human uniqueness). The findings of Cox et al. are important as they suggest that death concerns become more salient following more subtle reminders of physicality (e.g., using a public restroom, or cutting a finger).

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Heightened MS, in turn, can influence people's attitudes and behavior, with 36 years of TMT work showing increased negativity toward others (e.g., stereotyping, prejudice, aggression; Pyszczynski et al., 2015). Although much work has explored the physical body as an existential threat, research is limited in terms of individual differences in these effects. Mind-body dualism may shed some light in terms of understanding human uniqueness versus physicality.

### **Mind-Body Dualism**

Mind-body dualism generally refers to the belief that the mind and the body are fundamentally different (Forstmann & Burgmer, 2017). Western philosophy can be traced back to Plato (trans. 1948), who believed that “the soul was first born” and “living in the summit of the body.” It is the mind, according to Plato, that survives death to achieve immortality. Descartes (trans. 1984) argued that the mind (i.e., thinking, introspecting, reasoning) and the body (i.e., non-thinking, non-reasoning) are two completely different entities. Although the dualistic explanation of the mind-body relationship has been largely rejected following the development of neuroscience, mind-body dualism is still prominent among laypeople and even in the scientific community around the world (Churchland, 1984; Stanovich, 1989). For instance, many college students (i.e., 44%) and one-third of healthcare workers believe that the mind and the brain are separate entities (Demertzi et al., 2009; Stanovich, 1989). Regardless of era, mind-body dualism generally assumes that the mind is inside the body (or the brain), but it functions separately with a higher order of reasoning.

There are two forms of mind-body dualism: *implicit dualism* and *explicit dualism*. On one hand, implicit dualism refers to the intuitive perception of oneself as occupying the body, as well as an inborn tendency to understand the minds of others as being unrestricted to their

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bodies (Uhlmann et al., 2008). It has been proposed, from an evolutionary perspective, that people with dualistic beliefs have two different cognitive systems: one for physical objects and the other for social entities (Bloom, 2007). For example, neuroscience research has found that the temporoparietal junction in persons' brains becomes activated when contemplating others' reasoning but not their physical existence (Saxe & Kanwisher, 2003). Theory of mind, in turn, is a social-cognitive skill focused on the ability to think about mental states (e.g., thoughts, beliefs, desires, emotions, knowledge, etc.), both in yourself and others (Bering, 2006). Evolutionarily it is important to know that others have different thoughts from the self, although it might lead to the dualistic belief about the incongruence between mind and body (Antony, 2006; Wellman et al., 2001). Overall, the idea of implicit dualism demonstrates how people might naturally experience their mental states differently from that of the physical body, thus promoting a more dualistic view.

On the other hand, explicit dualism is a deliberate belief system related to cultural experiences. This mainly involves the belief in a mental, non-physical, or soul-like construct that can separate from and exist without physicality, and possibly survive death (Bering, 2006). It is also assumed by dualists that some, if not all, mental processes cannot be explained by physical causes (i.e., independent existence of the mind). For instance, a separable mind-body relationship is a foundation of various supernatural beliefs (i.e., religion, afterlife, reincarnation, spirits of the deceased, & extrasensory perception; Bering, 2006; Bloom, 2007; Heflick et al., 2015). Studies have demonstrated that explicit mind-body dualism is positively related to a greater belief in supernatural agents, gods, and religiosity (Riecki et al., 2013; Willard & Norenzayan, 2013). Importantly, it is believed that the mind or soul can live independently of the body. Research has shown that reminding people about

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a neurological explanation for mental processes decreased their belief in the soul; however, emphasizing a gap in neurological knowledge increased soul belief (Preston et al., 2013). This finding suggests that although individuals have an innate tendency of being implicit dualists, explicit belief in mind-body dualism may change based on education/knowledge acquired later in life.

### **TMT and Mind-Body Dualism**

Does holding a more dualized belief in the mind-body relationship affect people's terror management processes? Heflick and colleagues (2015) conducted three experiments to examine whether MS and dualism interact to influence people's belief in an afterlife. In Study 1, participants completed a mind-body scale (e.g., "My self is distinct from my physical body"), after which they were randomly assigned to answer questions about death or a neutral topic (i.e., an unexpected outcome). Everyone then completed a 3-item scale to indicate his/her state-level belief in life after death (e.g., "At this moment, I am confident that there is an afterlife"). The results revealed that MS boosted belief in an afterlife only in persons who scored high on the trait of dualism. Whereas the first experiment focused on the personality characteristic of dualism, a follow-up study explored manipulating mind-body beliefs. Heflick et al. began by randomly assigning participants to write about one of three topics: their physical self, their non-physical self (i.e., thoughts & personality), versus their college experience (i.e., control condition). After the dualism manipulation, participants received the same MS prime and afterlife belief measure as used in Study 1. The results showed that when dualism was manipulated (i.e., when participants wrote about their non-physical self), the belief in an afterlife increased following reminders of death.

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A third experiment was conducted using a more experiential manipulation of dualism. Specifically, researchers used a P300 speller, a communication tool, which enables a computer to write based on emitted brain signals. The device thus works by analyzing the electrical signals produced by persons' brains (i.e., 16 electrodes) as they focus on letters and numbers in a matrix. This enables individuals to type without the use of their hands (i.e., external body). To the extent that the P300 accurately produces (i.e., "types") the letters that participants focus on – and thereby exerting an influence on the outside world with only their thoughts and mind – dualistic beliefs should be primed. Importantly, this should not be the case when the speller produces inaccurate results. The researchers utilized the natural inherent variability of the P300 speller as manipulation of mind-body dualism in Study 3. This was followed by an MS prime, and the afterlife belief scale used in the prior experiments to examine whether afterlife belief was increased after mortality was made salience along with the dualistic experience of the mind-body relationship. The results showed that participants expressed more life after death belief when thoughts of mortality were salient along with greater P300 accuracy. This feedback suggested to individuals that their mind was operating independently of the body (i.e., dualism). When the speller was inaccurate, however, MS did not affect afterlife belief scores. Taken together, Heflick et al.'s work suggest that being high in mind-body dualism (i.e., trait or state) enhances a belief in a life after death to ameliorate existential anxieties.

Although this work begins to lay the foundation for understanding dualism within a TMT framework, it is limited in terms of the primary focus on afterlife beliefs. To make the case that dualism is threatening because of its connection to death, it seems important to explore terror management defenses (i.e., DTA, worldview defense) more generally. For



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example, today with elevated health concerns more salient (i.e., COVID-19), with associated increases in mortality salience (e.g., Cox et al., 2021), perceiving the mind as being distinct from the body may hamper people's openness to health (e.g., vaccinations) and political information as they regard their body as a *shell* for their self and ignore their body (Forstmann et al., 2012). The present research was thus designed to explore the associative link between the dualist belief of mind versus body on the accessibility of mortality-related thoughts (i.e., Study 1) and defense of one's cultural beliefs (Study 2). Given the animal nature of the human body, greater mind-body dualism should ameliorate death-related concerns and the need to validate one's worldview. For persons who see the mind as being interconnected with the body (i.e., low dualists), however, activating thoughts of human creatureliness should pose a threat, thereby increasing DTA, which would promote the need for defense.

### **The Current Research**

There is a large literature within the TMT tradition that demonstrates heightened negativity toward the self and others when the animality and physicality of the human body are salient (e.g., Goldenberg et al., 2000). These effects can be explained, in part, by the association of the physical and animal body with mortality awareness. Mind-body dualism, however, could potentially impact heightened death-related concerns as this worldview denies the physicality of human beings through the transcendence of the mind. Integrating these two perspectives, the current research examined whether dualist thoughts act as a buffer against creaturely concerns regarding the human body. For Study 1, participants were randomly assigned to read one of two essays used extensively in prior terror management research (e.g., Cox et al., 2007b; Goldenberg et al., 2001). The purpose of doing this was to

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activate how humans are similar (or different) from other animals. This was followed by a second manipulation whereby individuals were asked to read about the mind as a function of the body (i.e., physicalism) or how the two were distinct from one another (i.e., dualism; Forstmann et al., 2012). The dependent variable was a word-fragment task designed to measure the accessibility of death-related thoughts (e.g., Greenberg et al., 1994). It was hypothesized that dualist belief activation should ameliorate the effects of creaturely concerns on heightened DTA. However, when the mind and body were perceived as being intricately connected, an animal similarity essay (vs. human distinctiveness) should result in greater mortality awareness.

What are some of the carryover effects of heightened death cognition? A large literature has found that people become more judgmental, aggressive, stereotypical, and prejudicial following MS (see e.g., Pyszczynski et al., 2015 for a review). This is even the case when human/animal similarities are made salient (Landau et al., 2006). Study 2 explored the carryover effects of increased DTA from the creaturely essay and mind-body dualism primes used in the first experiment. To measure worldview defense, participants were given two essays, presumably written by foreigners in the United States. One was in favor of U.S. (e.g., “America is truly a great nation”), while the other was against it (“[America] thinks it’s a great country but it’s not”). Everyone was asked to evaluate each essay’s author to assess worldview defense. It was hypothesized that more belief in physicalism (i.e., a mind/body overlap) should lead to greater belief validation in response to an animal nature manipulation. This should not be the case for individuals who are high in mind/body dualism.

### **Study 1**

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Given that the physical body has the potential to provoke DTA, a dualistic approach to the mind-body problem might have an impact on mortality awareness. To protect themselves from perceived existential anxieties, people may deny their physicality and seek meaning in mental activities such as love and interpersonal connection (e.g., Plusnin et al., 2018). A dualistically perceived mind (i.e., separable from the body) may provide protection and transcendence from death concerns when confronted with human creatureliness. It was thus hypothesized that individuals primed with low dualism (i.e., physicalism) will show higher DTA in the creatureliness condition (i.e., human/animal similarity). When mind/body separation was made salient, however, there should be no increase in death cognition when confronted with a creaturely body threat.

### **Participants**

Participants were 309 persons recruited from MTurk (Amazon's Mechanical Turk). This was enough individuals based on a between-subjects analysis of variance (ANOVA) design with a power set at .80 ( $p \leq .05$ ) for medium effect size (G\*Power 3.1; Faul et al., 2009; see e.g., Burke et al., 2010 for meta-analytic results for TMT effects). The participants were all born in the U.S., as well as their parents (see Table 1 for demographic information).<sup>1</sup> Everyone received \$1 for their participation. Given that dualistic belief is popular among lay people (Riecki et al., 2013), MTurk participants were recruited given their more diverse backgrounds.

### **Table 1**

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<sup>1</sup> Following LeVay et al. (2016), additional analyses were performed to see if the demographic characteristics of age, gender, race and ethnicity, income, marital status, religious ideology, and political orientation affected the obtained results. None were significant covariates; further, the obtained results did not change when such demographic variables were included in analyses. These results, however, should be interpreted with caution given that a much larger sample of participants is needed.

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*Sample Demographic Characteristics (Study 1; N = 309)*

	Mean (SD)	Range
Age	42.46 (13.57)	18-77
Political Orientation <sup>2</sup>	4.40 (2.47)	1-9
Religiosity <sup>2</sup>	4.32 (2.88)	1-9
	<i>n</i>	%
<b>Ethnicity</b>		
White/non-Hispanic	257	83.2
Black/African American	26	8.3
Asian	1	.3
Hispanic/Latino(a)	10	3.2
American Indian/Native American	6	1.9
Other	9	2.9
<b>Gender Identity</b>		
Female	197	63.8
Male	107	34.1
Nonbinary or other	5	1.6

**Procedure**

In an online format, participants were presented with an informed consent document to read and affirm before taking part in the study. Once completed, a variety of filler questionnaires (e.g., self-esteem, life satisfaction, meaning in life) were given to maintain the cover story of the experiment (i.e., “personality and attitudes”) and to distract participants from the true purpose of the study in order to get authentic responses. Participants then completed an individual differences measurement for dualism, which was the trait dualism scale (Stanovich, 1989). Participants were then randomly assigned to either one of two essay conditions: (a) how humans are like other animals (i.e., creatureliness condition) or (b) how humans are distinct from other animals (Goldenberg et al., 2001). After this prime,

<sup>2</sup> Responses were made on a 9-point scale: 1 = very liberal, 9 = very conservative; 1 = not at all religious, 9 = very religious.

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participants were randomly assigned to read one of two vignettes for the dualism versus physicalism prime. In the dualism condition, a short text about mind-body separation was presented, while in the physicalism condition, participants read about the inseparability between the two entities (Forstmann et al., 2012). The dependent variable of interest was DTA scores. This was assessed by having everyone complete a word-fragment measure, whereby 6 of 28 fragments could be completed with death-related themes. At the end of the study, demographic information was collected, and a debriefing was provided.

### **Materials**

#### ***Filler Scales***

**Self-Esteem Scale.** The Rosenberg (1965) self-esteem scale consists of 10 items (e.g., “I feel that I am a person of worth, at least on an equal basis with others”) on a 4-point Likert scale (1 = *Strongly Disagree*, 4 = *Strongly Agree*).

**Meaning in Life Scale.** This measure contains five items (e.g., “My life has a clear sense of purpose”) on a 7-point Likert scale (1 = *Strongly Disagree*, 7 = *Strongly Agree*; Steger et al., 2006).

**Life Satisfaction Scale.** This scale, created by Diener and colleagues (1985), consists of five questions (“The conditions of my life are excellent”) on a 7-point Likert scale (1 = *Strongly Disagree*, 7 = *Strongly Agree*).

#### ***Dualism Individual Difference Scales***

**Trait Dualism Scale.** This scale is an abbreviated version of the Stanovich (1989) scale to measure people’s predisposed belief in mind-body dualism. It contains three items (e.g., “Minds are in principle independent of bodies, to which they are only temporarily attached”) on a 9-point Likert scale (1 = *Strongly Disagree*, 9 = *Strongly Agree*). Given

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critiques about the ambiguity and contradiction between scale items (e.g., Riecki et al., 2013), an abbreviated version of the measure was used in Study 1 ( $\alpha = .82$ ). Items were averaged together, with a higher score indicating greater mind-body dualism.

**Mind-body Overlap Scale.** After the measurement of the dependent variable, participants were given a modified version of the Inclusion of the Other in the Self (IOS; Aron et al., 1992) scale to assess dualistic attitudes. Specifically, there were seven diagrams, each consisting of two circles, one labeled *mind*, and the other labeled *body*. In each diagram, the circles were side by side on a horizon. From the first diagram to the seventh one, the circles started with no overlap and then get closer and closer to each other. The less overlap the circles had meant more mind-body dualism and vice versa. This measurement was included as a manipulation check and a potential individual difference measure to assess mind-body dualism.

### ***Manipulations***

**Creatureliness Prime.** Following Goldenberg and colleagues (2001), participants were randomly assigned to read either an article emphasizing human-animal differences (e.g., “although we humans have some similarities with animals, human beings are truly unique”) or an article emphasizing human-animal similarities (e.g., “the boundary between humans and animals is not as great as most people think”). As a manipulation check, and before the demographic page, participants were asked to complete six items describing their attitudes toward the article author (e.g., “How intelligent do you believe this person to be?”) on a 9-point Likert-type scale (1 = *not at all*; 9 = *very much*). Scores were computed by taking the average of the six items ( $\alpha = .94$ ).

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**Dualism vs. Physicalism prime.** Participants were randomly assigned to either dualism condition or physicalism condition (Forstmann et al., 2012). In the dualism condition, persons read a 320-word text describing mind-body dualism, which concluded, “In sum, the term ‘mind-body dualism’ describes the proposition that a person’s mind and body are two distinct entities.” In the physicalism condition, participants read a 312-word text about physicalism, which concluded that “In sum, the term ‘physicalism’ describes the proposition that a person’s mind and body are both rooted in the same physical substances.” The texts were equivalent in structure with similar arguments and examples, with differences regarding the framing.

### *Dependent Variable*

**DTA.** To measure the accessibility of death-related thoughts, a word-stem completion measure served as the primary variable of interest. This scale was similar to those used by other researchers (e.g., Basilli & Smith, 1986; Gilbert & Hixon, 1991; Tulving et al., 1982). Participants were presented with 28 word fragments (e.g., GRA\_ \_ ), 6 of which could be completed with a neutral (e.g., GRASS) or death-related (e.g., GRAVE) word. This measure has been used successfully in several terror management studies (e.g., Greenberg et al., 1994; also see Cox et al., 2019 for a review). Death accessibility scores were computed as the total number of death-related word completions.

At the end of the packet, participants were asked to provide their reactions to the study and demographic information (e.g., age, gender, religiosity, etc.). See Appendix A for a copy of the materials.

## **Results**

### **Data Analysis Plan**

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Statistical Package for the Social Sciences (SPSS Version 27) was used for all analyses. Data were cleaned based on filter questions (e.g., “I put enough effort in this study”) and attention checks (e.g., “Please select ‘5’ in answer to this question”). Data from 21 participants who did not meet the criteria were filtered from the results. Assumption tests (i.e., normality, homogeneity of variance) were conducted and met. Statistical significance was determined by  $p \leq .05$ . A two-way analysis of variance (ANOVA) was performed to determine whether there was an interaction between creatureliness and dualism primes on DTA scores.

For supplemental analyses, two-way moderated regressions were conducted to examine the interactive effects of the creatureliness manipulation and individual differences in dualism (i.e., mind-body overlap & trait dualism scale) on DTA. For the regressions, dualism scores were centered, and the essay condition was dummy coded. Main effects were entered in Block 1, and the 2-way interaction was entered in Block 2. Follow-up tests for significant interactions included an examination of the simple slopes of the relationship between dualism and DTA within each of the creaturely essay conditions (Rosenthal & Rosnow, 1985). Additionally, differences between creaturely and humanistic essays on death accessibility scores were examined at low ( $-1SD$ ), mean, and high ( $+1SD$ ) levels of mind-body dualism (Aiken & West, 1991). Moderated regression analyses were performed utilizing the PROCESS macro in SPSS (Hayes, 2017).

### **Main Analysis**

A 2 (essay: human uniqueness vs. human animality)  $\times$  2 (vignette: dualism vs. physicalism) between-subjects analysis of variance (ANOVA) was conducted to examine the interaction between essay and vignette on DTA scores. The main effect was significant for



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the dualism vignette,  $F(1, 12) = 3.87, p = .050, \eta^2_p = .013$ , with people in the dualism condition ( $M = 1.89, SE = .08$ ) having higher DTA than people in the physicalism condition ( $M = 1.68, SD = .07$ ). Additionally, there was a marginally significant effect for the creatureliness essay,  $F(1, 12) = 3.67, p = .056, \eta^2_p = .012$ , with people in the creatureliness condition ( $M = 1.89, SE = .08$ ) having higher DTA than people in the human uniqueness condition ( $M = 1.69, SE = .08$ ). However, the interaction was not significant,  $F(1, 12) = .87, p = .351, \eta^2_p = .003$ .

### Supplemental Analyses

Given non-significant ANOVA effects, two additional two-way moderated regression analyses were performed to examine the interaction between creaturely essay and trait dualism (i.e., dualism scale, overlapping circles) on DTA scores. For the 3-item trait dualism scale, the main effects and interaction were non-significant: (a) dualism,  $b = -.01 (SE = .01), t = -.84, p = .401, R^2 = .002$ ; (b) creatureliness,  $b = .18 (SE = .11), t = 1.63, p = .104, R^2 = .009$ ; and (c) 2-way interaction,  $b = -.01 (SE = .02), t = -.80, p = .430, R^2 = .002$  (see Figure 1).

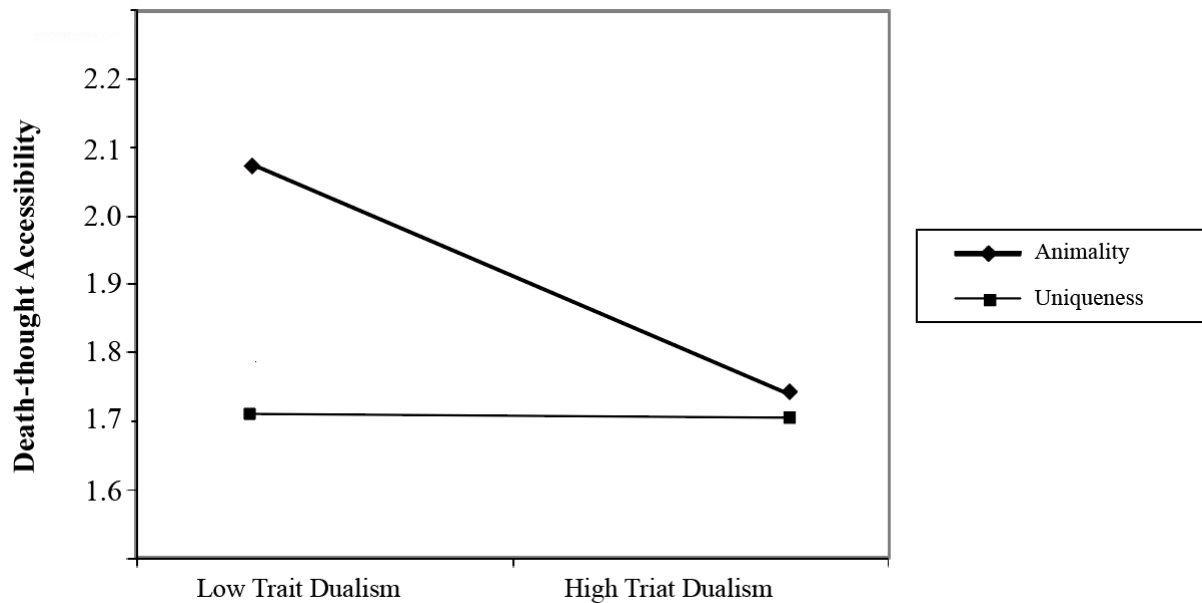
For the overlapping circle measure, both main effects were non-significant: (a) creaturely prime,  $b = .17 (SE = .11), t = 1.58, p = .115, R^2 = .008$ ; and (b) mind-body overlap,  $b = .01 (SE = .03), t = .20, p = .838, R^2 = .001$ . However, the interaction was significant (see Figure 2),  $b = .16 (SE = .06), t = 2.65, p = .008, R^2 = .023$ . Follow-up tests (i.e., simple slopes) showed that people who read the animality essay reported to have higher DTA if they perceived the mind and body as being more integrated with one another,  $b = .06 (SE = .04), t = 1.98, p = .048, R^2 = .013$ . There was no difference between high versus low mind-body dualists within the human uniqueness condition,  $b = -.08 (SE = .05), t = -1.78, p = .077, R^2 = .001$ .

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= .010. Looked at differently (i.e., group differences at  $\pm 1SD$  on dualism), participants who read about human animality demonstrated significantly higher DTA than people who read about human uniqueness when high mind/body overlap was endorsed,  $b = .45$ , ( $SE = .15$ ),  $t = 3.00$ ,  $p = .003$ ,  $R^2 = .029$ . However, there were no significant differences between the two essays at moderate,  $b = .17$ ,  $SE = .11$ ,  $t = 1.59$ ,  $p = .115$ ,  $R^2 = .008$ , and low levels of mind-body overlap,  $b = -.11$ ,  $SE = .15$ ,  $t = -.75$ ,  $p = .454$ ,  $R^2 = .002$ .

**Figure 1**

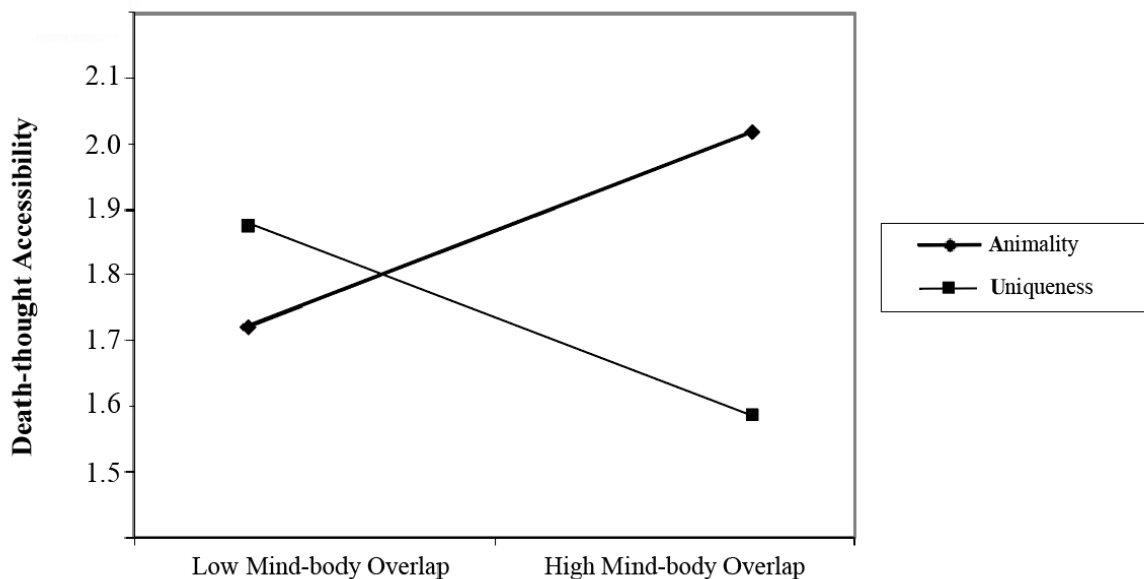
*2-way Interaction between Creatureliness Essay and Trait Dualism Scale.*



**Figure 2**

*2-way Interaction between Creatureliness Essay and Mind-body Overlap.*

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### Discussion

Given the terror management literature demonstrating that the human body is problematic because of its connection to death, the current study was interested in whether high mind-body dualists would respond to a creaturely essay with reduced death-related concerns. (Alternatively, persons who see the mind and body as being intricately connected should respond to an essay emphasizing the similarities between humans and animals with greater mortality awareness.) The results of Study 1 partially supported these hypotheses. Specifically, although the primary aim of this work was to examine the 2-way interaction between the creaturely (vs. humanistic) essay and the dualism (vs. non-dualism) prime on the accessibility of mortality-related thoughts, these findings were non-significant. Exploratory analyses, however, examining the 2-way interaction between dualism, as assessed as an individual difference (i.e., overlapping circles), and creaturely essay condition emerged as being significant. Participants who perceived the mind as having more of an overlap with the body experienced heightened death-related thoughts after they read the essay emphasizing

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how human beings were no more than animals. Individuals who perceived the mind and the body as separate entities, in turn, were protected from the existential threat of human animality.

There are a couple of reasons why the dualism manipulation may not have worked. First, although the mind-body debate has dominated philosophical and religious discussions for thousands of years, this is a relatively ignored topic in psychological research. To my knowledge, only a handful of published papers have utilized a dualism prime with significant effects (i.e., Burgmer & Forstmann, 2018; Burgmer et al., 2018; Forstmann et al., 2012; Heflick et al., 2015). (It should also be noted that the manipulation in all papers was used in isolation rather than in conjunction with other primes.) Future research would benefit from having a better understanding of manipulating dualist beliefs – for instance, whether people understand the concept of dualism, the potency of the prime, the role of other moderating variables (e.g., religion, spirituality), and so on. Second, there may have been a *double-dose* of physicalism because of the use of both dualism and creaturely essays within the same study. Given that the physicalism vignette suggested that all activities, including mental ones, were physical, it had the potential to serve as a prime for human physicality just like the creatureliness essay had done. Additional research should consider this by using other manipulation types (e.g., the subliminal presentation of the word *mind*, *body*, & *dualism*), or in the use of individual difference measures.

Additionally, it should also be noted that the results of Study 1 only worked in conjunction with one (i.e., overlapping circles), but not both, measures of predisposed mind-body dualism. (The pattern of results, however, was consistent across the two scales.) Although somewhat problematic, it also makes sense given that the Stanovich (1989)

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measure was not given in its entirety. Not only has this scale been criticized because of its ambiguity and contradictory nature (Riecki et al., 2013), but the pilot results of another study also demonstrated similar problems. I had hoped the use of fewer items would resolve this issue, but there may be a larger concern on how best to operationalize mind-body dualism as a theoretical construct to one that can be easily manipulated and measured.

Considering the significant effects of Study 1 regarding the dualism scale (i.e., circles) and creaturely essay prime, the following experiment utilized this measure and manipulation in its design with two notable changes. First, in Study 1, the mind-body measure was placed later in the study, following the independent and dependent (i.e., DTA) variables. This is not ideal as priming thoughts of creatureliness and/or dualism may have affected people's perception of the body and the mind. For Study 2, the overlapping circle measure was moved before the creaturely essay manipulation (i.e., embedded within the personality questionnaires at the start of the experiment). Second, whereas the prior study was primarily focused on the accessibility of death-related concerns, the following experiment was interested in the carryover effects of heightened mortality awareness on worldview defense.

### **Study 2**

From the perspective of TMT, people use their cultural beliefs as a protective shield when mortality concerns are salient (e.g., Pyszczynski et al., 2015). This is even the case for mind-body dualists who have been shown to report a greater belief in life after death following MS (Heflick et al., 2015). If the creaturely body is threatening, however, because of its connection to potential death and decay, this suggests that physicalists (i.e., low dualists) should be more defensive than high dualists because of elevated mortality

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awareness (i.e., Study 1). Study 2 was designed to test this possibility. Individuals were asked to complete a measure of mind-body dualism (i.e., overlapping circles; Forstmann et al., 2012), followed by an essay emphasizing either the similarities or differences between humans and animals. The dependent variable of interest was the participants' evaluation of two essays: one in favor of the United States and one against it. This served to assess worldview defense (see e.g., Greenberg et al., 1992 for similar procedures). It was hypothesized that people who were high on mind-body overlap would react to a human/animal similarity prime with an increased need to validate their beliefs (i.e., preference for the pro-American essay and disliking the anti-American one). As a belief in mind-body dualism may protect individuals from physicality through a mental transcendence, participants low in mind-body overlap (i.e., high mind-body dualism) should demonstrate less defensiveness (i.e., no preference for the pro-American essay).

### **Participants**

Participants were 229 MTurk workers who were born in the U.S., along with their parents (see Table 2 for demographic characteristics).<sup>3</sup> The sample size was slightly below the minimum number of 257 participants with a power set at .80 ( $p \leq .05$ ) for medium effect size (G\*Power 3.1; Faul et al., 2009). Everyone received \$1 for his/her participation.

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<sup>3</sup> Following Study 1, demographic variables did not affect the obtained results.

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**Table 2***Sample Demographic Characteristics (Study 1; N = 229)*

	Mean (SD)	Range
Age	42.69 (13.51)	21-78
Political Orientation	4.64 (2.48)	1-9
Religiosity	4.13 (2.98)	1-9
	<i>n</i>	%
Ethnicity		
White/non-Hispanic	190	82.8
Black/African American	24	10.3
Asian	1	.4
Hispanic/Latino(a)	9	3.9
American Indian/Native American	2	.9
Other	3	1.3
Gender Identity		
Female	134	58.4
Male	93	40.3
Nonbinary or other	2	1.3

**Materials and Procedure**

The materials and procedure were identical to Study 1 aside from the change in mind-body dualism (i.e., individual differences vs. prime), along with assessing worldview defense as the dependent variable of interest. The mind-body dualism measures were presented before the creatureliness essay manipulation; counterbalanced with the other filler tasks described in the first experiment (i.e., self-esteem, life satisfaction, & meaning in life).

***Delay Scale***

Evidence suggests that worldview defense is more likely to emerge when thoughts of death are primed but not in the focus of current attention (Pyszczynski et al., 1999).

Therefore, participants were asked to complete the Positive and Negative Affect Schedule

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(PANAS; Watson et al., 1988) to provide a delay as this method has been most widely used in TMT research. These measures were placed between the creatureliness essay manipulations and the dependent variable.

### *Pro- and Anti-American Essays*

The dependent variable measure consisted of two essays that participants were asked to read and evaluate (Greenberg et al, 1992). Individuals were told that the essays were written by other MTurk workers living in the United States and that they were randomly assigned to read two essays from a much larger pool. In the pro-American passage, individuals read, “In this country, people have more opportunity for success than in any other and success does not depend on the group belong to” and “While there are problems in any country, America truly is a great nation, and I don’t regret my decision to come here at all.” Conversely, in the anti-American essay, the essay included, “Americans are spoiled and lazy and want everything handed to them” and “America is a cold country that is insensitive to the need and problems of foreigners. It thinks it’s a great country but it’s not.” Both essays were counterbalanced to eliminate any order effects.

Five questions were included to measure people’s reactions to the essays. Following each passage, participants were asked, “How much do you like this person?” “How intelligent is this person?” “How knowledgeable is this person?” “How much do you agree with this person’s opinion of America?,” and “From your perspective, how true do you think this person’s opinion of America is?” People rated their responses on a 9-point scale ranging from 1 (*not at all*) to 9 (*totally*). Scores were calculated by taking the mean response for all five questions for the pro-American essay ( $\alpha = .92$ ) and the anti-American essay ( $\alpha = .94$ ).



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An overall score was obtained by subtracting the anti-American score from the pro-American one. Therefore, a higher score indicated an increased preference for the United States.

Upon study completion, everyone was asked to provide demographic information, reported their reactions to the study, and was thoroughly debriefed.

### Results

#### Data Analysis Plan

The data analysis plan followed the first experiment (i.e., SPSS 27). Twenty-one participants were filtered from Study 2 based on embedded attention check questions. Assumption tests were performed and met for both moderated regression results (e.g., Independence, Normality, Homoscedasticity, Linearity). Statistical significance was determined by a  $p$ -value  $\leq .05$ . Two moderated regressions were performed to explore the interaction between (a) trait dualism (centered) and (b) mind/body overlap (centered) with the essay condition (dummy coded) on worldview defense scores. Utilizing the PROCESS macro for SPSS (Hayes, 2017), the main effects were entered in Step 1, followed by the 2-way interaction in Step 2. Follow-up tests included simple slope (Rosenthal & Rosnow, 1985) and regions of significance tests (Aiken & West, 1991).

#### Primary Analyses

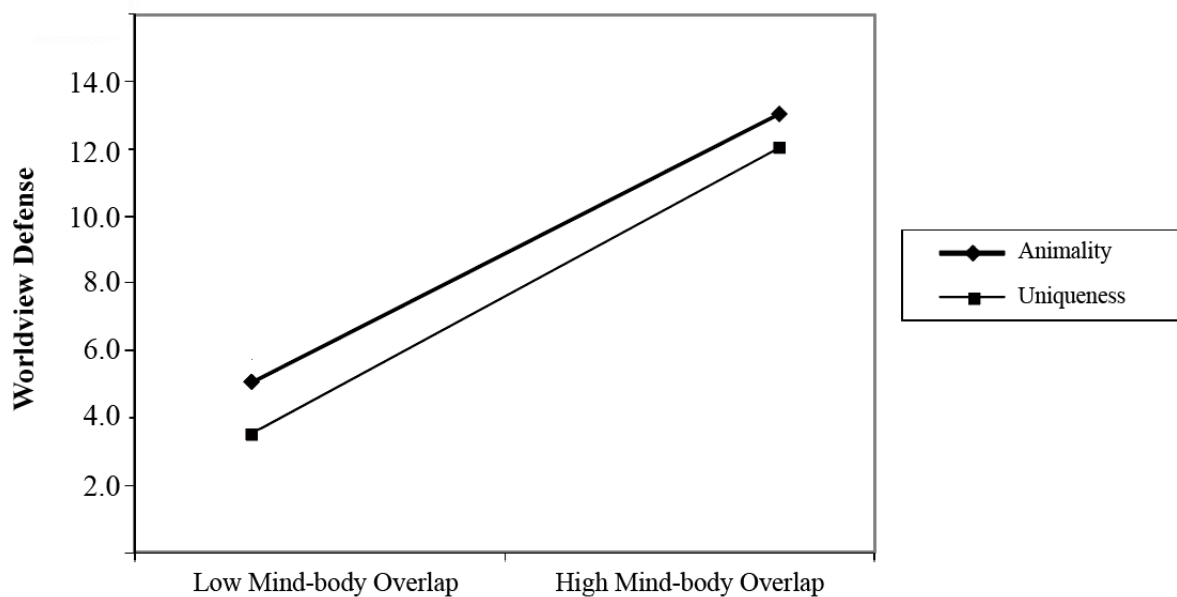
A moderated regression was performed on worldview defense scores. There was a significant main effect of predisposed mind-body overlap,  $b = 1.11$ ,  $SE = .57$ ,  $t = 1.93$ ,  $p = .054$ ,  $R^2 = .016$ , with low (as compared) to high dualists exhibiting a greater defense of their cultural beliefs. The main effect of creaturely essay was non-significant,  $b = 1.20$ ,  $SE = 1.78$ ,  $t = .68$ ,  $p = .499$ ,  $R^2 = .002$ , as was the 2-way interaction between dualism and essay prime (see Figure 3),  $b = -.06$ ,  $SE = 1.15$ ,  $t = -.05$ ,  $p = .961$ ,  $R^2 \leq .001$ .

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A moderated regression was also performed on defense scores. Both main effects and 2-way interaction was non-significant (see Figure 4): (a) trait dualism,  $b = .09$ ,  $SE = .15$ ,  $t = .61$ ,  $p = .540$ ,  $R^2 = .002$ ; (b) creatureliness essay,  $b = .84$ ,  $SE = 1.79$ ,  $t = .47$ ,  $p = .640$ ,  $R^2 = .001$ ; and (c) interaction,  $b = -.00$ ,  $SE = .30$ ,  $t = -.01$ ,  $p = .992$ ,  $R^2 \leq .001$ .

**Figure 3**

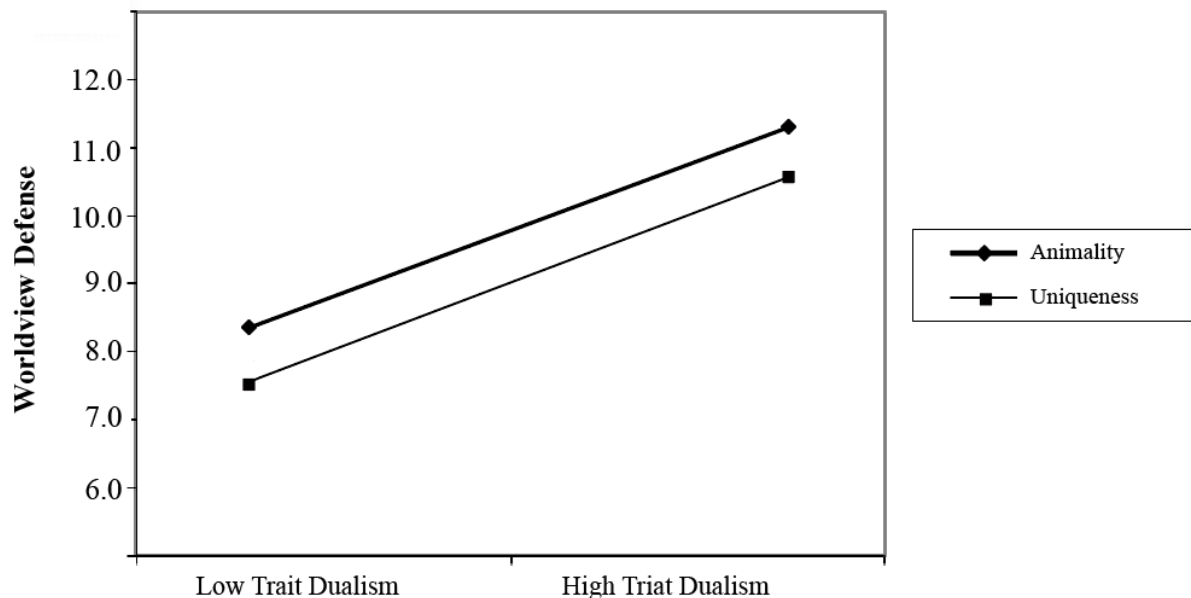
*2-way Interaction between Creatureliness Essay and Mind-body Overlap.*



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**Figure 4**

*2-way Interaction between Creatureliness Essay and Trait Dualism Scale.*



### Discussion

Given that a creaturely essay increases death-related concerns for low mind-body dualists as compared to their high-scoring counterparts (i.e., Study 1), the goal of Study 2 was to examine possible carryover effects on participants' defense of their cultural beliefs. Although it was expected that persons scoring low on dualism would exhibit more of a pro-American bias when animal-nature concerns were made salient, this was not the case as non-significant effects emerged. These results were not specific to the overlapping scale (i.e., circles) measure as similar non-results were found for Stanovich's (1989) trait scale too.

There are several limitations with the current study that need to be addressed. First, as previously mentioned, there may be a problem in exploring mind-body dualism and creaturely concerns within the same study. Although the overlapping circle measure was moved from the end of the experiment (i.e., Study 1) to the start (i.e., Study 2), the order of

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the questionnaires may have activated concerns about the physicality of the human body, thereby affecting participants' perceptions of and reaction to the animal versus human essays. This is a problem in the general TMT literature regarding the timing and saliency of individual difference measures. For example, Jonas and Fischer (2006) found that people with high intrinsic religiosity reported greater resistance to an MS prime if their religious beliefs were affirmed before the manipulation. Simply having people complete the individual difference scale can activate their beliefs, therefore eliminating MS effects. Something similar may have occurred in the second experiment.

Second, the worldview defense measure may not have been the best choice considering the topic under investigation (i.e., dualism, creaturely concerns). This scale has been used approximately 47% of the time in the TMT literature (Burke et al., 2010), influencing its inclusion in the current work. However, pro-and anti-American essays are commonly used after an MS manipulation whereby people are asked to think about their death and not their animal nature. There is scarce empirical evidence to suggest that a creatureliness prime should increase nationalistic worldview defense. Of the work that has been done, heightened mortality concerns stemming from the creatureliness of the body have been found to influence attitudes toward human/animal similarities, disgust towards bodily products, and the avoidance of body sensations (e.g., a massage; Goldenberg et al., 1999; 2000). Future work would benefit by changing the outcome measure of defense as used in Study 2; for example, given this research has implications for reactions to the current COVID-19 pandemic, studies could potentially examine people's willingness to get vaccinated, receive a booster, wear a mask, and social distance. Alternatively, instead of

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using a creaturely essay prime, future studies could utilize a traditional MS manipulation to see how it interacts with dualist beliefs on worldview defense.

Finally, the non-significant results of Study 2 could be due to an insufficient delay between the independent and dependent variables. The current study only used the 20-item PANAS as part of the questionnaire design. Returning to the meta-analytic results of Burke and colleagues (2010), researchers found that stronger MS effects emerge when there is a longer delay (i.e., 7-20 min) period as compared to a shorter one (i.e., 2-6 min). Although the timing of the delay may have been a factor in the current experiment, this is a tough question to answer given that reminders of death were not primed directly. Specifically, research also suggests that DTA and worldview defense should be assessed immediately following primes associated with mortality but not death per se (e.g., cancer, illness; Burke et al.).

### **General Discussion**

Building on terror management and dualism literature (e.g., Goldenberg et al., 2000; Heflick et al., 2015), the current research was interested in whether threats associated with the creaturely body would increase mortality-related concerns and defense of one's beliefs for individuals who see the mind and body as being connected (i.e., low dualism) versus apart (i.e., high dualism). This was supported in the first experiment whereby low dualists, as compared to their high-scoring counterparts, experienced greater DTA in response to an animal-nature prime (vs. a humanistic one). There was no difference between essay conditions for high mind-body dualists. Study 2, in turn, explored a change in worldview defense scores for low and high mind-body dualists as a function of creatureliness manipulation. Although the 2-way interaction was not significant, suggesting an animal nature threat and a mind-body dualism belief do not interact to make people more defensive,

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a predisposition toward dualism itself (i.e., main effect) emerged as a buffer. In other words, American individuals scoring low on dualism were more likely to adhere to their cultural beliefs while those scoring high on this trait do not.

The results of the present work extend past research in several different ways. Heflick and colleagues (2015) were the first, and only to my knowledge, to explore mind-body dualism within a TMT perspective. Findings from three experiments demonstrated that higher mind-body dualists (i.e., both trait & state) respond to MS with a greater belief in an afterlife. Whereas Heflick et al. were primarily interested in how reminders of death affect the life after death beliefs of mind-body persons, the current studies were interested in whether mortality concerns emerge on their own when the physicality of the body is made salient. These results are noteworthy for a couple of reasons. First, I found that thoughts of physicality – that is, being aware of the animal nature of humans and adhering to an overlap between mind and body – can increase existential concerns in individuals (i.e., higher DTA). Given the 36 years of terror management research demonstrating that greater morality awareness is associated with heightened negativity in thoughts, attitudes, beliefs, and behaviors (e.g., aggression, prejudice, stereotypes; see e.g., Pyszczynski et al., 2015), having a better understanding of factors that give rise to death concerns is of importance. Second, although unexpected, the findings from Study 2 showed that dualism on its own increased a defensive response among persons; that is, low dualistic participants exhibited a more pro-American bias than higher scoring ones. It could be that an animal nature prime is not needed to demonstrate a terror management effect on defensive beliefs (Study 2) but not death cognition (Study 1). Alternatively, or in addition, heightened mortality awareness may have given rise to the worldview defense of low dualists in the second experiment. This is purely

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speculative as DTA was not assessed as a mediator between the different variables of interest. Further research is needed to explore such possibilities.

Additionally, the current findings add to the general TMT literature on the creaturely body (e.g., Goldenberg et al., 2000). According to this work, the human body is a problem because it reminds us of our animal nature and ultimate demise (Goldenberg et al., 1999; 2002). Research has predominately focused on the effects of MS on people's reaction to physical versus romantic sex (Goldenberg et al., 1999; 2002), the human form (Goldenberg et al., 2001), attitudes toward women (e.g., pregnancy, lactation; Cox et al., 2007a; Goldenberg et al., 2007), and body sensations (Goldenberg et al., 2006). Only one series of studies have explored the association between physicality and mortality awareness, demonstrating that people exhibit increased DTA when the animal nature of humans is made salient (Cox et al., 2007b). Study 1 takes a similar approach using a word-fragment task to assess mortality concerns after priming human/animal similarity and takes one step forward by examining the moderating role of mind-body dualism, which shows that mortality awareness increases in reaction to the physicality of the body as compared to human uniqueness for those low in dualism. Study 2, importantly, extends upon Cox and colleagues (2007b) work to explore whether people become more defensive (in general) when death concerns are (presumably) made salient from animal nature primes. Further, whereas a bulk of TMT research on the creaturely body has examined neuroticism as a moderating variable (Goldenberg et al., 1999; 2006), the present studies suggest that people's view of the mind-body relationship also moderated whether they would perceive their body as being existentially threatening.

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Finally, even though dualism is well argued in other disciplines, such as philosophy and religion, little is known about the psychological implications of holding such a worldview. Of the work that has been done, research has found that dualism is related to religiosity and supernatural beliefs, as supernatural entities (e.g., God) are typically perceived as agents who are lacking a body (Bloom 2007; 2012); mind-body dualism is a cross-cultural phenomenon and has an inborn tendency (Roazzi et al., 2013); and there is a large range of individual differences on the spectrum from monism to dualism (Lindeman et al., 2015; Willard & Norezayan, 2013). Burgmer and colleagues (2018) found that dualist beliefs were associated with free will in that greater mind-body separation was related to a tendency to see humans as having a choice over their destiny. Although the exact cause of this relationship is unclear, researchers proposed that both constructs represent a more intuitive style of thinking rather than a rational one. Forstmann et al. (2012) and Burgmer and Forstmann (2018) also showed that a greater endorsement of mind-body separation was associated with reduced health-promoting behaviors (i.e., willingness to exercise, eating healthy). If the mind is thus less dependent on the physical form for which it resides, then such a view of mind-body relations should lead to greater neglect of physical health.

The current work also focused on the physicality of the body with implications for existential psychology. Unlike Forstmann et al. (2012) and Burgmer and Forstmann (2018), body-related attitudes were included as an independent variable to moderate dualism beliefs. Future studies should continue to explore the overlap between physicality and mortality awareness. Utilizing a terror management health model (TMHM; Goldenberg & Arndt, 2008) may be of particular interest as individuals respond differently to health-related outcomes when death concerns are salient versus non-salient. According to TMHM, when



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death is in focal attention, people repress death concerns by engaging in health-promoting behavior. However, after a delay when death is out of attention, people engage in symbolically self-enhancing behaviors but not necessarily healthy ones. For instance, females express greater interest in sun-protecting products (e.g., hats, sunscreen) when MS is in focal attention (Routledge et al., 2004). When tanned skinned is associated with attractiveness (i.e., self-esteem), however, women report higher tanning motivations following a delay, when thoughts of death are on the fringes of attention. Maybe a similar phenomenon is happening with individuals scoring high (vs. low) on mind-body dualism. The separation of the mind from physicality may be symbolic self-protection from death thoughts (e.g., “If I physically die, my soul will continue”) and result in fewer health concerns. The terror management effects with mind-body dualism, along with implications for the physical body and health-related outcomes, is a direction for future studies.

There are some limitations with the current work that warrant discussion. The first involves the limitation of statistical power. Although Study 1 met the minimum participant requirement based on an a priori power analysis, Study 2 fell short of its number. Adding to this, given the use of MTurk participant samples, researchers have proposed the need to control for important demographic characteristics (e.g., age, gender, race, etc.) to obtain a more representative sample of participants (LeVay et al., 2016). A much larger number of individuals were needed in the current work to meet the needs of statistical power while also including multiple covariates in each model. A second limitation is in the use of MTurk samples in and of itself. According to LeVay and colleagues, Amazon Turk workers are usually younger, more politically liberal, have lower income, are less racially diverse, and score lower in religiosity as compared to the more general population of Americans. Within

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the terror management literature, males are more likely to defend their beliefs in nationalistic ways while females exhibit a greater preference for close relationships (Arndt et al., 2002). Other work has demonstrated that older adults are less defensiveness than their younger counterparts when reminders of death are salient (Maxfield et al., 2007); this effect, however, is eliminated when higher-aged persons are more cognitively healthy (i.e., executive function; Maxfield et al., 2012). Future research would thus benefit from replicating the current findings with more variability in demographic characteristics.

A better understanding of mind-body dualism is additionally warranted. It might be more difficult to measure dualistic beliefs using a self-report questionnaire. Given the conceptualization of the mind versus the body among laypeople is typically non-verbalized, implicit, and outside of focal attention (Riekkki et al., 2013), a self-report measure, such as Stanovich's scale (1989), might be less effective as compared to something that directly involves actual actions. This may be why significant results emerged with the overlapping circle measure in Study 1 in that the pictorial representations of the mind/body relationship may have been intuitively easier to understand. Additionally, although already discussed, future research would benefit from not only understanding trait levels of dualistic beliefs but also state ones. The mind-body prime utilized in Study 1 was taken from prior research by Forstmann and colleagues (2012). There may have been more success if I used Heflick et al.'s (2015) manipulation in which researchers had participants write about the separation (vs. unity) of the mind and body rather than reading about it. An analysis of written results would further be beneficial in seeing whether existential concerns naturally arise when people hold (or do not hold) dualistic beliefs.

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Despite these limitations, and others noted elsewhere, the implications of this work are important for a couple of reasons. How individuals view the mind and the body can affect psychological and medical treatment decisions. A lack of dualism, from a patient perspective, may make them less receptive to non-biological explanations of their illness (e.g., psychosomatic; Duncan, 2000). Adopting such a view can also have consequences for what is considered healthy (Burgmer & Forstmann, 2018; Forstmann et al., 2012), and lifestyle choices (e.g., diet, exercise), even in non-medical settings. For practitioners, holding monistic beliefs may make them isolate patients' well-being from that of their physical self; this, in turn, can lead to an over-concentration on treating the diseased body while neglecting the psychology of the mind (Mehta, 2011). As argued elsewhere (Burgmer & Forstmann, 2018; Switankowsky, 2000), it is important to consider a more interactive approach to medicine by seeing patients as more than their diseased bodies. Alternatively, people holding more dualistic beliefs may overlook the physical health and biological aspects of treatment as a result of overemphasis on the mental aspects (Forstmann et al., 2012). Given the role of existential concerns in both doctor and patient samples (see e.g., Goldenberg & Arndt, 2008), having a better understanding of how mind-body beliefs interacts with mortality salience would be informative for treatment and medical-decision making.

Overall, although mind-body dualism has been criticized by science (e.g., Riecki et al., 2013), the current research reveals a plausible benefit of maintaining such belief as it buffers against mortality awareness. This is especially worth noting as we are still living in a pandemic (or "post-pandemic") when we are reminded about the vulnerability of our bodies to illness and death daily. This, along with our predisposed belief in the mind-body relationship, may impact our attitudes and behaviors in ways that we are usually not aware

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of, such as people's attitudes towards vaccination, healthcare, mask-wearing and social distancing. It is thus important to explore the intersection between terror management and dualistic attitudes in an attempt to raise awareness about how we view our minds and bodies, how this may affect us, and to identify potential remedies to reduce the existential dilemma of the creaturely body for which we reside.

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**Appendix****Materials**

## Self-Esteem Scale

This questionnaire is designed to give a better picture of you as an individual. Enter the number in the space provided that most accurately describes how you feel about yourself in general. Please answer as truthfully as possible taking into account what is generally true about the way you would describe yourself.

1 = Strongly Disagree

2 = Disagree

3 = Agree

4 = Strongly Agree

\_\_\_\_\_ 1. I feel that I am a person of worth, at least on an equal basis with others.

\_\_\_\_\_ 2. I feel that I have a number of good qualities.

\_\_\_\_\_ 3. All in all, I am inclined to feel that I am a failure.\*\*

\_\_\_\_\_ 4. I am able to do things as well as most other people.

\_\_\_\_\_ 5. I feel I do not have much to be proud of.\*\*

\_\_\_\_\_ 6. I take a positive attitude toward myself.

\_\_\_\_\_ 7. On the whole, I am satisfied with myself.

\_\_\_\_\_ 8. I wish I could have more respect for myself.\*\*

\_\_\_\_\_ 9. I certainly feel useless at times.\*\*

\_\_\_\_\_ 10. At times I think I am no good at all. \*\*

\*\* reverse coded

## DUALISM AND DEATH CONCERNS

Sum scores for all ten items. Keep scores on a continuous scale. Higher scores indicate higher self-esteem.

## DUALISM AND DEATH CONCERNS

## The Satisfaction with Life Scale

By Ed Diener, Ph.D.

DIRECTIONS: Below are five statements with which you may agree or disagree. Using the 1-7 scale below, indicate your agreement with each item by placing the appropriate number in the line preceding that item. Please be open and honest in your responding.

1 = Strongly Disagree

2 = Very much Disagree

3 = Disagree

4 = Slightly Disagree

5 = Neither Agree or Disagree

6 = Slightly Agree

7 = Agree

8= Very much Agree

9= Strongly Agree

\_\_\_\_\_ 1. In most ways my life is close to my ideal.

\_\_\_\_\_ 2. The conditions of my life are excellent.

\_\_\_\_\_ 3. I am satisfied with life.

\_\_\_\_\_ 4. So far I have gotten the important things I want in life.

\_\_\_\_\_ 5. If I could live my life over, I would change almost nothing.

## DUALISM AND DEATH CONCERNS

## Meaning in Life Scale

Below are five statements with which you may agree or disagree. Using the scale below, indicate your agreement with each item by placing the appropriate number in the line preceding that item. Please be open and honest in your responding.

1 = Strongly Disagree

2 = Very much Disagree

3 = Disagree

4 = Slightly Disagree

5 = Neither Agree or Disagree

6 = Slightly Agree

7 = Agree

8 = Very much Agree

9 = Strongly Agree

\_\_\_\_\_ 1. I understand life's meaning.

\_\_\_\_\_ 2. My life has a clear sense of purpose.

\_\_\_\_\_ 3. I have a good sense of what is meaningful.

\_\_\_\_\_ 4. I have discovered a satisfying life purpose.

\_\_\_\_\_ 5. My life has no clear purpose.



## DUALISM AND DEATH CONCERNS

## Trait Dualism Scale

Please indicate the extent to which you agree or disagree with each statement.

1 = Strongly Disagree

2 = Very much Disagree

3 = Disagree

4 = Slightly Disagree

5 = Neither Agree or Disagree

6 = Slightly Agree

7 = Agree

8= Very much Agree

9= Strongly Agree

1. Minds are in principle independent of bodies, to which they are only temporarily attached.
2. The consciousness of myself does not die with my physical body.
3. The body is material and the mind is immaterial.

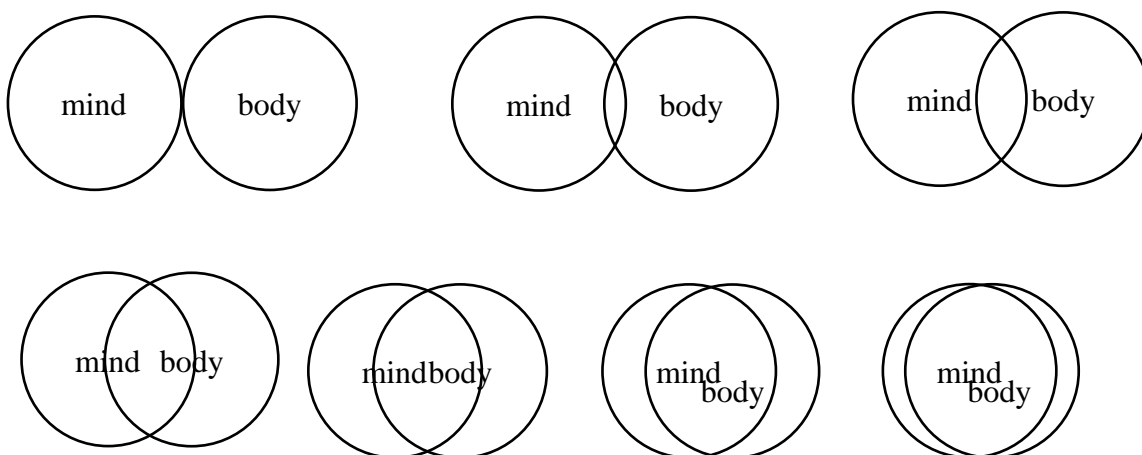
## DUALISM AND DEATH CONCERNS

## Mind-body overlap scale

**Scoring:** Respondents choose a pair of circles from seven with different degrees of overlap.

1 = no overlap; 2 = little overlap; 3 = some overlap; 4 = equal overlap; 5 = strong overlap; 6 = very strong overlap; 7 = most overlap. The number chosen is the respondent's score.

**Instructions:** Please circle the picture below that best describes your relationship.



## DUALISM AND DEATH CONCERNS

### Dualism vs. Physicalism Prime

Vignette –dualism priming condition:

In accordance with theories of ancient Greek and early modern philosophers, many contemporary scientists believe that a person's mind and body are two distinct entities.

This thesis, which is called "mind-body dualism", is based on the assumption that immaterial mental states are different from, though dependent on, physical brain states. Thus, unlike the brain, the mind refers to a state of consciousness not equated with physiology.

Thus, unlike the brain, the mind refers to a state of consciousness not equated with physiology. This mind-body distinction has been proposed to account for the observation that mental phenomena appear to be qualitatively and substantially different from the physical bodies on which they appear to depend.

We do not perceive ourselves as "machines made of meat." Instead, we feel as if we occupy our bodies. This is also suggested by our day-to-day experiences. It is quite common to distinguish between "my body" and "my self." For instance, our bodies may become injured or ill even though our minds are still active and alert. Our mental experience is also private, reinforcing the feeling that it is somehow separate. Further, there is still no scientific consensus as to precisely how mental life emerges from a physical body, and many scientists doubt there will ever be a satisfying explanation.

Therefore, some scientists believe that even a computer that could perfectly mimic human beings, including humans' emotional expressions (like joy, fear, anger, etc.), would never be able to actually experience them. Thus, this computer's actions would be indistinguishable in every way from those of a normal human being, except that it lacks conscious experience or sentience. In this same vein, we quite naturally acknowledge that

## DUALISM AND DEATH CONCERNS

identical twins are separate human beings who have their own individual conscious experiences, even though they are completely identical on a biological level.

In sum, the term “mind-body dualism” describes the proposition that a person’s mind and body are two distinct entities.

Vignette –physicalism priming condition:

In accordance with theories of modern philosophers, most contemporary scientists believe that a person’s mind and body are rooted in the same physical substances.

This thesis, which is called "physicalism", is based on the assumption that mental states are nothing but physical brain states. Consciousness and the mind can thus be described as properties of matter and as a function of a biological substance: the brain.

Physicalism has been proposed to account for the many recent research findings in the field of neuroscience, which show that any mental activity is reflected in brain activity. Minds are what brains do. We readily accept that apparently solid objects are actually mostly empty space, consisting of tiny particles and fields of energy. Consistently, modern scientists view the mind as emerging from the forces of living matter, or as a mere epiphenomenon of this matter.

This is also suggested by our day-to-day experiences. For instance, we know that physical pain or a decreased blood glucose level can affect our mood, and that psychoactive drugs can rapidly change our perception and our behavior. Further, as there is growing scientific consensus as to how mental life emerges from a physical body, most modern scientists do not doubt the neural basis of thought, i.e., the physical origin of mental life.

Therefore, some scientists believe that a computer that could perfectly mimic human beings, including humans’ emotional expressions (like joy, fear, anger, etc.), would be able

## DUALISM AND DEATH CONCERNS

to actually experience them. Thus, this computer's actions would be indistinguishable in every way from those of a normal human being, and it would experience consciousness and sentience. In this same vein, we quite naturally acknowledge that identical twins often share personality traits, as they are completely identical on a biological level.

In sum, the term "physicalism" describes the proposition that a person's mind and body are both rooted in the same physical substances.

## DUALISM AND DEATH CONCERNS

### Creatureliness Prime

#### Human/Animal Similarity

THE FOLLOWING SHORT ESSAY WAS WRITTEN BY ANOTHER MTURK WORKER WHO WAS ASKED TO WRITE ON THE TOPIC: THE MOST IMPORTANT THINGS I HAVE LEARNED ABOUT HUMAN NATURE.

The boundary between humans and animals is not as great as most people think. Although we like to think that we are special and unique, our bodies work in pretty much the same way as the bodies of all other animals. Whether you're talking about lizards, cows, horses, insects, or humans, we're all made up of the same basic biological products. We're all made up of skin, blood, organs, and bones. We're all driven by needs for food, water, sex, and comfort. Although some people like to claim that we humans are vastly more intelligent than other animals, this doesn't really seem to be true. What appears to be the results of complex thought and free will is really just the result of our biological programming and simple learning experiences, just like all other animals. Research shows that chimps have the capacity for language, even pigeons are able to solve pretty complex problems, and all animals show caring for and attachment to their offspring. Human beings are just another species of animals, maybe a little more intelligent than others, but not different in any really important or meaningful way. Seeing ourselves as special or different from the cows we eat for lunch or the insects we wash off our windshields is just another example of human vanity and self-delusion.

## DUALISM AND DEATH CONCERNS

### Human/Animal Difference

THE FOLLOWING SHORT ESSAY WAS WRITTEN BY ANOTHER MTURK WORKER WHO WAS ASKED TO WRITE ON THE TOPIC: THE MOST IMPORTANT THINGS I HAVE LEARNED ABOUT HUMAN NATURE.

The one thing that my education has made clear to me is that, although we humans have some things in common with other animals, human beings are truly unique. Although our bodies may be pretty similar to simpler species, the potential of the human mind and spirit go far beyond anything remotely similar to what is found in simple animals. First there are the obvious things: Humans have language and culture. We create works of art, music, and literature that enable us to live in an abstract world of the imagination -- something no other animal is capable of. Although simple animals may communicate with grunts and groans, and chimps can be taught basic sign language by humans, this is a far cry from the complex and inspiring works of human culture: Shakespeare, Beethoven, and Picasso, to name just a few. Unlike animals, humans live in a world of ideas and concepts, morals and values. We can even come to understand ourselves, as in the works of the great philosophers and psychologists. More importantly, humans have the capacity for love, generosity, and kindness ---- putting the welfare of others above themselves. 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. Although we certainly have some things in

## DUALISM AND DEATH CONCERNS

common with simple animals, we humans are truly special and unique.



## DUALISM AND DEATH CONCERNS

Positive and Negative Affect  
Schedule

This scale consists of a number of words that describe different feelings and emotions. Read each item and then circle the appropriate number next to that word. Indicate to what extent you feel this way right now, that is, at the present moment. Use the following scale provided to record your answers.

1 = very slightly or  
not at all  
2 = a little  
3 =  
moderately  
4 =  
quite a  
bit  
5 =  
extremely

1. Interested	1	2	3	4	5
2. Disinterested	1	2	3	4	5
3. Excited	1	2	3	4	5
4. Upset	1	2	3	4	5
5. Strong	1	2	3	4	5
6. Guilty	1	2	3	4	5
7. Scared	1	2	3	4	5
8. Hostile	1	2	3	4	5
9. Enthusiastic	1	2	3	4	5
10. Proud	1	2	3	4	5
11. Irritable	1	2	3	4	5
12. Alert	1	2	3	4	5
13. Ashamed	1	2	3	4	5
14. Inspired	1	2	3	4	5
15. Nervous	1	2	3	4	5
16. Determined	1	2	3	4	5
17. Attentive	1	2	3	4	5
18. Jittery	1	2	3	4	5

## DUALISM AND DEATH CONCERNS

19. Active	1	2	3	4	5
20. Afraid	1	2	3	4	5

## DUALISM AND DEATH CONCERNS

## SAMPLE WORD COMPLETION TASK

We are simply pre-testing this questionnaire for future studies. Please complete the following by filling letters in the blanks to create words. Please fill in the blanks with the first word that comes to mind. Write one letter per blank. Some words may be plural. Thank you.

1. CHA

2. PLA

3. \_\_ \_\_ OK

4. WAT

5. MOV

6. MUS

7. \_\_ \_\_ NG

8. DE\_\_ \_\_

9. \_\_ \_\_ ASS

10. P \_\_ \_\_ TURE

11. FL\_\_ W \_\_ R

12. GRA\_\_ \_\_

13. K\_\_ \_\_ GS

14. BUR\_\_\_\_ D

15. \_\_ ET\_\_ L

16. CL\_\_ \_\_ K

## DUALISM AND DEATH CONCERNS

17. TAB

18. W \_ \_ DOW

19. SK \_ \_ L

20. TR

21. P \_ P \_ R

22. CH \_ \_ S

23. KI \_ \_ ED

24. POST

25. STI

26. R \_ DI

27. COFF

28. M \_ \_ N



## DUALISM AND DEATH CONCERNS

## Anti-American #420

When I first came to this country from my home in\_\_I believed it was the “land of opportunity” but I soon realized this was only true for the rich. The system here is set up for rich againstthe poor. All people care about here is money and trying to have more than other people. This no sympathy for people. Its all one group putting down others and nobody cares about the foreigners. Thepeople only let foreigners have jobs like pick fruit or wash dishes because no American would do it.

Americans are spoiled and lazy and want everything handed to them. America is a cold country that isunsensitive to needs and problems of foreigners. It thinks it’s a great country but its not.

1. How much do you like this person?

1	2	3	4	5	6	7	8	9
not at all								totally

2. How intelligent did you think this person was?

1	2	3	4	5	6	7	8	9
not at all								totally

3. How knowledgeable did you think this person was?

1	2	3	4	5	6	7	8	9
not at all								totally

4. How much did you agree with this person’s opinion of America?

1	2	3	4	5	6	7	8	9
not at all								totally

5. From your perspective, how true do you think this person’s opinion of America is?

1	2	3	4	5	6	7	8	9
not at all								totally

## DUALISM AND DEATH CONCERNS

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## VITA

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## ABSTRACT

### MIND-BODY DUALISM BUFFERS EXISTENTIAL CONCERNS

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Terror management theory suggests that the potential for anxiety from the awareness of death can be buffered by a cultural worldview. Mind-body dualism, the belief that the mind and the body are separate, might affect people's mortality concerns. Given that the body is threatening given its vulnerability to death, individuals who perceive the mind and body as being connected (vs. separate) should experience higher mortality-related thoughts and defense of their cultural beliefs. The current research examined these ideas in two experiments. Specifically, low (vs. high) mind-body dualists responded to a creaturely essay with greater accessibility to death-related thoughts. Study 2 explored the carryover effects of mortality salience stemming from low dualism and animal nature concerns on worldview defense. The interaction was non-significant. The implications and future directions are further discussed.