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Does Mortality Salience Priming Influence an Individual's Perceptions of Healthy Behaviors as Important?

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Abstract

Death awareness, or mortality salience, has the potential to motivate people to engage in healthy behaviors, such as diet/exercise, sleep, and religious/spiritual importance, especially when the behaviors are perceived as reducing the connection between a particular health risk and death. One-hundred-and-eighty-three participants completed a survey to assess whether mortality salience priming, compared to a dental pain control, influences an individual's perceptions of healthy behaviors as important after priming compared to before priming, and if certain behaviors are ranked preferentially in importance to others. Self-esteem levels and age were also measured to determine if condition-induced anxiety and perceptions of behavioral importance varied with these factors. Overall, while mortality salience priming did significantly increase participant anxiety levels compared to the control, this death awareness did not translate into increased perceptions on the importance of healthy behaviors. Across both conditions, however, participants perceived healthy behaviors as more important after priming compared to before priming, with certain behaviors viewed as more important than others after priming. Lower self-esteem was found to result in increased anxiety as well as result in a greater difference in perceived behavioral importance post-priming compared to before priming in mortality salience participants. Further, older participants were found to score healthy behaviors as more important. This study suggests that death awareness can influence an individual's anxiety levels, but other factors such as age and self-esteem may serve as stronger predictors of perceived behavioral importance than condition alone.

Keywords: mortality salience, death awareness, behavioral importance, self-esteem

Does Mortality Salience Influence an Individual's Perceptions of Healthy Behaviors As Important?

Humans are always searching for ways to extend life. However, it is this mortality and awareness that life ultimately will come to an end, that defines life. Humans' capability of complex and abstract thinking allows us to be more aware that death is inevitable and the self-preservation instinct and abilities, or the set of behaviors both humans and other species possess to avoid injury and maximize chances of survival (e.g. pain reflexes, fight or flight response), will ultimately fail (Harmon-Jones et al, 1997). Death serves as a stark reminder that we do not know how much time we have left on Earth and future moments are not necessarily guaranteed, so it is reasonable for thoughts of personal mortality to make individuals more inclined to value the present over the future. Despite this, individuals still make plans and set goals that can only be achieved in the future. These future goals allow one to give meaning to the present and can further provide psychological protection against the threat of death, and makes future life seem more valuable (Kelley & Schmeichel, 2015). Future goals can be determined by how important one finds a particular behavior, needed to achieve this goal, within the current moment. It is also possible to see which goals are most important to an individual by reminding them of their mortality and then asking about particular behaviors. For example, if one has a continual goal to lose weight, they may then rank exercising or eating a balanced diet as being very important to them (especially after death reminders), as by achieving these goals, they can derive meaning and be proud of their life. The current experiment sets out to explore how priming mortality salience and reminders of death influence an individual's intentions for healthy behaviors, such as how these behaviors are ranked in importance, both before and after priming, and whether certain behaviors are ranked as more important compared to others.

Mortality salience refers to a psychological state in which an individual is consciously thinking about death. Mortality salience can be conceptualized in the works of Ernest Becker and Otto Rank on Terror Management Theory (TMT), which proposes that the awareness of death is a critical motivating force in human behavior that has the potential to undermine adaptive functioning, or how an individual handles particular demands (Vail et al., 2012). The theory asserts that people are highly motivated to avoid/manage the anxiety that the awareness of personal mortality may cause and do so via a dual component buffer system, involving sustained faith in cultural worldviews (such as religions and secular identities) and attaining self-esteem (by living up to the standards of value these worldviews may provide) (Routledge et al., 2010; Vail et al., 2012). Cultural worldviews can be defined as socially constructed and validated beliefs that provide people with an opportunity to become part of something more enduring than their own physical existence (Burke et al., 2010). For example, the Christian worldview takes a biological entity (human being) and transforms the individual into a spiritual entity with a soul that will live eternally. These worldviews offer a sense of symbolic self-endurance in the sense that they promote a collective self that will transcend the individual self. This can also be seen with non-religious ideas, such ast nationalism, as even after an individual dies, the nation they are a part of will continue to live on, allowing a part of each nationalist to live on also. Similarly, this is seen in family relationships as the legacy of parents lives on in the children (via memories, parenting style, parental influences, etc). As a result, solace can be found from feeling as if a defining part of one's identity transcends physical death and lives on (Routledge et al., 2010). Further, the mortality salience hypothesis proposes that if certain structures, or worldviews, provide protection from the psychological consequences of death awareness, then heightening the awareness of death will increase investment in these structures (prioritizing certain

beliefs/traditions), creating a continuous cycle (Routledge et al., 2010). This heightened awareness is created via a process known as priming, in which the introduction of certain stimuli (such as death-related imagery or words, writing about one's own mortality, etc.) influence how one responds to subsequent stimuli (e.g. questions regarding healthy behaviors).

However, simply believing in a cultural worldview that facilitates an eternal sense of self is not in itself sufficient. People also need to feel as if they are valued and meaningful contributors to their culture, and thus worthy of the eternal "transcendence" that it offers (Routledge et al., 2010). Self-esteem, in the context of TMT, is regarded as how well one is living up to the standards prescribed by this cultural worldview. By living up to this standard well, individuals become confident in one's own worth and abilities (Harmon-Jones et al., 1997). These defenses allow individuals to escape potential death anxiety related thoughts by instead fixing their attention on other things to decrease their vulnerability (Gordillo et al., 2017). The absence of terror management buffers (e.g. absence of high self-esteem), however, leave people vulnerable to the heightened accessibility of death-related thought, which can lead to decreased psychological well-being, and if not buffered in some way, is thought to contribute to certain anxiety disorders and symptoms of depression (Vail et al., 2012). Similar to other forms of existential stress (uncertainty, failure, pain, etc.), extreme levels of mortality salience induced stress, or death anxiety, can be detrimental, while minimal or well-buffered amounts can be beneficial. Mortality salience increases efforts specifically targeted toward bolstering a sense that one is a significant and worthy member of a broader meaningful world, such as by increasing the desire for positive self information (e.g. horoscope reading, reading multiple news sources) and the implementation of self-serving attributions (e.g. optimism) (Routledge et al., 2010). Ben-Ari et al. (1999) show that mortality salience also elevates attempts to live up to cultural standards of

value (e.g. self-striving, take greater risks), even if such attempts actually compromise physical health (e.g. self-sacrifice), as was seen with participants who derive self-esteem from their driving ability manifesting riskier driving behaviors in a stimulator following mortality salience priming (Ben-Ari et al., 1999).

Traditional/early TMT and mortality salience research (1960s-1970s) primarily focused on how existential fears contribute to evaluative biases, defensive distortions, and the aggressive protection of one's cultural beliefs and self-esteem. Early work by Becker himself and others indicated that mortality salience increases negative attitudes toward those with different beliefs and values, amplifies greed and materialism, and promotes racism and stereotyping. These results created a view that the awareness of death fosters destructive outcomes (Vail et al., 2012). However, it is also important to consider any beneficial/positive outcomes (defined as promoting general well-being) mortality salience may have beyond effective management of death awareness. While conscious death thought could cause distortions of one's potential health risks, it can also enable deliberate evaluation of one's own attitudes and behaviors and, if perceiving a better way to prevent or cope with the idea of death, adjust their attitudes and behaviors accordingly. This model, proposed by Vail et al. (2012), further suggests that conscious death awareness may also trigger conscious evaluation and adjustment of one's personal goals toward those perceived as more intrinsically meaningful and supportive, while trivializing those not perceived as relevant to coping with mortality. Therefore, terror management can inspire positive attitudes and behaviors in individuals, depending on how they integrate and maintain positive contingencies of self-worth and worldview beliefs (Vail et al., 2012). The model builds on research demonstrating that nonconscious accessibility of death thought can enhance motivation to develop and maintain caring relationships, contribute to one's community, and support

peaceful intergroup cooperation and further suggests that management efforts can sometimes lead to enriching self- and social-exploration among cognitively flexible (open-minded/creative) individuals (Vail et al., 2012). Emerging research by Arndt et al. (2006) and Cooper et al. (2010) highlights the potential for death awareness to motivate people to engage in healthy behaviors, such as greater fitness and exercise intentions, smoking less, and increased sunscreen use, especially when the behaviors are perceived as reducing the connection between a particular health risk (e.g. heart attack or lung/skin cancer) and death (Vail et al., 2012; Arndt et al., 2006; Cooper et al., 2010). The present study expands on the research described by examining the influence mortality salience priming has for health intentions and how self-esteem may moderate this relationship.

Most people, despite knowledge of their biological limitations, manage to successfully navigate daily life well-adjusted, rather than being debilitated by insecurities about mortality as early studies have suggested. More recent studies of mortality salience research, including those by Harmon-Jones et al. (1997) and Routledge et al. (2010) have shown that self-esteem has a greater importance in the dual component buffer system and mitigating death concerns than previously thought. In the article by Routledge et al. (2010), multiple studies were conducted to test whether self-esteem mitigates the effect of mortality salience on an individual's psychological adjustment and expands on the work by Harmon-Jones et al. by looking at multiple predictors of self-esteem and how each predictor changes with death-cognition. Contemplating one's transient nature was found to decrease satisfaction with life, subjective vitality (how alive one feels), meaning in life, and exploration while increasing negative affect and state anxiety, and social avoidance consistently in individuals with low self-esteem but not high-self esteem. As a result, individuals low in self-esteem are thought to be not adequately

insulated from mortality or anxiety concerns, and will instead respond with a heightened defense of worldview-related attitudes. Therefore, affirming a positive view of self, that one is important and has meaningful contributions, provides the psychological fortitude needed to accept self-threatening but also life-saving information about risky health behaviors (Routledge et al., 2010). Given that low self-esteem has strong, positive correlations with symptoms of depression, stress, and hopelessness, it has become an important factor in functioning in society. Individuals are often bombarded with reminders of mortality (e.g. health risk information, COVID-19, terrorist threats), likely operating outside of focal or conscious attention, causing self-esteem to play a crucial role in preserving one's own adaptive psychological functioning in the face of threats (Routledge et al., 2010). Since self-esteem has been shown to mitigate the role of mortality salience priming on the resulting anxiety one feels, it will be measured in the current study to control for any moderators that may influence the strength of the relationship between death anxiety and how individuals rank healthy intentions as important.

Age was also identified as a potential moderating variable on the relationship between mortality salience priming and rankings of healthy intentions. Research done by Maxfield et al. (2008) highlights the lack of consideration of prior TMT and mortality salience research in regard to age, often focusing on young adults or not looking at age at all (Maxfield et al., 2008). As people age, however, health tends to decline with signs of worsening physical health (e.g. breaking bones, decreased cognitive ability, limited independence, etc.) serving as reminders that the body will continue to grow older and continue to deteriorate until death (Bevan et al., 2014). Further, older adults are more likely to have greater experience with the death of friends, family, and peers, increasing overall death awareness and potentially influencing one's attitudes toward death. It is also believed that with increasing age, many older adults become less capable of

meeting the standards through which they obtained self-esteem earlier in life, which typically focus on fiscal and physical success. This is complicated as mainstream Western culture is very youth-oriented, making it difficult to shift away from these standards that one is used to. Additionally, as society and cultural mainstreams shift over time (new technology, ideas, values), older adults tend to be left with a vision of the world that is considered outdated, which could potentially lessen their feelings of belonging in one's culture (Maxfield et al., 2008). According to TMT, these reminders of mortality along with increased challenges to one's worldview and self-esteem should make older individuals more defensive, aggressive, and less tolerant of those with opposing views. However, according to research by Diehl et al. (1996), older adults are actually exhibiting less defensive and aggressive methods of coping in adverse situations and proposed this may result from older adults' tendency to distance themselves from conflict and use positive framing and denial to minimize conflict (Diehl et al., 1996; Maxfield et al., 2008). Findings such as those by Diehl et al. (1996) led to formation and widening support of Carstensen's socioemotional selectivity theory (SST), positing that with increasing age, individuals become more selective in their behavior in order to maximize positive emotions and outcomes and is motivated by a sense of limited time remaining to accomplish one's goals (Carstensen, 1992; Maxfield et al., 2008). This suggests that individuals adapt to the difficulties posed by increasing age by prioritizing interests, selecting appropriate goals, and eliminating standards that are no longer realistic or adjusting them to fit one's current abilities. By minimizing losses and creating new areas for growth, most (but not all) individuals are better able to adjust to an increased death awareness. The results of the studies by Maxfield et al. (2008) support the SST and related ideas, showing that older adults (over 60 years) reacted to death reminders with lower punitiveness toward moral transgressors and had greater concern for

future generations compared to the typical reaction of greater punitiveness found in young adults (17-34 years) (Maxfield et al., 2008; Bevan et al., 2014). Overall, older adults are not immune to the effects of mortality as certain defenses are still observed, but tend to show more positively oriented responses (greater leniency, etc.), showing they may have achieved some level of acceptance of the eventuality of death, making them less susceptible to the types of defenses observed in younger individuals (Bevan et al., 2014). This research may therefore indicate that one's ages may influence how willing they are to engage in future healthy behaviors.

Current Study

As discussed above, this study will look at the influence of mortality salience priming, compared to control priming, on how individuals rank healthy intentions in level of importance to them. In this study, dental pain will be used as a control, as in numerous other mortality salience studies (Maxfield et al., 2008; Bevan et al., 2014), in order to ensure that the effects of mortality salience priming are different than the effects of contemplating a typical, aversive life experience (e.g. pain of dental procedure). While common priming methods in mortality salience studies implement essay writing tasks, graphic pictures related to death, and thinking periods, this study uses a more "subtle" priming method, in which basic statements related to topics of death are listed (e.g. "The thought of death often enters my mind") and participants rank their level of agreement. Subtle priming, such as these brief survey questions, have also been shown to be able to promote healthy behaviors, especially when these behaviors are perceived to decrease one's vulnerability to death. Consistent with previous research in TMT, it is predicted that the mortality salience priming group, versus the dental pain control, will experience greater condition-induced anxiety, and therefore rank the various healthy intentions as more important

overall, prioritizing ones that are perceived to reduce the risk or cope with the anxiety caused by a conscious awareness of the condition.

While there are differences in how/which behaviors individuals integrate and derive self-esteem from, it is overall predicted that participants in dental pain control will rank lower overall on the importance of healthy behaviors (both pre- and post- priming). On the other hand, participants in the mortality salience condition will likely rate the healthy behaviors, particularly those related to exercise/diet, religion/spirituality, and interpersonal relationships as more important than the control (both pre- and post- priming). Exercise and proper diet are relatively easy behaviors that individuals can implement into their daily life and reduces the risk of many chronic illnesses and diseases (heart disease, diabetes, etc.), and ranking these behaviors as high in importance post priming allows individuals to reduce the connection between potential health risks and death in the moment. Religion/spirituality is expected to be ranked highly in importance due to the basic tenets of TMT suggesting that when made to consciously think about death and mortality salience, one will increase involvement in and embrace their cultural worldviews (e.g. religion and spiritual practices), which allows one to be part of something more enduring than their own physical existence and thereby offers solace to the idea of death. Similarly, interpersonal relationships are considered an important aspect of an individual's cultural worldview (e.g. living on in memories) and play an important role in the development and management of individual self-esteem (via affirmation, valued behaviors, etc.), further decreasing the potential negative threat of death.

In addition to comparing differences by condition in level of anxiety induced (independent variable) and how healthy behaviors are ranked as important (dependent variable), the differences in how participants rank healthy behaviors as important before and after priming

will also be explored (overall and by condition). This within subjects comparison will reveal if certain healthy behaviors are observed as more important before/after priming and how one changes their goals to reduce vulnerability to the aversive stimuli. Four main healthy behaviors will be examined for differences before and after priming- importance of religion/spirituality, physical exercise, balanced meals, and sleep in an individual's daily life. Six additional healthy behaviors were explored post priming (including prosocial, goal-setting, drug-use, and dental hygiene behaviors), which could be used for comparisons between conditions.

Since self-esteem is a well studied buffer to mortality salience priming and TMT, participants will also answer a series of questions to determine an approximate level of self-esteem (low vs. high). An individual's level of self-esteem can serve as a marker of a person's fulfillment in their life and how they cope with stressors, such as death awareness. Self-esteem therefore can influence the level of anxiety one feels toward a particular condition (death anxiety or dental pain anxiety) and may indicate behaviors one already participates in and their willingness to adjust these behaviors in the future if perceived to reduce their vulnerability to aversive stimuli. In a study by Baumeister et al. (2003), individuals with high self-esteem were shown to have greater confidence, having higher aspirations and being more willing to persist in the face of initial failure (and derive satisfaction from success) rather than succumb to feelings of incompetence and self-doubt (Baumeister et al., 2003). As a result, individuals with higher self-esteem tend to have a greater inclination to believe their actions can positively impact their health (Vail et al., 2012). Therefore, It is predicted that individuals with greater self-esteem will experience less condition-induced anxiety, and will thereby rank healthy behaviors as being more important overall compared to those with low self-esteem (both before and after priming), as those with high self-esteem generally have more behaviors from which they derive self-esteem,

allowing them to cope better with potential stressors and perceive these behaviors as opportunities to persist in the face of a challenge. Further, it is predicted that low self-esteem individuals will experience a greater overall anxiety to the condition and then show a greater change in how they rank healthy behaviors as important before and then after priming. These individuals are less likely to have the confidence to persist through potential stressors, resulting in a greater likelihood of fostering subtle insecurities within the individual that cause them to want to conform to societal standards or exaggerate intentions rather than remaining confident in their own worth.

Age will also be taken into account as a factor, as the life experiences between younger and older adults varies greatly and can impact not only an individual's self-fulfillment, but also how they perceive time and death. At the beginning of the survey, participants will be asked basic demographic questions, including age, education levels, religious affiliations, gender, and race/ethnicity, as each of these factors could also be potential covariates within the current study and could influence one's cultural worldview, self-esteem levels, and therefore perceptions of death. Older adults are predicted to experience less condition induced anxiety but also indicate a greater intentionality toward healthy behaviors overall, however this is a tentative prediction due to a lack of research on age as a factor in mortality salience studies. This prediction stems from Bevan et al. (2014) as older adults are more likely to experience reminders of mortality, such as declining health and frequent deaths of loved ones (family, friends). Further, these individuals, often retired, are more likely to have the time and resources to take to take proactive steps in maintaining their health. Therefore, they may be more motivated to already have healthy habits and develop further habits if perceived to lower risk of death. Additionally, these individuals have potentially developed more mechanisms for coping with stress and be less phased by the

idea of death/mortality salience, due to the greater amount of life experiences and time to process emotions related to death. However, these individuals may also indicate lower intentions toward healthy behaviors due to health reasons or pain potentially limiting what they are able to participate in to derive greater self-esteem (Bevan et al., 2014). These relationships between age, condition-induced anxiety, and intentions toward healthy behaviors will be explored in this study.

Method

Participants

A total of 183 participants, 18 and older, were recruited using convenience sampling, including via an email link sent out and through social media. A majority of participants were young adults (18 to 29 years old, $N = 111$), primarily undergraduate students at Trinity University, as well as some students from other universities. Middle-aged (30-49 years old) and older participants (50 years and older) were also recruited ($N = 22$, $N = 30$), with many having a direct relationship to the researcher. Participants' ages ranged from 18 to 79 ($M = 30.503$, $SD = 16.488$), with 18 individuals not reporting their age. Participants were predominantly female (78.69%) compared to male (20.77%) and were of the following race/ethnicity: White (60.40%), Asian/Middle-Eastern (17.33%), Hispanic (14.36%), Black/African-American (5.48%), and Native-American, -Alaskan, or -Hawaiin (2.48%). Additionally, a majority of participants indicated that they were religiously affiliated, including Christian, Muslim, Jewish, Buddhist, and Hindu (68.13%), while the remainder indicated they were agnostic or spiritual but non-affiliated (18.66%) or atheist (13.19%). Participants completed the study via a survey, using the platform Qualtrics, on their own time and environment and were randomly assigned to either a mortality salience or dental pain (control) condition.

Ethics Statement

This study was approved by the Institutional Review Board (IRB) at Trinity University. A waiver of informed consent was approved by the IRB because the study involved no more than minimal risk to participants. After reading a brief information sheet and introduction to the survey, participants were able to either select to proceed with the survey or exit the survey. Participants will be non-identifiable from the information given. All participants were warned of being asked questions that could potentially be uncomfortable, and those within the mortality salience condition were further warned that questions regarding death may be asked. If a participant wishes to avoid responding to certain items or end their participation, they were permitted to do so at any time. There were no risks or rewards associated with completing this survey.

Design

This study followed a 2 x 4 x 2 mixed-factorial design, such that the condition (mortality salience or dental pain) the participants were randomly assigned to being analyzed as a between-subjects factor. The main healthy behaviors (importance of religion/spirituality, sleep, exercise, and balanced meals) and the time the participants were asked (pre or post priming) were analyzed as within subjects factors. Which healthy intentions were ranked higher in importance followed a within subjects design (as every participant answered the same survey questions regarding health intentions).

Materials

Self-Esteem. A five-point scale (strongly disagree (1), somewhat disagree (2), neither/neutral (3), somewhat agree (4), and strongly agree (5)) was created for seven statements related to self-esteem, in which participants could indicate their level of agreement with. The statements, such as “on the whole, I am satisfied with myself” and “I feel that I have a number of

good qualities", were adapted from the Rosenberg Self-Esteem Scale and modified to fit this study (made into a five point scale, reduced size of survey, and edited a couple questions) (Rosenberg, 1965). All participants were asked these questions prior to priming to gain a baseline self-esteem level that could impact the priming results. It should be noted that nly N = 24 individuals were determined to have low self-esteem (determined by an averaged self-esteem score lower than 3.0), while N = 159 individuals were determined to have high self-esteem (an averaged score of 3.1-5.0), with variance between groups potentially influencing results.

Mortality Salience Condition. 87 participants were randomly assigned to the mortality salience condition, in which they read eleven statements related to death and were asked to indicate their level of agreement on a five point scale (strongly disagree (1), somewhat disagree (2), neither/neutral (3), somewhat agree (4), and strongly agree (5)) in order to foster a subtle conscious awareness of death. These statements, such as "The thought of death seldom enters my mind" and "I fear dying a slow, painful death" was adapted from a Modified Templer Death Anxiety Scale, with some questions added/removed to fit this study (Templer et al., 2006). A single short answer question was also given, for a total of twelve questions, for the participants in this condition to "briefly describe three emotions" they "experience in regards to the thought of death". This was added based on several studies including short answer questions as they can show a little more insight into the effectiveness of the priming condition and include responses potentially not asked about in the previous eleven statements.

Dental Pain Condition. 96 participants were randomly assigned to the dental pain, or control condition. Dental pain was used as the control priming condition as it has been commonly used in studies regarding TMT and mortality salience priming (Kelley et al., 2015). Dental pain, similar to mortality salience, can induce feelings of discomfort and negative

associations. This makes it useful as a control, as it will be possible to determine whether the results on the dependent variable (healthy intentions) are due to death awareness itself, and not just a negative mindset or discomfort. Similar to the mortality salience condition, participants were asked to read and indicate their level of agreement with eleven statements related to dental pain on a five-point scale (strongly disagree (1), somewhat disagree (2), neither/neutral (3), somewhat agree (4), and strongly agree (5)). These statements were made to bear as much resemblance to the death anxiety statements as possible, by using similar wording and sentence structure, such as "The thought of dental pain seldom enters my mind". However, it is important to note that for some statements it was not possible to have the sentence structure/wording similar. A short answer response question was also given, similar to that given in the mortality salience condition asking for the participant to "briefly describe 3 emotions" in regard to the thought of dental pain and going to the dentist.

Intentions for Healthy Habits. After the priming condition, participants were asked to rank on a five point scale how they ranked twelve statements in regard to healthy habits as being important to them, given their current feelings (not important at all (1), not very important (2), neutral (3), somewhat important (4), and very important (5)) . Statements included "discuss my problems and concerns with those close to me" and "take part in light to moderate physical activity for about 30 minutes daily" and were adapted from the health-promoting lifestyle profile by Walker et al. (Walker et al., 1987).

Procedure

Participants were sent a recruitment email, introducing the study and purpose (class credit) and giving a link to the survey. All participants that decided to take part in the study first read an informed consent page and were asked to either consent, given they will not be

identifiable and may end participation at any time. If the participants consented, then they would be able to answer the self-esteem questionnaire. Using the Qualtrics survey platform, two different versions of the survey were produced (one with the mortality salience condition and one with the dental pain condition), which uses a random number generator to assign half the participants to each survey/condition (avoiding order effects). After priming, all participants answered the healthy intentions questionnaire. At the end of the survey, participants were given the opportunity to comment and leave feedback on the survey.

Results

Analyses were conducted to determine the impact reminders of death (priming mortality salience), compared to reminders of dental pain (a similarly aversive stimuli), has on an individual's perception of healthy behaviors as important to them and if certain healthy behaviors are ranked as more important compared to others. Heightened death awareness has a unique potential to foster more subtle insecurities within individuals and create a greater vulnerability as one is made to think of their current impact on society and future trajectories of life. As such, it was expected that the mortality salience condition, compared to the dental pain control, would experience a greater level of primed-anxiety, and therefore cause individuals within this condition to perceive healthy behaviors as more important post-priming. This is because these behaviors offer a way for individuals to focus their attention on ways of coping with death awareness and, assuming one derives self-esteem from these behaviors, could ultimately facilitate one's self-esteem and belief in their cultural worldview, bolstering a sense of one as significant in a broader world. Further, it was expected that, post-priming, certain behaviors would be prioritized over others, depending on which behaviors best reduce one's perceived vulnerability to death or most facilitate self-esteem and one's worldview.

The measure, average condition-induced anxiety, was found by computing the mean level of agreement to the ten statements regarding condition (either mortality salience or dental pain) for each participant, with a higher score indicating one thinking more about the condition and being more concerned/anxious in response (e.g. high anxiety). The mean condition-induced anxiety was determined to be reliable and exhibited high internal consistency in capturing participants' perceptions of the respective condition as anxiety-provoking ($\alpha = 0.893$). The measure for average importance of healthy behaviors was similarly found by computing the mean level of agreement of the ten statements regarding various healthy behaviors (diet, exercise, spiritual importance, drug use, etc.) for each participant, with a higher score indicating greater importance. The measure, average importance of healthy behaviors, was determined to be reliable and exhibit moderate internal consistency in capturing participants' perceptions of behaviors as important ($\alpha = 0.684$). As a result, it was possible to conduct several factorial ANOVA analyses to determine the interaction of condition, condition-induced anxiety, and importance of healthy behaviors with each other and other factors.

A 2 (Condition: mortality salience or dental pain) x 2 (Induced anxiety: low or high) between-subjects ANOVA, on mean perceived overall importance of healthy behaviors, revealed that there were no statistically significant main effects or interaction effects, as visualized in Figure 1. Although several factors were explored as potential covariates (including age, gender, education, and self-esteem) in the relationship between condition and condition-induced anxiety and importance of healthy behaviors, only age was determined to have a significant influence on the relationship ($p = .009$) and was included and adjusted for in the analysis (others excluded). Contrary to the predictions, participants in the mortality salience condition ($M = 3.913$, $SD = 0.573$) did not view healthy behaviors as more important than participants in the dental pain

condition (M = 3.924, SD =0.524), F (1, 159) = 0.081, p = .777. Further, the levels of condition-induced anxiety did not appear to influence participants' perceptions of healthy behaviors as important, with participants with low levels of anxiety (M = 3.925, SD = 0.548) ranking similar to those with high levels of condition anxiety (M = 3.904, SD = 0.548), F(1, 159) = 0.009, p = .925. As there was also no interaction between condition and condition-induced anxiety, F(1, 159) = 1.456, p = .229, the results do not support the hypothesis that death awareness impacts, and particularly increases, one's perceptions of healthy behaviors as important.

A 2 (BS condition: mortality salience or dental pain) x 4 (WS healthy behavior: religion/spirituality, sleep, exercise, balanced diet) x 2 (WS time of ranking: pre-priming or post-priming) mixed-design ANOVA was conducted, revealing main effects for both within subjects factors (behavior and pre/post priming) as well as interactions between the two factors. Age was again found to be a covariate (p < .001), accounting for some of the variation in the perception of behavioral importance, and was therefore controlled for. As shown in Table 1 and both Figure 2 and Figure 3, participants ranked healthy behaviors as more important overall post-priming (M = 3.822, SD = 0.737) compared to the same behaviors before priming (M = 3.134, SD = 0.738), consistent with predictions, F(1, 159) = 22.156, p < .001, η_p^2 = .122). However, similar to the first analysis conducted, and contrary to predictions, the condition the participant was assigned to did not predict how participants would rank healthy behaviors as important to them overall, F(1, 159) = 0.806, p = .371, and showed no interaction pre/post priming, F(1, 159) = 0.350, p = .555. As depicted in Figure 3, the type of healthy behavior being considered was a strong predictor of how the behavior was ranked as important F(3, 477) = 10.884, p < .001, η_p^2 = .064. The main effects were qualified by a Healthy Behavior x Pre-or-Post Priming interaction,

also depicted in Figure 3, $F(3, 477) = 7.645$, $p < .001$, $\eta_p^2 = .046$. A post-hoc pairwise multiple comparisons revealed that the type of healthy intention influenced participants only after priming by the condition occurred, while none of the healthy behaviors before priming differed significantly in importance. Post-priming, participants ranked a balanced diet ($M = 4.167$, $SD = 0.865$) and exercise ($M = 4.049$, $SD = 1.008$) as most important, followed by sleep ($M = 3.901$, $SD = 1.110$) and then religion/spirituality ($M = 3.019$, $SD = 1.429$). Balanced diet was significantly greater than both sleep (M difference = 0.269) and religion/spirituality (M difference = 1.160), but not exercise. Exercise was significantly greater than religion/spirituality (M difference = 1.040), but not sleep. Lastly, sleep was ranked as significantly more important than religion/spirituality (M difference = 0.891). Table 1 depicts the descriptive statistics for each healthy behavior individually and then combined, pre-priming (not already indicated), post-priming and overall, which, along with Figure 3, allows for the visualization of both main effects and the interaction effects described. These results partially support the predictions, such that individuals perceived healthy behaviors to be more important after priming compared to before and also ranked certain behaviors as more important over others, suggesting differences in which behaviors allow for more buffering from anxiety. However, these results did not differ between conditions as expected and it was found that religion/spirituality was ranked as significantly less important after priming compared to the others, which was the opposite of what was expected.

Several exploratory analyses were also conducted to test additional hypotheses potentially influencing the relationship between condition-induced anxiety and importance of healthy behaviors. It was expected that individuals with lower self-esteem (compared to high self-esteem) would experience higher levels of condition-induced anxiety, and therefore show a

greater change in behavioral importance post-priming, compared to pre-priming. It was also expected that age would influence one's level of condition-induced anxiety and healthy intentions ranking, but an exact prediction could not be made due to contrary evidence and a lack of research on the relationship of age in mortality salience.

A 2 (Condition: mortality salience or dental pain) x 2 (Self-esteem: low or high) between-subjects ANOVA, with average condition-induced anxiety as the dependent variable, revealed a significant main effect for condition, illustrated in Figure 4. No significant covariates were found, and therefore included, in the analysis to account for some of the variation in the anxiety levels or in the analyses conducted following this one. Participants in the mortality salience condition ($M = 2.875$, $SD = 0.611$) experienced significantly greater levels of ranked anxiety levels compared to participants in the dental pain condition ($M = 2.352$, $SD = 0.970$), $F(1, 179) = 17.205$, $p < .001$, $\eta_p^2 = .088$. Though not statistically significant, the level of self-esteem of participants appeared to generally predict anxiety levels, such that participants with lower self-esteem ($M = 2.700$, $SD = 1.043$) experienced slightly higher levels of anxiety compared to those with higher self-esteem ($M = 2.586$, $SD = 0.829$), $F(1, 179) = 1.757$ $p = .187$. Though a potential interaction of Condition x Self-esteem could be visualized in Figure 4, this interaction was found to not be statistically significant $F(1, 179) = 2.761$, $p = .098$. Despite the interaction effect not being statistically significant, a post-hoc comparison revealed that the level of indicated anxiety levels post-priming was significantly different between the conditions for participants with low self-esteem (M difference = 1.067) and those with high self-esteem (M difference = 0.457). Among participants with low self-esteem, those within the mortality salience condition ($M = 3.367$, $SD = 0.312$) experienced significantly higher levels of anxiety compared to those within the dental pain condition ($M = 2.300$, $SD = 1.130$). Among participants with high

self-esteem, those within the mortality salience condition (M = 2.818, SD = 0.613) also experienced significantly higher levels of anxiety compared to those in the dental pain condition (M = 2.362, SD = 0.945). In the mortality salience condition, participants with low self-esteem showed elevated levels of anxiety compared to those of high self-esteem (M difference = 0.548), but this difference was not statistically significant. These results are consistent with predictions in that the mortality salience condition resulted in significantly higher levels of anxiety (death anxiety) compared to the dental pain condition (dental anxiety). While self-esteem was not shown to significantly increase the anxiety one feels, particularly in the mortality salience condition as predicted, this general trend is still seen in Figure 4, with some interactions found in post-hoc comparisons as indicated. Further, more individuals were found to have high self-esteem (N = 159) than expected compared to those of low self-esteem (N = 24), likely decreasing the power of this analysis and resulting in higher p-values.

A 2 (BS self-esteem: low or high) x 4 (WS healthy behavior: religion/spirituality, sleep, exercise, balanced diet) x 2 (WS time of ranking: pre-priming or post-priming) mixed-design ANOVA was conducted, revealing main effects for all three factors as well as a significant interaction between the three factors. Age was again found to be a covariate (p = .004), accounting for some of the variation in the perception of behavioral importance, and was therefore controlled for. Table 2 illustrates the descriptive statistics for this analysis, comparing individuals of low self-esteem and high self-esteem, both pre- and post- priming for each of the four behaviors indicated. Consistent with previous analyses, participants ranked healthy behaviors as significantly more important post-priming compared to before priming, $F(1, 161) = 19.632$, $p < .001$, $\eta_p^2 = .109$). Further, a main effect of healthy behavior was also revealed in this analysis, such that participants will rank different healthy behaviors as more important, with

similar trends as discussed in the earlier mixed-design analysis, $F(3, 483) = 8.277$, $p < .001$, $\eta_p^2 = .049$. These two main effects were qualified by a Healthy Behavior x Pre-or-Post Priming Interaction effect, also similar to prior results such that certain healthy behaviors were ranked more important post-priming while all healthy behaviors were ranked fairly equally prior to priming, $F(3, 483) = 8.298$, $p < .001$, $\eta_p^2 = .053$. Supporting predictions, a participant's self-esteem was found to also strongly predict how participants would rank healthy behaviors as important to them overall, $F(1, 161) = 5.901$, $p = .016$, $\eta_p^2 = .035$, but showed no interaction pre/post priming, $F(1, 161) = 2.814$, $p = .095$, or interaction between healthy behaviors, $F(3, 483) = 0.704$, $p = .550$. The main effects were qualified by a Self-Esteem x Healthy Behavior x Pre-or-Post Priming interaction, $F(3, 483) = 4.428$, $p = .004$, $\eta_p^2 = .027$. A post-hoc pairwise multiple comparisons revealed that, while both low and high self-esteem individuals ranked healthy behaviors as more important post-priming (compared to pre-priming), low self-esteem individuals exhibited a greater mean change post-priming compared to pre-priming (*M* difference = 0.906) than did higher self-esteem individuals (*M* difference = 0.627). These results can be represented in Figure 5 and supports the prediction made that high self-esteem individuals will rank healthy behaviors as more important overall, both before and after priming, but that after priming, low self-esteem individuals will experience a greater shift in their ranking.

A 2 (Condition: mortality salience or dental pain) x 2 (Religious affiliation: religious or not religious) x 3 (Age: young, middle-aged, or older adults) between-subjects ANOVA, with average condition-induced anxiety as the dependent factor, revealed a significant interaction effect between condition and age as well as age and religious affiliation. Though participants within the mortality salience condition ($M = 2.902$, $SD = 0.617$) were shown to experience greater levels of anxiety post-priming compared to those in the dental pain condition ($M = 2.330$,

SD = 0.971), as visualized in Figures 6 and 7, this difference was shown to not be statistically significant, $F(1, 155) = 3.380$, $p = .068$. Further, there was no significant main effect of age, averaged across religious affiliation or condition, $F(2, 155) = 1.766$, $p = .174$, or of religious affiliation averaged across age and condition, $F(1, 155) = 1.851$, $p = .176$. However, a Condition x Age interaction was revealed to be statistically significant, as visualized in Figure 6, $F(2, 155) = 2.998$, $p = 0.050$, $\eta_p^2 = 0.037$. A post-hoc pairwise comparison revealed that the condition only influenced young adults (*M* difference = 0.673, $p < .001$), such that young adults within the mortality salience condition experienced significantly greater anxiety levels post-priming (*M* = 3.020, *SD* = 0.648) compared to young adults in the dental pain control (*M* = 2.305, *SD* = 0.996). Middle-aged adults within the mortality salience condition also experienced greater anxiety levels (*M* = 2.700, *SD* = 0.459) compared to middle-aged adults within the dental pain condition (*M* = 2.167, *SD* = 0.957), however this difference was not statistically significant (*M* difference = 0.480, $p = .222$). Similarly, older adults within the mortality salience condition showed greater anxiety levels post-priming (*M* = 2.676, *SD* = 0.537) compared to older adults in the dental pain condition (*M* = 2.560, *SD* = 0.905), with this difference not statistically significant (*M* difference = 0.422, $p = .178$). Contrary to predictions, neither condition revealed significant differences in anxiety levels post-priming between the age categories (e.g. young adults vs. older adults). An interaction of Age x Religious Affiliation was also revealed to be statistically significant, as visualized in Figure 8, $F(2, 155) = 2.592$, $p = .021$, $\eta_p^2 = 0.048$. A post-hoc pairwise comparisons revealed that religious affiliation only influenced the anxiety levels of older participants (*M* difference = 1.193, $p = .007$), such that older participants indicating that they were religious or religiously affiliated experienced significantly greater anxiety levels (*M* = 2.721, *SD* = 0.610) compared to older participants indicating they were not religious (*M* = 1.600, *SD* = 0.693), which

was also contrary to predictions. In comparison, the anxiety levels of young adults that indicated religious affiliation (M = 2.538, SD = 0.883) were lower than those that indicated they were not religious (M = 2.784, SD = 0.973), though not statistically significant (M difference = -0.133, p = 0.408). Similarly, among middle-aged adults, those that indicated religious affiliation experienced lower levels of anxiety (M = 2.344, SD = 0.825) compared to those that were not religious (M = 2.613, SD = 0.708), but was also not statistically significant (M difference = -0.097, p = 0.805). Among all participants that indicated they were not religious or religiously affiliated, a significant difference was only found between young adults and older adults in condition-induced anxiety levels (M difference = 1.150, p = 0.007), with no significant differences between age groups among those that did indicate they were religious. No interaction of Condition x Religious Affiliation, $F(1, 155) = 0.147$, p = .702, or three-way interaction of Condition x Age x Religious Affiliation were found, $F(2, 155) = 0.007$, p = .933. However, a post-hoc pairwise comparison revealed that among participants that indicated they were not religious or non-affiliated, those within the mortality salience condition experienced significantly higher levels of anxiety (M = 2.973, SD = 0.682) compared to those in the dental pain condition (M = 2.312, SD = 1.127), suggesting religious affiliation could potentially influence how one experiences anxiety depending on the condition (M difference = 0.756, p = .014). In contrast, among those that were religious or religiously affiliated, participants in the mortality salience condition only experienced slightly higher levels of anxiety (M = 2.858, SD = 0.576) than religious individuals in the dental pain condition (M = 2.337, SD = 0.912), but was not statistically significant (M difference = 0.361, p = .056). Further, among young adults particularly, there was a significant difference in the levels of anxiety of those that were religiously affiliated compared across conditions (M difference = 0.772, $p < .001$) as well as the

levels of anxiety of those that were not religiously affiliated compared across conditions (*M* difference = 0.574, *p* = .022). Of young adults, those that indicated they were religiously affiliated experienced lower levels of anxiety (*M* = 2.232, *SD* = 0.911) in the dental pain condition compared to the mortality salience condition (*M* = 3.004, *SD* = 0.596). Similarly, young adults that indicated they were not religiously affiliated experienced lower levels of anxiety in the dental pain condition (*M* = 2.463, *SD* = 1.168) than in the mortality salience condition (*M* = 3.038, *SD* = 0.714). Of individuals within the dental pain condition particularly, there were some significant differences among anxiety levels of participants, such that religiously affiliated older adults experienced significantly higher anxiety compared to religiously affiliated younger adults (*M* difference = 0.677, *p* = .015) as well as religiously affiliated middle-aged adults (*M* difference = 0.769, *p* = .031). No similar trend was found within the mortality salience condition. Further, of older adults within the dental pain condition, there was a significant difference in levels of anxiety, such that those that were religiously affiliated experienced much higher anxiety compared to non-religious older adults of the same condition (*M* difference = 1.309, *p* = 0.006). It should be noted that this same comparison could not be conducted in the mortality salience condition as all older adults in that condition (*N* = 16) indicated that they were religiously affiliated, so there were no non-religious older adults in the mortality salience condition, potentially skewing results. Based on results and post-hoc comparisons, in contrast to predictions, there was no difference in levels of anxiety in either condition for between religious vs. non-religious individuals averaged across age (Figure 6), such that the significant difference of non-religious individuals between conditions compared to religious individuals is likely just due to differences in anxiety caused by the condition itself or differences due to age. However, the significant interactions with age support predictions made

regarding the potential moderation of age as a factor in anxiety levels, but still do not indicate a specific direction regarding anxiety levels or mortality salience.

To further quantify the potential role of age, a 3 (Age: young, middle-aged, or older adult) x 2 (Condition: mortality salience or dental pain) between-subjects ANOVA was conducted, with average rankings of the ten healthy behaviors as important as the dependent variable as visualized in Figure 8. A main effect of age was revealed, such that older participants ranked healthy behaviors to be more important overall (M = 4.161, SD = 0.779), followed by young adults (M = 3.811, SD = 0.654) and middle-aged adults (M = 3.708, SD = 0.999), $F(2, 160) = 3.277$, $p = .040$, $\eta_p^2 = .039$. Consistent with prior results, there was no main effect of condition, such that mortality salience priming did not result in increased rankings of healthy intentions compared to the dental pain condition as expected, $F(1, 160) = 0.014$, $p = .905$. Further, there was no interaction of Condition x Age, such that the condition of the participant did not influence how participants of various ages ranked healthy behaviors as important, $F(1, 160) = 0.331$, $p = .331$. A post-hoc pairwise comparison confirmed that there were significant differences between rankings of behavioral importance across age groups, but only for participants within the mortality salience condition. In the mortality salience condition, older participants (M = 4.250, SD = 0.683) were found to find healthy behaviors as more important to them compared to young adults (M = 3.784, SD = 0.730) and compared to middle-aged adults (M = 3.667, SD = 1.073). There were no significant differences between rankings of behavioral importance between young adults or middle-aged adults in the mortality salience condition. Consistent with predictions, age was found to influence how participants rank behaviors as important revealing the importance of age and life factors in mortality salience priming, such that older adults in the mortality salience condition found them more important than young adults (M

difference = 0.466, p = .030) and middle-aged adults (M difference = 0.583, p = .041). However, the difference is not as stark as expected, likely due to condition not serving as a predictor of behavioral importance as the results have shown.

Discussion

The results of this study revealed that, contrary to predictions, participants in the mortality salience condition did not view healthy behaviors as more important post-priming compared to participants in dental pain control. The level of anxiety (low or high) of individuals post-priming also did not appear to predict a participant's perceptions of healthy behaviors as important. However, the results did show that participants, regardless of condition, perceived healthy behaviors as more important post-priming compared to before priming, except for in regard to taking time for religious/spiritual practices. This change in perception suggests that the priming used in the study did influence participants' attitudes and behaviors, as predicted, but was similar for both conditions, such that heightened stress/anxiety (whether death awareness or dental pain) leads individuals to increase investment in structures (e.g. healthy behaviors) that may potentially buffer and mitigate this anxiety. Further, the hypothesis that certain healthy behaviors would be perceived as more important post-priming compared to others was also supported. Participants post-priming generally perceived a balanced diet as most important, followed by exercise, and sleep (only the difference between diet and sleep was statistically significant), with taking time for religion/spiritual practice perceived as significantly less important compared to each of the three other behaviors. Before priming, each of the behaviors was perceived as roughly equivalent in importance.

These results are interesting as they offer insight into how individuals in today's society buffer or cope with stress via the integration of more positive contingencies of self-worth and

behaviors. In particular, the finding that religious/spiritual behaviors did not increase in importance (if anything, showed a downward trend, though not statistically significant), and was further found to be less important than other behaviors of more physical health- diet, exercise, sleep, is also interesting and opposite of predictions. It was expected that religious/spiritual behaviors would be ranked as equally important, if not more important, based on traditional mortality salience research indicating that existential stress, such as mortality salience priming, would lead one to increase investment into their cultural worldviews (such as religion), which offers individuals a symbolic sense of self-endurance beyond the physical self (after death). The difference in results found in this study reveal that individuals in today's society may be instead turning away from religion/spirituality and rather integrate or obtain their self-worth from more tangible acts of coping, such that balanced diet and exercise may allow individuals to feel physically healthy and boost self-worth and reduce anxiety. Further, as no significant differences between conditions were found in how individuals perceive healthy behaviors as important, these results may suggest that individuals today may have less death anxiety overall or are better at coping with this anxiety to lessen condition-induced anxiety to mortality salience priming. In contrast, these results may also suggest that the mortality salience priming in this study was not strong enough to produce a response different from a similarly aversive stressor (dental pain). Traditional mortality salience priming typically requires participants to write for several minutes about their own mortality, worldview, and symbolic self-defenses or involve high-arousing experiences with death-related content (e.g. watching brutal car accident footage) (Routledge et al., 2010). As a result, this study may be limited due to time/design constraints, such that priming only involved participants to rank 10 statements discussing death and life after death and list a couple emotions that they feel in response to the topic. Individuals may therefore not feel greater

levels of stress or death-anxiety than they feel on a daily basis or compared to other stressors such as dental pain and may also allow individuals to more easily buffer anxiety felt as they are answering the death-related statements based on their worldview. Further, the study may be limited due to participation effect, such that they may rank their anxiety lower than it actually is or intentions toward healthy behaviors as higher, based on what individuals believe the study is about or in how they feel they should respond, rather than how they actually feel (creating potential response biases).

Exploratory analyses were then conducted to determine if mortality salience conditioning compared to dental pain conditioning increased a participant's perceived level of stress/anxiety, as predicted, and if so, what other factors may influence how an individual perceives this stress (e.g. self-esteem, age, and religion). Results revealed that participants in the mortality salience condition did experience significantly higher levels of anxiety compared to those in the dental pain condition, supporting the hypothesis. Therefore, these results indicate that mortality salience priming influences an individual's anxiety, but this anxiety compared to the anxiety of dental pain, does not differentially result in changes of perceived behavioral importance. This could potentially be due to the questions being designed to answer quickly (short, statements that one ranks in level of agreement) versus in depth writing, or also indicating other factors influencing the relationship between anxiety and perceived behavioral importance, such that any anxiety influences a person's perception of healthy behaviors as important equally. Additionally, while both low and high self-esteem groups showed significantly higher levels of anxiety within the mortality salience compared to the dental pain condition, this difference in anxiety levels was almost doubled between the low self-esteem groups compared to high self-esteem, though this was not found to be statistically significant. However, the presence of this general trend as well

as low self-esteem individuals showing elevated levels of anxiety compared to high self-esteem individuals within the mortality salience condition, but not the dental pain condition, offers interesting implications (even if the Condition x Self-esteem interaction was not statistically significant as predicted). The presence of the trend, but with a lack of statistical significance, could likely be due to variations between sample size. A significantly larger proportion of participants were found to have high self-esteem ($N = 159$) compared to participants with lower self-esteem (only $N = 24$), resulting in more variation between groups and likely decreasing the power of the analysis, making it difficult to obtain significant *p*-values. This trend follows predictions as self-esteem has been previously shown to indicate one's willingness to adjust their behaviors in the future and can serve as an indicator in how one perceives their vulnerability to aversive stimuli, with higher self-esteem individuals having greater confidence and therefore being more likely to persist in face of failure or when threatened, rather than this threat fostering subtle insecurities as in low self-esteem individuals. A mixed-design analysis regarding self-esteem and healthy intentions again revealed a significant difference between how participants rank healthy behaviors as important pre-priming compared to after-priming (similar to the mixed-design with condition), for both low and high self-esteem individuals. Similarly, post-priming, both groups ranked the different healthy behaviors following a similar pattern as discussed for the condition mixed-design analysis (diet/exercised ranked highest and religion/spiritual behaviors lowest). However, in this analysis, self-esteem was found to serve as a strong predictor in how participants would perceive healthy behaviors as important to them, such that high self-esteem individuals overall found healthy behaviors as more important. In contrast, low self-esteem individuals experienced a greater change in the perception of these behaviors as important post-priming compared to pre-priming than did high self-esteem

individuals. These results support the hypothesis made that high self-esteem participants generally have more behaviors from which they derive self-esteem from and are more likely to already engage in health behaviors/find them important before priming due to a higher inclination to believe their actions can positively impact their health. Low self-esteem individuals, on the other hand, are less likely to have the confidence to persist through potential stressors, allowing these insecurities to foster and want to conform to societal standards or exaggerate intentions to implement healthy behaviors as opposed to remaining confident in their own worth.

Further results revealed that religiosity/religious affiliation overall did not influence the level of condition-induced anxiety that participants felt, except for in older participants, with no significant differences in condition-induced anxiety between age groups. Older participants that indicated they were religious were found to experience significantly higher anxiety levels compared to older, non-religious participants. However, due to convenience/access of participants, significantly more young-adult participants ($N = 111$) compared to middle-aged ($N = 22$) and older adults ($N = 30$) were recruited, resulting in limitations when comparing age groups. Further, of older participants within the mortality salience condition in this analysis ($N = 16$), all of them indicated they were religiously affiliated, making comparisons of non-religiously affiliated older adults impossible. Of the older participants in the dental pain condition ($N = 15$), only 4 of them indicated they were not religiously affiliated. Further, limitations existed in this analysis as religiosity was based solely on whether the participant indicated their association with a particiular religious affiliation (Christian, Muslim, Buddhist, etc.). However, it is extremely likely that the level in which they participate in the particular religion or the importance of the religion to them, would probably serve as a better indicator of religiosity and

influence an individual's cultural worldview and self-esteem more than just whether they are affiliated or not (does not mean they regularly attend services, etc.). However, based on this limited data, some inferences could be drawn as older participants were more likely to be religiously affiliated than younger participants, which could explain some potential differences in anxiety/healthy intentions found due to age differences. This results that as participants age, they are more likely to be affiliated with a particular religion which offers a way to cope with potential death anxiety and boost one's cultural worldview/self-esteem.

Finally, results also revealed that, consistent with predictions, age was found to influence how participants rank health behaviors as important to them. Older adults in the mortality salience condition were found to rank behaviors as more important overall than both young adults and middle-aged adults, with no significant difference between the later two groups. This therefore indicates that, despite there being no significant difference between conditions on behavioral importance, age did account for some of these differences (some of which could potentially be due to changes in religiosity over one's lifetime). While the differences between the age groups were not as stark as expected, this could likely be a result of condition not serving as a predictor in behavioral importance. These results indicate build on previous research by Bevan et al. (2014) and highlight the importance of including age in mortality salience research. As discussed, older adults have significantly more life experience than both younger and middle-aged adults which includes more frequent death reminders as the body ages physically (arthritis, etc.) as well as the loss of loved ones becomes increasingly common. However, these individuals also have more time to process emotions related to death and may have greater systems of coping with any potential death anxiety. Older adults were found to rank healthy intentions as more important overall compared to the other age groups, but did not differ

significantly in anxiety levels (rather showed a trend of lower anxiety levels, though not significant). However, these generally low levels of anxiety may be a result of older individuals already having constant reminders of death in daily life and therefore these questions may not cause much additional stres (items they already think about). As a result, older adults may have an already increased motivation to engage in healthy behaviors and develop habits to reduce risks of death as well as due to increased time with retirement, with life experiences showing that these healthy behaviors make one feel better physically and mentally (way to distract focus onto something productive, experiences with trial/error over time in coping methods, etc.).

Overall, future studies should expand on the design of this study to include additional healthy behaviors and factors of each (e.g. relationships- marriage and friendship, cognitive flexibility, empathy, etc.) and also include a wider variety of behaviors measured before priming that can then be compared to rankings of behaviors post-priming (rather than just the behaviors of diet, exercise, sleep, and religion/spiritual importance). It would also be interesting to obtain more measurements of an individual's level of self-esteem (beyond the 5 statements used), such as to obtain a better idea of how different individuals derive their self-esteem from (e.g. physical looks, diet/exercise, religion, relationships) and see how this directly relates with different healthy behaviors. Further, as the difference between mortality salience and dental pain priming was not very stark, and not significant in the relationship with how individuals perceive behavioral importance, it would be interesting to look at different forms of control conditions. While dental pain is commonly used as a control due to the similar negative/aversive associations, it would be interesting to see what differences exist between mortality salience anxiety as well as neutral priming, or compare differences in death anxiety, dental pain anxiety, and regular/general anxiety (non-aversive- e.g. regular life), and then a neutral stimulus or even

positive stimulus. Similarly, further research should be conducted to see if similar results would be obtained if this study was conducted with more in depth priming of mortality salience, such as with the traditional methods of longer writing prompts, or if more noticeable results would be obtained. Further, though race was collected in the survey for demographics, it was not looked at as a potential factor so future studies could look at this factor as well. More in depth studies should also be conducted to look at how different cultures experience death anxiety or awareness and subsequently mitigate this anxiety, beyond religion/spirituality or look at specific forms of religion and differences between them as well as other cultural traditions. This could help determine the applicability of this study beyond Western society. As age was also found to be an important factor moderation the relationship of other factors with how individuals perceive behavioral importance, this factor should be studied further in relation to other aspects of life that change as one ages. Religion was speculated to increase with increasing age in this study and it would be interesting to see if further research confirms this idea as well as potentially how life experiences, such as parenting styles, trauma, family relationships, and more change as one ages and if this has any influence on one's level of anxiety or how they rank behaviors as important. Lastly, it would be interesting to research mortality salience among individuals of varying personality- e.g. varying levels of narcissism, optimism, or other character traits that influences one's perception of others and the world around them.

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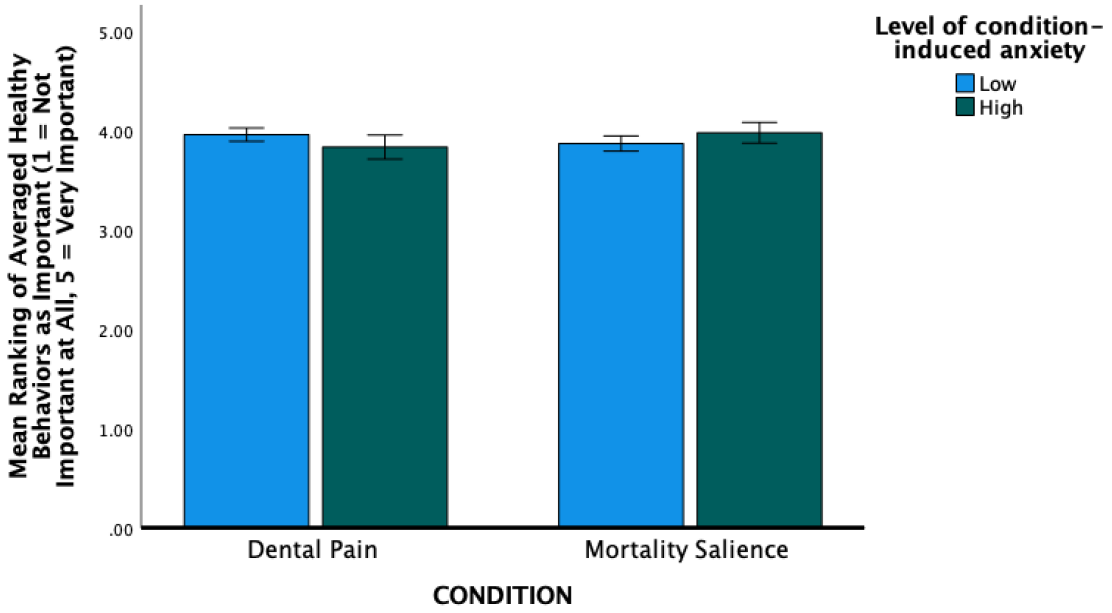

Figure 1. Adjusted mean perception of behavioral importance overall, accounting for differences due to age, after either dental pain or mortality salience priming (condition) and separated by low or high condition-induced anxiety levels. Age (separated by young, middle, older) appears in the model as a covariate and is evaluated at the value = 1.5061. Standard errors are represented in the figure by error bars attached to each column, indicating +/- 1 standard error of the mean.

Table 1

Descriptive Statistics for Different Healthy Behaviors (Religion/Spirituality, Sleep, Exercise, and Balanced Diet, and Combined), Pre- and Post- Priming as well as Combined/Overall (Averaged Across Conditions)

	Pre-Priming		Post-Priming		Combined/Overall	
Healthy Behavior	*M*	*SD*	*M*	*SD*	*M*	*SD*
Religion/Spirituality	3.154	1.381	3.019	1.429	3.090	1.333
Sleep	3.191	1.208	3.901	1.110	3.579	0.982

Exercise/Physical Activity	3.123	1.265	4.049	1.008	3.590	0.964
Balanced Diet	3.074	1.188	4.167	0.865	3.648	0.815
Combined/Overall	3.134	0.738	3.822	0.737		

Note. N= 162. Some participants were excluded from this analysis due to exclusion of age or other factors necessary for conducting the tests. Results represented are averaged across both dental pain and mortality salience conditions (due to no significant differences or observable trends between the conditions)

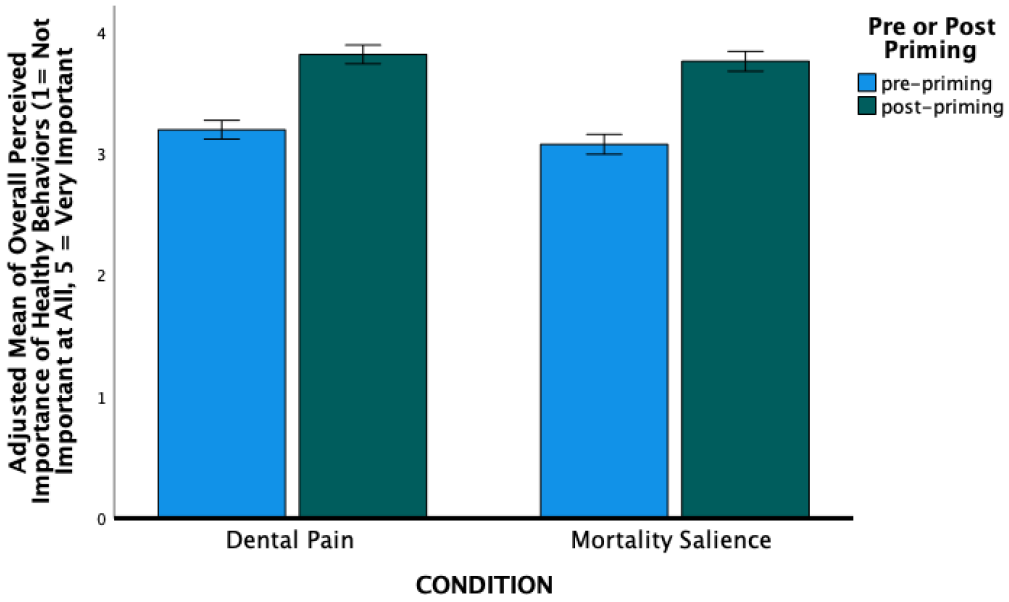

Figure 2. Adjusted mean perception of behavioral importance overall, adjusting for differences due to age, by condition (dental pain and mortality salience), as measured both before and after priming. Age (separated by young, middle, older) appears in the model as a covariate and is evaluated at the value = 1.4988. Standard errors are represented in the figure by error bars attached to each column, indicating +/- 1 standard error of the mean.

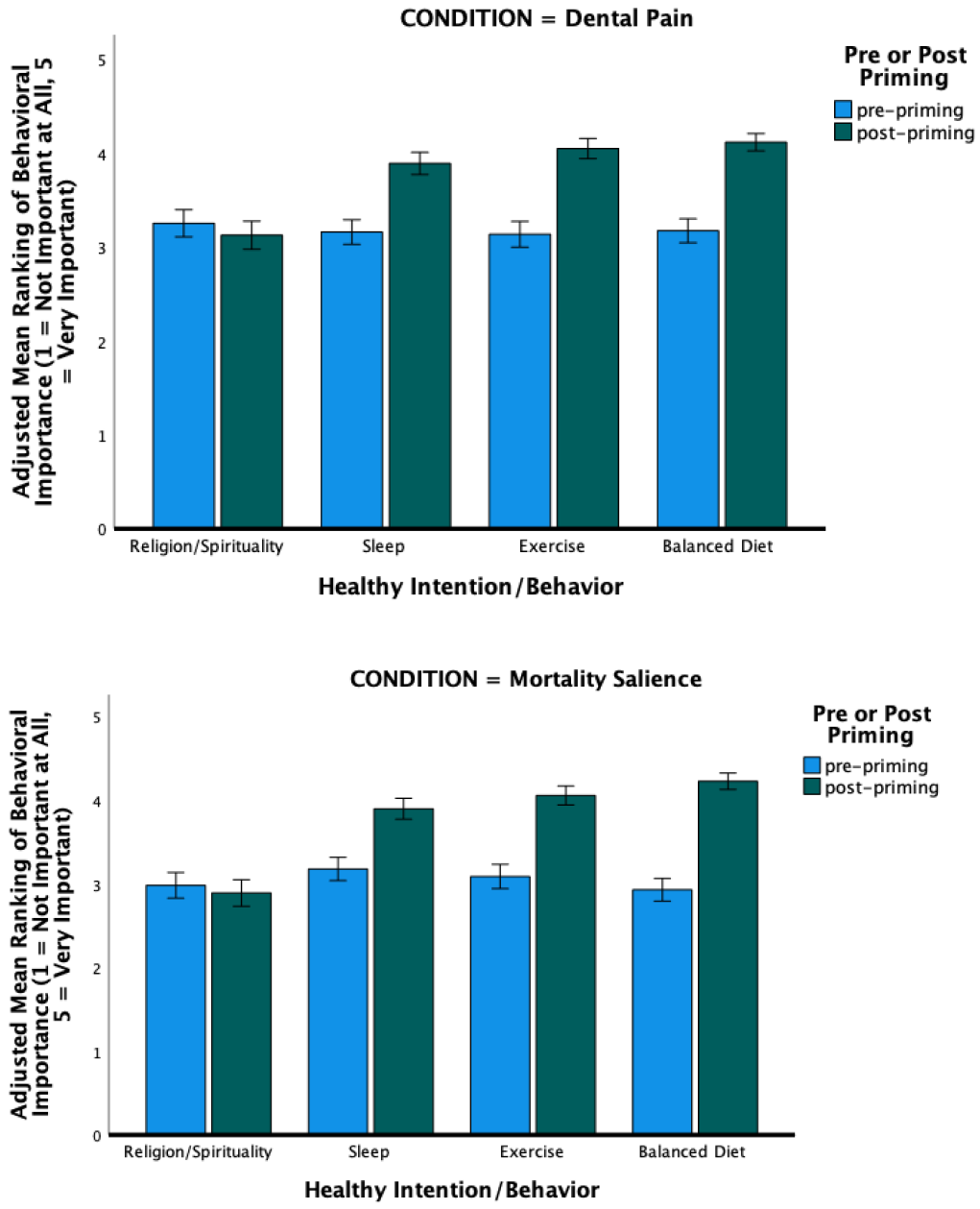

Figure 3. Adjusted mean perception of behavioral importance for 4 specific healthy behaviors as measured both before and after priming. Dental pain condition is represented on the top and mortality salience condition on the bottom. Age (separated by young, middle, older) appears in the model as a covariate and is evaluated at the value = 1.5122. Standard errors are represented in the figure by error bars attached to each column, indicating +/- 1 standard error of the mean.

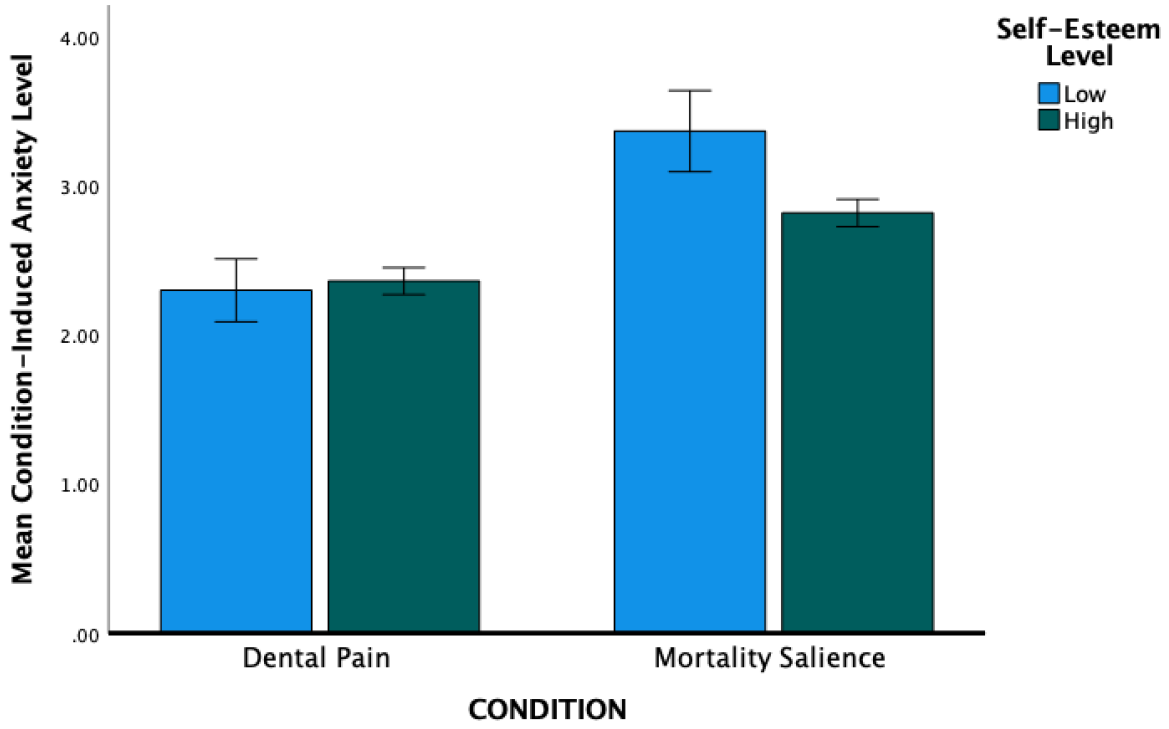

Figure 4. Mean anxiety levels post-priming for both the dental pain and mortality salience condition, separated by self-esteem level (low, high). Standard errors are represented in the figure by error bars attached to each column, indicating +/- 1 standard error of the mean.

Table 2

Descriptive Statistics for Different Healthy Behaviors (Religion/Spirituality, Sleep, Exercise, and Balanced Diet, and Combined), Pre- and Post- Priming for Individuals of Low Self-esteem Compared to those of High Self-esteem

	Low Self-Esteem				High Self-Esteem			
	Pre-Priming		Post-Priming		Pre-Priming		Post-Priming	
Healthy Behavior	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Religion/Spirituality	2.913	1.379	2.609	1.373	3.163	1.397	3.085	1.442
Sleep	2.304	1.146	3.695	1.146	3.312	1.172	3.929	1.113

Exercise/Physical Activity	2.870	1.456	3.782	1.445	3.156	1.238	4.099	0.913
Balanced Diet	2.522	1.377	3.913	1.276	3.149	1.140	4.212	0.773
Averaged	2.652	1.340	3.500	1.310	3.195	1.237	3.831	1.060

Note. *N*= 164. Some participants were excluded from this analysis due to exclusion of age or other factors necessary for conducting the tests.

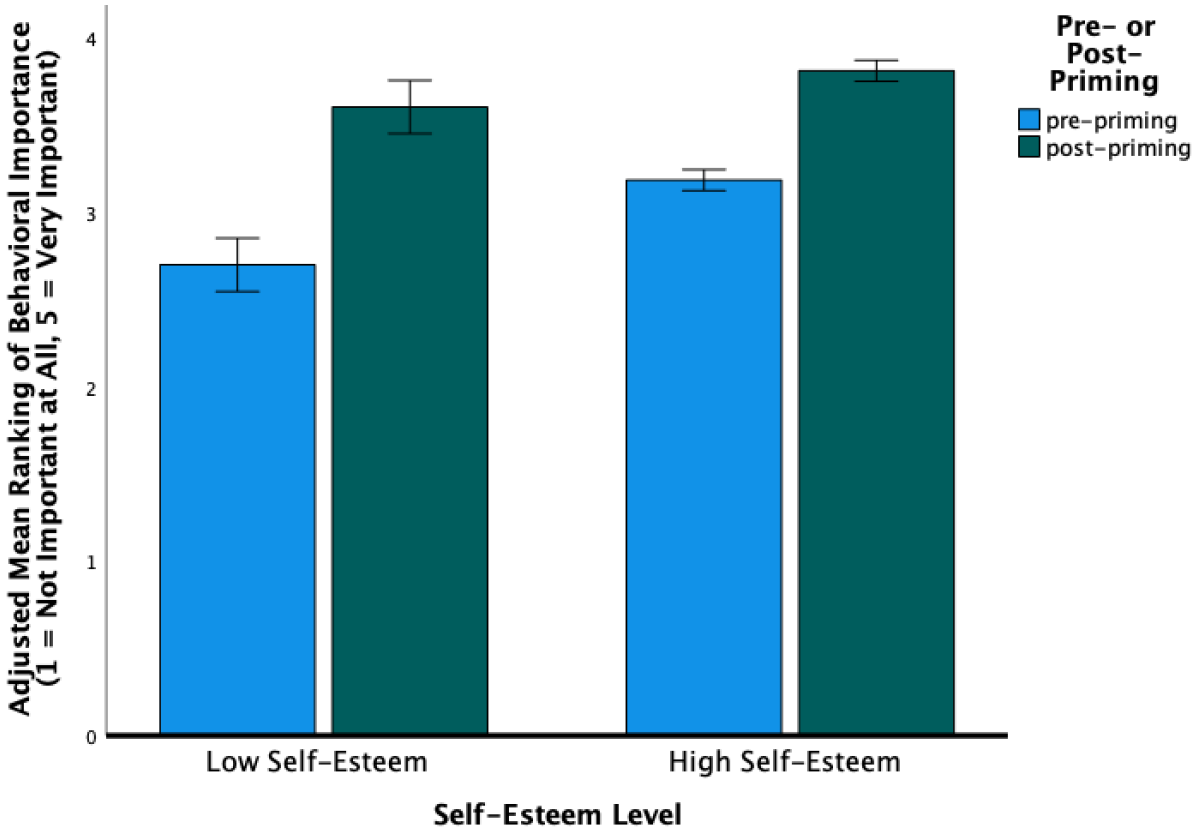

Figure 5. Adjusted mean perception of behavioral importance as measured both before and after priming, compared between individuals of low versus high self-esteem. Age (separated by young, middle, older) appears in the model as a covariate and is evaluated at the value = 1.5122. Standard errors are represented in the figure by error bars attached to each column, indicating +/- 1 standard error of the mean.

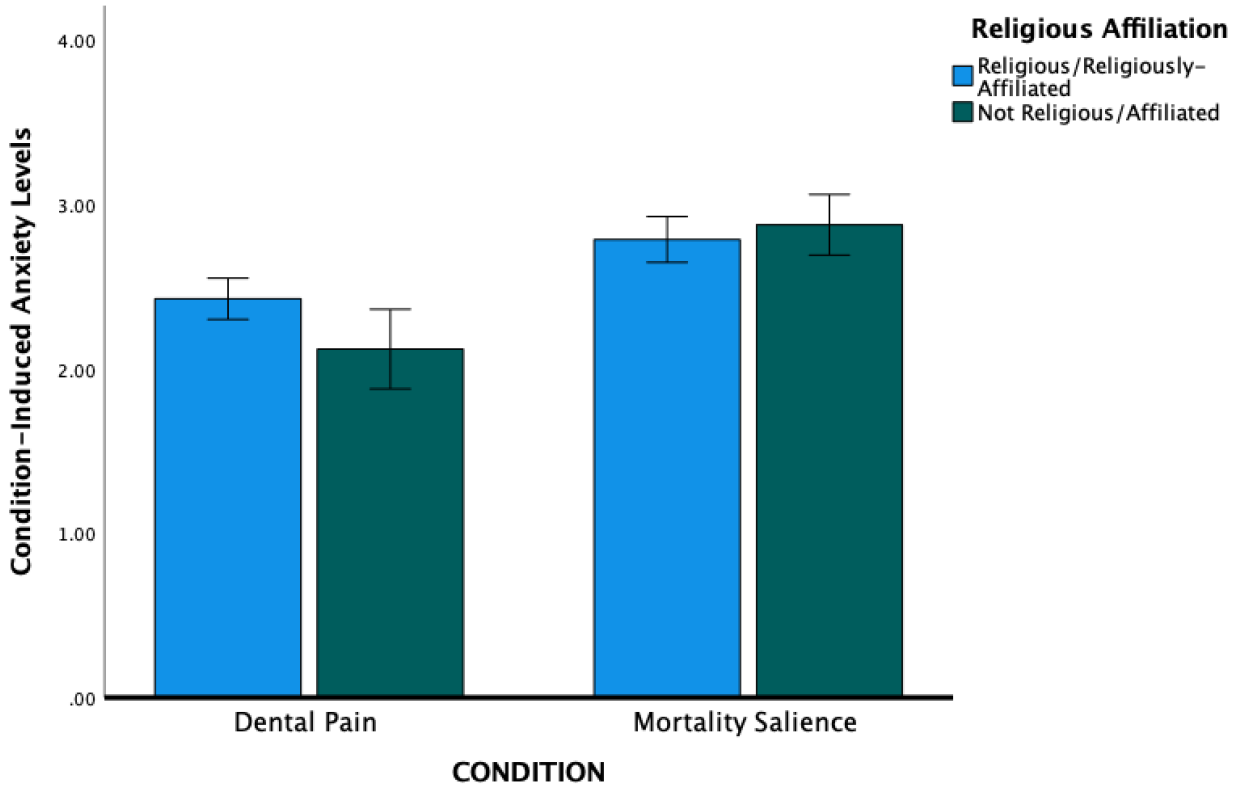

Figure 6. Mean anxiety levels post-priming for both the dental pain and mortality salience condition, separated by religious affiliation (religious or not religious/affiliated). Standard errors are represented in the figure by error bars attached to each column, indicating +/- 1 standard error of the mean.

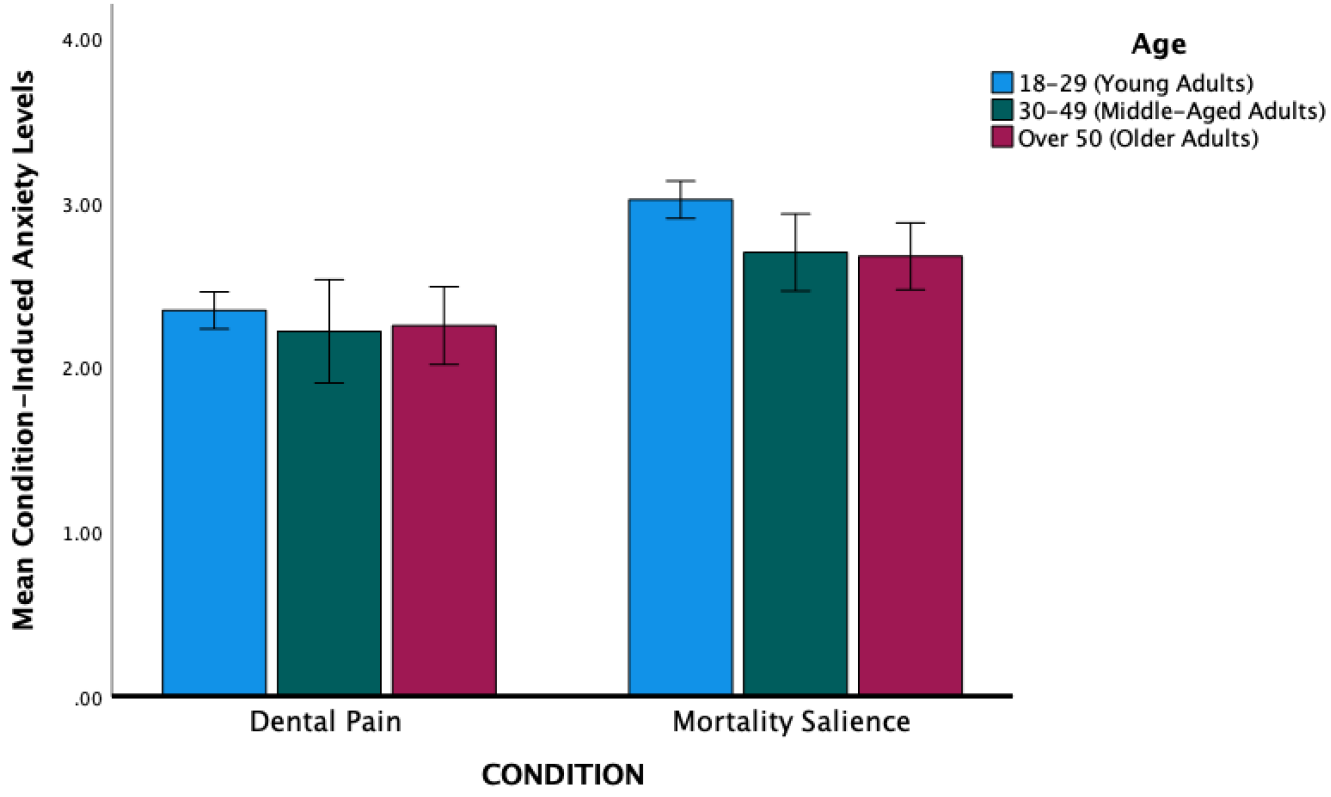

Figure 7. Mean anxiety levels post-priming for both the dental pain and mortality salience condition, separated by age (young, middle-aged, and older adults). Standard errors are represented in the figure by error bars attached to each column, indicating +/- 1 standard error of the mean.

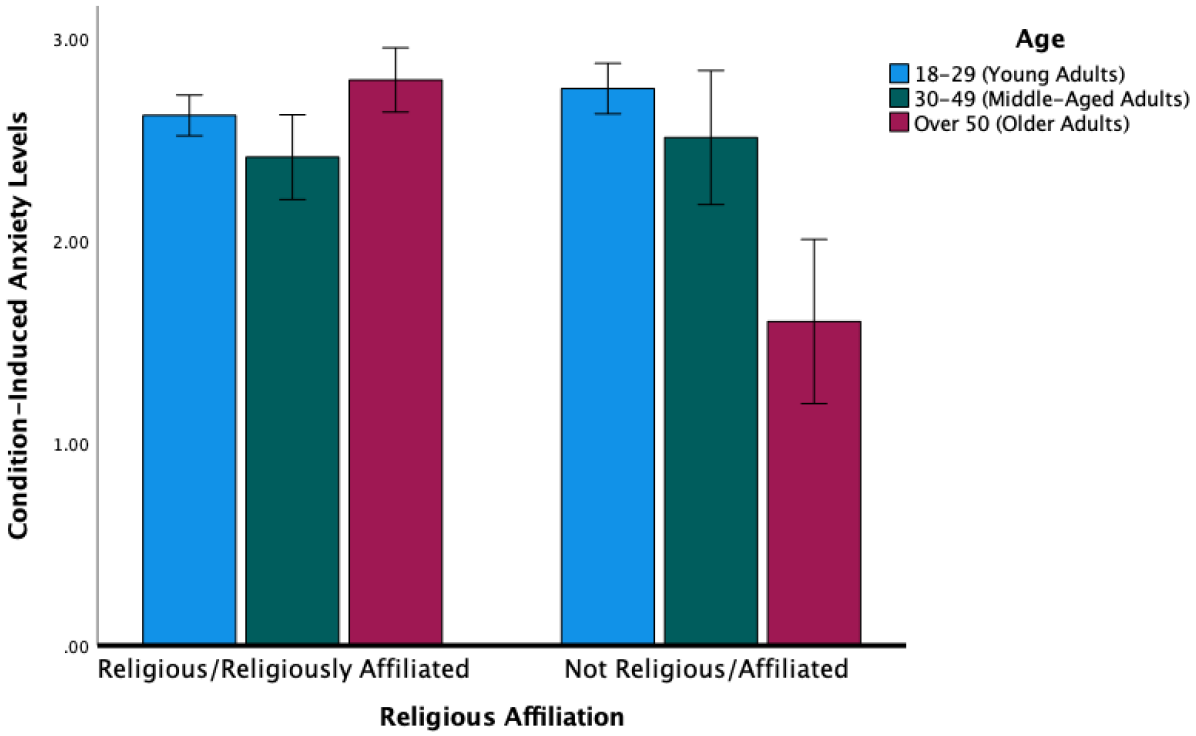

Figure 8. Mean anxiety levels post-priming separated by indicated religious affiliation (affiliated or not) and by age (young, middle-aged, and older adults), averaged across both mortality salience and dental pain conditions. Standard errors are represented in the figure by error bars attached to each column, indicating +/- 1 standard error of the mean.

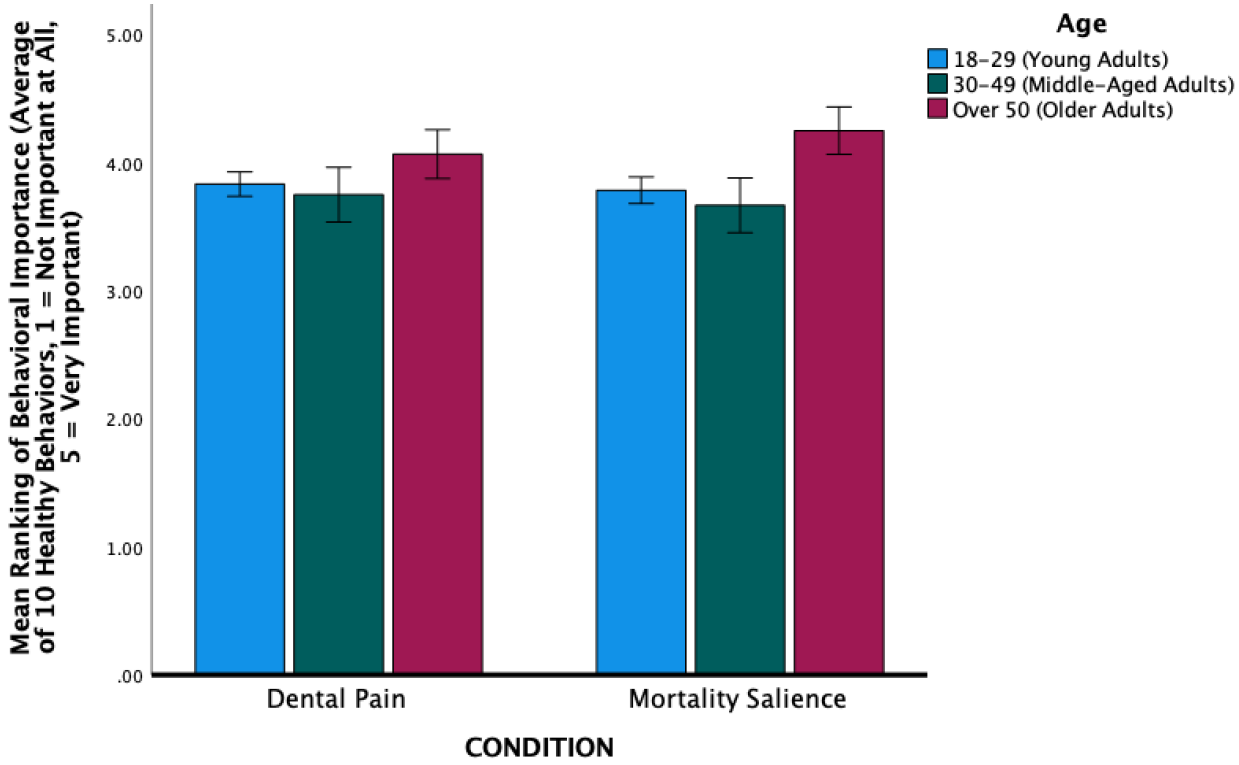

Figure 9. Mean rankings of behavioral importance for different age groups (young adults, middle-aged adults, and older adults) between the two conditions. Standard errors are represented in the figure by error bars attached to each column, indicating +/- 1 standard error of the mean.