UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

A TEST OF THE TERROR MANAGEMENT HEALTH MODEL AND PSYCHOLOGICAL REACTANCE IN THE CONTEXT OF SKIN PROTECTIVE BEHAVIORS

A THESIS

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

MASTER OF ARTS

By

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Norman, Oklahoma
2021

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A TEST OF THE TERROR MANAGEMENT HEALTH MODEL AND PSYCHOLOGICAL REACTANCE IN THE CONTEXT OF SKIN PROTECTIVE BEHAVIORS

A THESIS APPROVED FOR THE
DEPARTMENT OF COMMUNICATION

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Acknowledgements

Foremost, I would like to express my sincere gratitude to my advisor, Dr. Elena Bessarabova for the incredible support, expertise, patience, and understanding throughout my entire degree. The time and dedication put in to help me become the best student I could be will be something I will remember for the rest of my life.

I also thank the rest of my amazing committee, Dr. Ioana Cionea, whom I'll forever be honored to share my first publication with, and of course, Dr. John Banas, the 1st Communication professor I ever had back during my second year of undergrad whose passion and enthusiasm, alongside Dr. Cionea's Communication in Non-Western Cultures course that same semester, helped plant the seed for my love of communication, which only grew from there.

I am extremely grateful to my parents for their love, incredible support, and all the sacrifices they made so I could go to school in the United States, attend the University of Oklahoma, follow my dreams, and get both my Bachelor's and Master's degrees. My whole life they have been my biggest supporters, and I love them more than words could ever do justice.

Last but not least, I'd like to thank my dog Jake "Bou" MacDonald. My "little brother" and best friend, you were by my side through it all. From walks to school and around the pond, our drives around town, and just simply hanging out, you made each and every day better. When I went to school far from home, you were always eagerly there waiting when I'd come home; always ecstatic to see me. You're my buddy, you kept me going, and I will love you forever.

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Abstract

This thesis presents the results of an experiment ($N = 206$) that utilized sun overexposure prevention messages and a 2 (mortality: salient, control) × 2 (freedom threat: high, low) independent-group design. The study tested the terror management health model (Goldenberg & Arndt, 2008) and integrated its predictions with the theory of psychological reactance (J. W. Brehm, 1966) to examine the effects of mortality salience on proximal defenses. When mortality is salient, proximal terror management defense can help motivate individuals to engage in adaptive health behaviors. Conversely, when direct, freedom-limiting messages are used in persuasion, individuals can become reactant and fail to adhere to risk mitigation messages. However, using freedom limiting messages to address health concerns that activate death awareness may help mitigate reactance, resulting in adaptive, body protective behaviors. Consistent with this reasoning, study results revealed that mortality salience significantly increased intentions to wear sunscreen all year around relative to the control (dental pain) condition. However, the effect of mortality salience on the intention to purchase high or low-SPF lotions was not significant. In addition, a main effect of mortality salience on threat-to-freedom perceptions was marginally significant and indicated that mortality salience generated less threat to freedom perceptions. This finding suggests that mortality salience can mitigate threat to freedom perceptions that are part of reactance. Finally, a significant interaction between freedom threat and mortality salience on behavioral intention to purchase a high-SPF lotion showed that, when a high threat-to-freedom message was paired with mortality salience, intentions to purchase a high-SPF lotion were significantly higher as compared to the low-threat-control condition, indicating that mortality salience mitigated the maladaptive effects of reactance. These results provide a handful of insights and future directions for research to improve risk and crisis

communication efforts. In situations where individuals are faced with explicit, freedom-limiting messages, tailoring alert/prevention messages by making mortality salient can help maximize adherence to self-protective claims and increase overall message effectiveness by avoiding unintended reactance effects.

Keywords: reactance, terror management health model, terror management theory, freedom threat, death, persuasion, mortality salience, sun exposure, tanning, skin cancer prevention

Chapter 1: Introduction

For decades, skin cancer has been a growing problem in the United States, with over one million new cases annually (Falzone et al., 2017). The Centers for Disease Control and Prevention estimate that 1 in 5 Americans will develop skin cancer in their lifetime, largely as a result of exposure to harmful ultraviolet (UV) radiation (Johnson et al., 2017). Although the CDC recommends that everyone use sunscreen on a daily basis, compliance with such messaging has been met with limited success: Despite decades of empirical evidence demonstrating that the majority of skin cancers are preventable with regular sunscreen use, more Americans are diagnosed with skin cancer than all other cancers combined (Lai et al., 2018). As a result, communication of both the long-term dangers of exposure to UV radiation and the benefits of wearing sunscreen regularly remains of utmost importance. Despite decades of ongoing skin cancer awareness campaigns and prevention efforts, rates of skin cancer in the United States have continued to increase (Falzone et al., 2017). Emergent adult populations (adolescents and young women in particular) are increasingly turning to both outdoor and equally harmful indoor tanning methods (e.g., tanning beds), suggesting that current approaches to warning about preventable skin cancers are inadequate (Sharpe, 2006).

Health messages focusing on cancer prevention inadvertently activate death awareness because message content often focuses on the ramifications of skin cancer, including morbidity and mortality effects. One theory that details the influences of death awareness in health prevention messages is the terror management health model (THTM, Goldenberg & Arndt, 2008). Given the relative novelty of TMHM, the first goal of this study is to provide a test of TMHM's predictions in the context of sunscreen use and preventing skin cancer by examining risk message effectiveness when an existential threat is present.[1]

Given the risks associated with unprotected sun exposure, clear communication stating explicitly how these risks can be remedied is key to prevention. Yet, messages that are explicit in nature have been shown to trigger resistance, undermining effectiveness of risk communication efforts known as psychological reactance (J. W. Brehm, 1966). Research on reactance demonstrates that health messages featuring preventive recommendations that advocate behavior change are often framed using prescriptive language, limiting people's autonomy to make decisions for themselves (Quick et al., 2012). Past reactance research has shown that when persuasive communication uses forceful language, adverse effects such as source derogation (Quick & Stephenson, 2007), adopting attitudes contrary to the message (i.e., boomerang effects; Bessarabova et al., 2013), and counterarguing can reduce message effectiveness (Dillard & Shen, 2005).

Communicating risk prevention messages explicitly without triggering reactance is an important issue for public health and health communication practitioners. Researchers have examined a variety of reactance mitigation techniques including freedom restoration pre-scripts (e.g., Richards et al., 2020) and postscripts (e.g., C. H. Miller et al., 2007; see also Bessarabova et al., 2013, 2017). Extending these reactance mitigation efforts, recent research has proposed mortality salience as a boundary condition for psychological reactance, arguing that death anxiety makes freedom threat concerns less salient, thereby promoting body protective behaviors. There has been only one study (Bessarabova & Massey, 2020) to date testing mortality salience as boundary condition for reactance. This thesis attempts to replicate the effects found in previous research in the new health context of sun exposure protection and sunscreen use.

Chapter 2: Theoretical Rationale

The Terror Management Health Model

TMHM (Goldenberg & Arndt, 2008) is an extension of terror management theory (TMT), which predicts that existential anxiety causes individuals to engage in coping behaviors when they are made aware of their own eventual death (Solomon et al.,1991). Whether reinforcing self-held cultural beliefs (Greenberg et al., 1990) or engaging in body-protective behaviors (Arndt et al., 2003), TMT proposes that the overarching drive to reduce existential anxiety through coping behaviors allows one to symbolically transcend death (Burke et al., 2010; Greenberg et al., 1990). While TMT is largely centered around how individuals behave, when thoughts of death and dying are made salient, it is primarily focused on how individuals engage in means to *symbolically* transcend death. From an evolutionary standpoint, humans are hard-wired with a variety of psychological (e.g., anxiety, discomfort, stress, fear) and biological (e.g., changes to breathing and oxygen intake, increased heart rate and adrenaline levels) responses to even the ideas of dying (Greyson, 1998). TMT was built around explaining how individuals cope with thoughts of dying most commonly through rationalizing different ways their essence will transcend biological death. Placing heavy emphasis on cultural values, TMT mainly considers how, when faced with thoughts of death, individuals work to reinforce their own cultural worldviews in order to boost their self-esteem so that it acts as a buffer against otherwise uncomfortable existential anxiety (Taubman–Ben-Ari & Noy, 2010).

Unlike TMT, which focuses primarily on how individuals manage existential anxiety and attempt to bolster cultural worldviews and self-esteem to buffer against thoughts of death, the TMHM centers on specific bodily protective behaviors individuals engage in when faced with existential anxiety. In the context of skin protective behaviors, the TMHM presents itself as a

better choice over TMT in that the TMHM focuses on adaptive health behaviors to bolster physical health as opposed to buffering actions that, while boosting self-esteem, do little to address death itself. While death is inevitable at some point, preventing skin cancer through means of adhering to body protective claims (e.g., wear sunscreen to prevent skin cancer) acts as a means to proactively extend life as opposed to symbolically transcend death. Building on core principles of TMT, the TMHM focuses on two central psychological defenses for managing existential anxiety in health-related matters: distal and proximal defenses. Depending on whether death-relevant thoughts are held within (proximal defenses) or outside (distal defense) of focal awareness, individuals respond differently and can engage in different coping behaviors (Pyszczynski, Greenberg, & Solomon, 1999).

Terror Management Psychological Defenses

Proximal Defenses

Proximal defenses involve a direct, immediate, and conscious consideration of death inductions by having participants write two paragraph-length essays in which they are asked to consider and describe their own death (Greenberg et al.,1986). Such inductions have been shown to result in existential anxiety that subsequently can be dealt with in adaptive or maladaptive ways (Taubman-Ben-Ari & Findler, 2005). Whereas adaptive ways include adhering to body-protective actions (Arndt & Goldenberg, 2017) and engaging in safe, responsible practices (Courtney et al., 2020), maladaptive approaches involve either quelling death-relevant thoughts (Arndt et al., 2007) or denying vulnerability to death (Greenberg et al., 2000).

TMHM research has demonstrated that when mortality is made salient individuals become more motivated to engage in adaptive health-promoting behaviors, such as using sunscreen (Routledge et al., 2004) or exercising (Arndt et al., 2003). As demonstrated by TMHM

research, people have a strong tendency to quickly and easily deal with death-related thoughts as they are inherently uncomfortable and are a source of existential anxiety (Bassett, 2007). One way in which individuals actively attempt to mitigate such thoughts of death is through compliance with pro-health messages. For example, Routledge and colleagues (2004) found that proximal defenses served to increase intention to purchase sunscreen when specific life-threatening consequences of sun exposure brought mortality within focal awareness. Thus, proximal defenses present themselves as useful means to convey dangers to health and provide a means to protect oneself through adaptive body-protective actions.

Distal Defenses

Distal defenses are aroused when people are reminded of their mortality but subsequently these death thoughts are moved outside of focal awareness, thus bypassing proximal defenses (Hayes & Schimel, 2018). Empirically, distal defenses have been aroused by first priming participants with mortality salience, followed by a distraction to shift thoughts of death outside of focal awareness. Following the distraction task, participants are generally asked to complete a series of lexical-decision tasks in which word fragments containing death-related words are embedded alongside non-death words (Hayes et al., 2010). Despite the distraction mechanism, distal defenses still ensure a heuristically accessible degree of death-related cognitions outside of the explicit, cognitively salient thoughts induced by proximal defenses (Hayes et al., 2010).

TMHM predicts that, in situations when thoughts of death and dying are held outside of focal awareness, it is more likely distal defenses will drive an individual to engage in maladaptive, harmful, and, in some cases, potentially fatal behaviors. When death is outside of focal awareness (i.e., in distal defense), messages advocating for daily sunscreen use and discouraging tanning may be incompatible with existing symbolic defenses, therefore driving

individuals to engage in alternative, albeit maladaptive ways of reducing risk (e.g., using a tanning bed or excessive outdoor tanning). Conversely, proximal effects in which mortality is made salient and within focal awareness and effective means to protect oneself (e.g., sunscreen use) are made clear, individuals will be motivated to engage in adaptive health behaviors (Arndt & Goldenberg, 2017).

While a multitude of behavioral, environmental, and socio-economic effects influence whether one continues with a health-behavior change (Middleton et al., 2013), removing existential anxiety form focal awareness by giving people behavioral recommendations (efficacy) to deal with the health threat marks a critical first step in health-behavior change. Sustained existential anxiety, when held in focal awareness, can cause extreme psychological discomfort **(**Kesebir, 2014; C. H. Miller & Massey, 2020). As a result, and in line with foundational TMT research, the TMHM extends the desire to alleviate unsettling existential anxiety to health contexts whereby adhering to advocated health messages or actions, an individual can engage in adaptive body-protective behaviors that reduce existential anxiety. Such body-protective behaviors are achieved through proximal defenses as, when death is brought into focal awareness, proximal defenses best serve to motivate individuals to directly engage in adaptive health behaviors (Arndt & Goldenberg, 2017). In line with the TMHM, proximal defense research, and the motivating effects mortality salience has on body-protective behavioral intentions, the following hypothesis is proposed:

H1: Relative to the control condition, mortality salience results in body-protective behavioral intentions.

Theory of Psychological Reactance

Traditionally, prevention messages use direct and explicit language that unequivocally

explains what needs to be done to avoid negative consequences described in the message (Staunton et al., 2020). Unfortunately, however, such framing can make people resistant to comply with the message due to psychological reactance (J. W. Brehm, 1966; J. Miller et al., 2021). The theory of psychological reactance (TPR) explains the unpleasant motivational state individuals experience when faced with an authentic or perceived threat to one's freedoms (J. W. Brehm, 1966). Reactance is typically induced through a combination of anger and relevant negative cognitions (Dillard & Shen, 2005) and can be aroused a multitude of ways. Reactance can be experimentally aroused through various approaches including guilt appeals (Bessarabova et al., 2015), direct limitation of choices (Andreoli et al., 1974) or personal freedoms (J. W. Brehm et al.,1966). Additionally, the use of intense, explicit language (C. H. Miller et al., 2007) along with the intent to persuade (Dillard & Shen, 2005) has been reliably demonstrated to arouse reactance.

Reactance in Persuasive Messaging

Psychological reactance has long been demonstrated to be a main driving factor behind persuasive message rejection (J. W. Brehm, 1966; LaVoie et al., 2015). In persuasive messaging, the implications of reactance are considerable and can range from source derogation to complete rejection of the message (Quick et al., 2013). The effects of reactance have been examined through a wide array of topics from advertising (e.g., Amazeen, 2020), political communication (e.g., Meirick & Nisbett, 2011), to traffic safety messaging (e.g., Ward et al., 2021) and climate change information efforts (e.g., Chinn & Hart, 2021). Irrespective of topic, reactance typically manifests itself in a variety of behavioral and cognitive effects.

Behaviorally, in persuasive messaging advocating for action to be taken (e.g., smoking cessation to prevent lung cancer), reactant individuals may reject the message they deem

freedom-threatening and, instead, carry through with their actions in order to restore or assert their freedom. These oppositional behaviors, often described as *boomerang effects* (actions contrary to persuasion efforts; see Bessarabova et al., 2013) are inherently counterproductive to persuasive messaging efforts. Cognitively, reactant individuals may engage in source derogation or downplaying the threat and its significance. Often exacerbated by displays of anger, aggression, and hostility towards the message, threat, or source itself, the behavioral and cognitive effects of reactance serve as a major barrier to persuasive messaging efforts across disciplines (Steindl et al., 2015).

Reactance in Public Health Campaign Messages

In the context of public health campaigns such as anti-smoking efforts, it comes as no surprise that reactance plays a significant role in both simple message rejection as well as the proliferation of deliberate, maladaptive health behaviors (C. H. Miller & Quick, 2010). Public health campaigns by definition aim to persuade individuals into (or away from) behaviors that will improve (or harm) their health (Heath, 2005). Such efforts have long been examined in the context of psychological reactance and, thus, provide relevant insights into various elements that affect message adherence and campaign effectiveness (Clayton et al., 2017). Investigations into anti-smoking messages have demonstrated that when unhealthy behaviors are depicted alongside their respective consequences, not only can mortality salience affect messaging (Wong et al., 2017), but also reactance can be elicited as well (Henriksen et al., 2006). Similarly, Quick and Stephenson (2008) demonstrated that vivid, often graphic, messages conveying the negative health threats of smoking significantly increased freedom threat. More recently, the role of reactance in public health communication has been extended to the COVID-19 pandemic and the plethora of responses to ever-changing public health guidance (Ma & Miller, 2021).

Likewise, meta-analytic findings investigating reactance in a multitude of health-related messaging contexts such as binge drinking, exercise, and tanning demonstrate that threats to freedom reduce message effectiveness (Rains, 2013). Numerous studies have shown the effects of mortality salience induction from the theoretical perspectives of TMHM (Cox et al., 2009; Martin & Kamis, 2019; Routledge et al., 2004). Likewise, the effects of reactance have been extensively studied (LaVoie et al., 2015; C. H. Miller & Quick, 2010; C. H. Miller et al., 2007). Only recently, however, has death awareness been demonstrated to mitigate threat to freedom perceptions, demonstrating mortality salience as a boundary condition for psychological reactance (Bessarabova & Massey, 2020).

Integrating the TMHM with TPR

Psychological reactance poses a significant threat to ongoing risk communication and health promotion efforts. However, the way in which reactance can cause message rejection can be counteracted if the message involves a direct, existential, and often immediate threat whereby clear and actionable means of mitigation are presented. Bessarabova and Massey (2020) hypothesized that mortality salience is a boundary condition for psychological reactance, arguing that relative to existential threats limitations of freedoms are less of a concern. They tested their predictions in two experiments examining the effects of mortality salience and freedom threat in the context of safe-sex behaviors directed at prevention of sexually transmitted diseases (STDs). Results demonstrated that mortality salience can mitigate a mild freedom threat (Study 1) as well as high threat-to-freedom levels (Study 2). Their study, however, only revealed distal effects of mortality salience and reactance on behavioral intentions as study inductions motivated behavioral intentions promoting procreation rather than safe-sex behaviors. Explaining their results, Bessarabova and Massey (2020) speculated that “the human impetus to procreate—and

thus continue the species—is so deeply ingrained as a product of adaptation that situations eliciting incentives to procreate (e.g., death awareness) may draw upon primordial motives that transcend dual-model defense systems" (p. 42). Body protective behaviors associated with skin cancer prevention do not contain the same evolutionary motivations as procreation, thereby making testing of proximal effects possible. Although on the topic of procreation, one can certainly make mortality salient and in focal awareness, the underlying cultural and even biological drive to reproduce likely serves as a special case which leads to behaviors more characteristic of distal defenses (e.g., pushing thoughts outside of focal awareness and not adhering to protective measures) regardless of the effectiveness of the proximal defense arousal. Since preventing skin cancer with sunscreen use lacks such a fundamental evolutionary mechanism, making mortality salient and within focal awareness is more likely to generate typical proximal defense responses such as adaptive health behaviors.

Thus, this study provides another test for the integration of TMHM and psychological reactance theory's predictions using the context of sunscreen use and skin cancer prevention messages. This study aims to replicate how death awareness mitigates psychological reactance and attempts to demonstrate the adherence to body protective intentions to wear sunscreen (consistent with proximal defenses). In the control, non-death condition, typical reactance responses—increased threat perceptions along with anger and negative cognitions and decreased behavioral intentions to comply with message recommendations—prompted by high threat to freedom are expected. In the absence of an existential threat, people's primary motivation is likely to be restoring the perceived threat to freedom, but, when death awareness is activated, the existential threat and means by which it can be alleviated should present themselves as a more pressing concern than reactance and personal autonomy. Despite an obvious freedom limiting

message, given that thoughts of death and dying have been brought into focal awareness, it is expected that people will primarily focus not on the threat to freedom, but instead the source of existential anxiety and means by which they can alleviate such feelings. Given the explicit call to action to alleviate the existential threat, individuals should feel their freedom is less threatened and in turn, less likely to experience reactance. With reactance mitigated, the likelihood of persuasive success in getting individuals to adhere to an otherwise freedom limiting message thus improves thus increasing body protective behaviors. Thus, in the death-prime condition, death awareness should mitigate perceptions of anger, threat, and negative cognitions, thus alleviating the effects of reactance. In addition, death awareness paired with high threat to freedom should increase the intentions to engage in body protective behaviors. Based on this reasoning, the following prediction is made:

> H2: Mortality salience interacts with freedom threat such that, when paired with high threat, mortality salience (a) reduces threat perceptions and (b) reactance, and (c) increases body protective behavioral intentions, relative to the low-threat levels; but in the control condition, high threat increases (d) threat perceptions and (e) reactance and (f) reduces body protective behavioral intentions, relative to low threat.

Chapter 3. Method

Participants

Participants consisted of 206 adults ranging from 18 to 25 (M = 19.43, SD = 1.46) were recruited from a research participation pool at a large public university in the South-Central US and received extra-credit for their participation. Fifty-eight percent of participants identified as female, and approximately 80% of participants self-identified as White, 3% as Black, 5% as Asian, 3% as Native-American, 5% as Hispanic, 0.5% as Middle-Eastern, 1.5% as Central-Asian (Indian/Pakistani), and 1% did not fit into provided categories.

Design and Procedure

This data collection was approved by the university's Internal Review Board (IRB) and all data was completely de-identified following collection. A 2 (mortality: salient, control) × 2 (freedom threat: high, low) independent group design was employed. Upon attending an in-person data collection session at a departmental computer lab, participants were seated at a computer station and provided with an electronic informed consent form. The consent form reminded them that their participation was voluntary and that they could withdraw from the study at any time. While students were provided with an opt-out button at the bottom of the informed consent screen, all participants elected to proceed with the study. Following consent procedures, participants were provided with instructions and practice on how to use magnitude scales.[2]

A standard mortality-salience induction was introduced next, wherein participants were randomly assigned to write two short essays about either their own death (mortality salience condition) or dental pain (control condition; Greenberg et al., 1986). For the mortality-salience

condition, participants were asked: “Please describe, in a paragraph or two, the emotions that the thought of your own death arouse in you. Describe how you would feel as you experience your death;” before being prompted to: “Write down, as specifically as you can, what you think happens to your body as you die and physically experience death.” Participants in the control condition also wrote two essays prompted with similar instructions but with a topic of experiencing a painful toothache.[3]

Following the completion of the essay writing tasks, participants read a sunscreen message containing a threat-to-freedom induction. The high-threat message opened with the following statement: “There’s really no choice when it comes to protecting your skin: You simply have to do it! The information about the importance and benefits of preventing skin cancer that you must know... ”. Conversely, in the low-threat condition, participants read a statement which opened with the following: “You have a choice when it comes to protecting your skin: Please consider wearing sunscreen!! Below is some important information about the benefits of sunscreen that we would like you to think about ... ”.

Both conditions subsequently proceeded with identical descriptions of not wearing sunscreen, the harmful effects of UV exposure, and sunscreen use advocacy (i.e., efficacy) statements:

> The Center for Disease Control and Prevention (CDC) has shown that Ultraviolet Radiation (UVA) is a known carcinogen linked to skin cancer, premature aging, and a weakening of the immune system. Wearing sunscreen prevents skin cancer! Regularly applying sunscreen significantly decreases the ability of UV rays to penetrate into the skin and damage subcutaneous tissue: Just use SPF 15 or higher and reapply sunscreen every 2 hours.

The high-threat-to-freedom message concluded with the following: “There’s no other choice: You must wear sunscreen! Do not ignore this message. Wearing sunscreen is important: You must protect yourself!” whereas the conclusion of the low-threat message read: “The choice is yours! Please choose to wear sunscreen! We're asking you to consider this message. Wearing sunscreen is important: Try to protect yourself!”

After reading one of the message conditions, participants completed measures of psychological reactance, which included threat-to-freedom perceptions, anger, and a thought-listing task, capturing negative conditions. Finally, at the end of the study, participants completed a questionnaire that assessed their attitudes toward sunscreen use, behavioral intentions to wear sunscreen all year round and to purchase sunscreen lotions of various SPF levels, followed by demographic questions. Lastly, participants were instructed to write down their unique research participant number so that extra-credit could be assigned to the course of their choosing.

Instrumentation

For means and standard deviations, refer to Table 1. Dependent variables were measured using magnitude scales.[4] Participants were asked to use a scale from zero to infinity to respond to scale items. For example, in measuring anger, a score of zero would indicate the absence of anger and a score of 100 would represent moderate levels of anger. All continuous variables were examined for violations of the normality assumption, were winsorized to control for outliers, and transformed, as needed.[5] Transformations helped substantially improve the violations of the normality assumption (skewness and kurtosis values of the original data and after winsorization and transformations are summarized in Table 2).[6]

All indexes containing multiple items were formed by saving first unrotated principal component scores. By using principal components analysis with an unrotated one-component

solution and saving standardized regression component scores (Afifi et al., 2004), each scale item is weighted proportionally to its contribution to the principal component. Given that transformations change variable metrics, using the PCA approach makes interpretation of the results easier because all indexes produced from this method have $M = 0.00$, $SD = 1.00$, range ≈ -3 to +3. Subsequently, index reliabilities were calculated using the following equation: $N/(N\text{-}1) \times (E\text{-}1)/E$, wherein N = number of items and E = Eigenvalues for principal components (Hampson, Goldberg, & John, 1987; Serlin & Kaiser, 1976). All index reliabilities provided below were computed as PCA reliabilities.

Perceptions of Threat to Freedom and Reactance

Threat to freedom was assessed with a four-item measure (e.g., "manipulated," "pressured"; Dillard & Shen, 2005; PCA reliability = .88). Reactance was operationalized as a combination of anger (a four-item index; e.g., "irritated," "angry"; PCA reliability = .99; see Dillard & Shen, 2005) and relevant negative thoughts. Relevant negative thoughts were assessed with Dillard and Shen's (2005) approach, which involves excluding affective thoughts from the overall count of negative thoughts. Two undergraduate research assistants were recruited to help with coding. To be able to separate cognitive thoughts from affective, coders were provided with a list of affective terms created by Shaver et al., (1989). Thoughts that included affective terms (e.g., "this is annoying") were not included into the count of negative relevant thoughts (Scott's π = .88). Remaining relevant negative thoughts included those expressing disagreement with the message, message or source derogation, an intention not to comply, or act contrary to the message (Scott's π = .73).

Behavioral intentions. Participants were asked to estimate their likelihood of using sunscreen all year round, measured as a single-item estimate (see Dillard & Shen, 2005, for a

similar approach). Participants also rated their likelihood of purchasing different sunscreen lotions with eight images obtained from Routledge et al. (2004) that depicted sunscreen bottles across four sunscreen brands with various SPF levels. Two indices were formed, using principal component analysis as guidance: a low-SPF (Coppertone SPF 4, Hawaiian Tropic SPF 4, Banana Boat SPF 4, Neutrogena SPF 5; $\alpha = .79$) and high-SPF (Banana Boat SPF 50, Coppertone SPF 50; $r = .90$) index. Originally and per Routledge et al. (2004), there were a total of four different images across four sunscreen brands for lotions with higher SPF index. However, two of the images exhibited poor factor loading in PCA and were omitted from the index. It is likely that attitudes towards certain brands may vary over time, be affected by changing trends or product recalls; any of these factors may be responsible for the differences in index composition in this study as compared to Routledge et al.

Chapter 4. Results

To test study predictions, a Multivariate Analysis of Variance (MANOVA) with the threat-to-freedom and mortality-salience inductions entered as the independent variables, and the threat-to-freedom perceptions, anger, negative cognitions, and behavioral intentions (intentions to purchase a high-SPF lotion, intention to purchase a low SPF-lotion, and intention to wear sunscreen all year round) as the dependent variables. The multivariate effect of the threat-to-freedom induction was significant, Wilks' $\Lambda = .66$, $F(6, 191) = 16.07$, $p < .001$, $\eta_p^2 = .34$. The multivariate effects of mortality salience, Wilks' $\Lambda = .94$, $F(6, 191) = 1.97$, $p = .07$, $\eta_p^2 = .06$, and threat to freedom by mortality salience interaction, Wilks' $\Lambda = .94$, $F(6, 191) = 2.04$, $p = .06$, $\eta_p^2 = .06$, was marginally significant. Note that in the analysis below, the sample used to test predictions was $N = 200$ due to missing data and listwise deletion being used as a default option for MANOVA in SPSS.

In the analyses that follow, all means and standard deviations (except for the results reported for negative relevant thoughts, a single item measure that did not require transformation) used the principal component metric.

Freedom-Threat-Induction Checks

Results indicated that high threat ($M = 0.56$, $SD = 0.89$, $n = 102$) increased threat perceptions significantly more, $F(1, 196) = 84.92$, $p < .001$, $\eta_p^2 = .30$, than low threat ($M = -0.55$, $SD = 0.78$, $n = 98$). The threat induction also produced reactance: The high threat-to-freedom condition ($M = 0.44$, $SD = 1.06$, $n = 102$) generated significantly greater levels of anger, $F(1, 196) = 44.16$, $p < .001$, $\eta_p^2 = .18$, relative to the low threat to freedom condition ($M = -0.42$, $SD = 0.71$, $n = 98$). Similarly, the high threat-to-freedom condition ($M = 3.24$, $SD = 2.11$, $n = 102$) resulted in significantly greater number of negative relevant thoughts, $F(1, 196) = 11.46$, $p < .001$, $\eta_p^2 = .06$, as compared to the low threat to freedom condition ($M = 2.27$, $SD = 1.88$, $n = 98$). Thus, the threat induction was successful.

Hypotheses Tests

Hypothesis 1

H1, which predicted that, relative to the control condition, mortality salience would produce body-protective behavioral intentions, was partially supported. Mortality salience ($M = 50.05$, $SD = 95.70$, $n = 100$), significantly increased the intention to wear sunscreen all year around, $F(1, 196) = 5.09$, $p = .03$, $\eta_p^2 = .03$, relative to the control condition ($M = 26.10$, $SD = 47.94$, $n = 100$). However, the effects of mortality salience on the intention to purchase a high-SPF lotion, $F(1, 196) = 2.25$, $p = .14$, or a low-SPF lotion, $F(1, 196) = 0.50$, $p = .48$, were not significant.

Hypothesis 2

H2, predicted that mortality salience would interact with freedom threat such that, when paired with high threat, mortality salience (a) would reduce threat perceptions and (b) reactance, and (c) would increase body protective behavioral intentions, relative to the low-threat levels; but in the control condition, high threat would increase (d) threat perceptions and (e) reactance and (f) would reduce body protective behavioral intentions, relative to low threat. Results revealed a main effect of mortality salience on threat-to-freedom perceptions was marginally significant, $F(1, 196) = 3.35$ $p = .069$, $\eta_p^2 = .02$, indicating that mortality salience ($M = -0.13$, $SD = 0.99$, $n = 100$) generated less threat to freedom, relative to the control condition ($M = 0.16$, $SD = 1.00$, $n = 100$) . Given that the results produced a main effect that approached significance and not an interaction, H2a and H2d were partially supported. The predicted interaction effects on reactance, measured as a combination of anger, $F(1, 196) = 0.49$, $p = .49$ and negative cognitions, $F(1, 196) = 1.96$, $p = .16$, were not significant; therefore H2b and H2e were not supported. Lastly, results revealed a significant interaction between freedom threat and mortality salience on behavioral intention to purchase a high-SPF lotion, $F(1, 196) = 7.20$, $p = .008$, $\eta_p^2 = .04$. As evident from Figure 1 (and as predicted), when high threat was paired with mortality salience ($M = 0.27$, $SD = 0.80$, $n = 48$), intentions to purchase a high-SPF lotion were significantly higher, $t(98) = 1.81$, $p = < .05$ (one tailed), as compared to the low-threat-morality-salience condition ($M = -0.06$, $SD = 1.00$, $n = 52$). Furthermore (and consistent with hypothesized relationships), when high threat was paired with control condition ($M = -0.32$, $SD = 1.15$, $n = 54$), intentions to purchase a high-SPF lotion were significantly lower, $t(98) = 1.97$, $p = .05$, as compared to the low-threat-control condition ($M = 0.10$, $SD = 0.95$, $n = 46$). Thus, H2c and H2f were supported. Taken together, H2 received partial support.

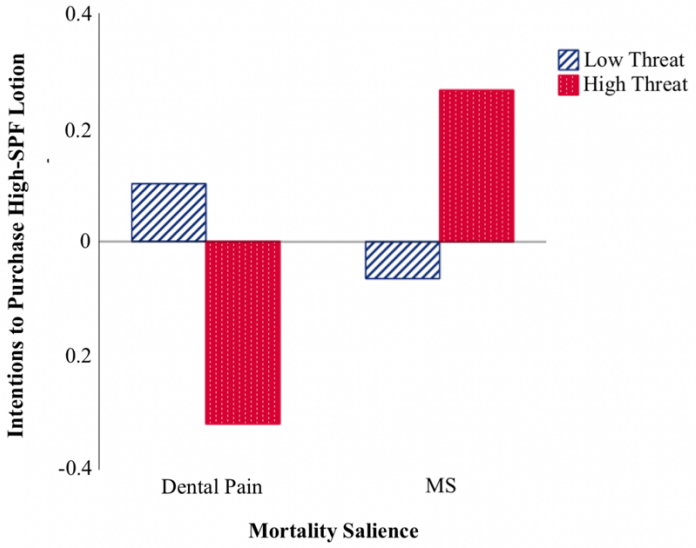


Figure 1. Morality Salience by Threat to Freedom Interaction on Intentions to Purchase High-SPF Lotion.

Chapter 5: Discussion

This study tested the TMHM in the context of sunscreen use and integrated its predictions with TPR in order to replicate how death awareness can mitigate the negative consequences of psychological reactance. As expected, mortality salience mitigated threat-to-freedom perceptions. This study, by extending both the TMHM and TPR, presents several fruitful considerations and directions of future research that transcend the world of academia and offer practical implications for risk and crisis communication efforts. Not only do the results of this study further underscore the need to consider the effects of death awareness and message forcefulness in communicating and warning against health threats, such findings further lend themselves to more effective methods to gain adherence to protective health measures.

Testing the TMHM

The TMHM proposes that depending on the locality of death-awareness thoughts, either within (proximal) or outside (distal) of focal awareness, different behavioral effects present

themselves (Arndt & Goldenberg, 2017). As long as perceptions regarding efficacy are sufficient, when death is held within focal awareness and proximal defenses are activated, adaptive health behaviors often take hold. Conversely, when thoughts of death are held outside of focal awareness causing distal defenses to emerge, individuals often engage in maladaptive behaviors that serve to bolster self-esteem and reduce anxiety instead of alleviating the threat itself.

As predicted in H1, mortality salience significantly increased the intention to wear sunscreen all year around when compared to the non-death control condition. In short, when death is brought into focal awareness, participants acted to alleviate existential anxiety associated with the thoughts of death and dying by intending to engage in body protective behaviors. Thus, our results not only support H1 but are also consistent with previous TMT and TMHM research. Participants responded to the risks posed by excessive exposure to UV radiation and understood the serious and potentially lethal consequences of not using sunscreen. Overall, as evident from results supporting H1, this was itself enough to significantly increase intentions to alleviate the threat (an associated existential anxiety) by expressing intent to adhere to the advocated measure by wearing sunscreen all year around.

Integrating TMHM with TPR

Extensive research has already established persuasion undermined by freedom-limiting messages can lead to maladaptive behaviors or counterarguing against a message or campaign's advocated positions or actions (Rains, 2013). Studies have examined the maladaptive effects of prevention messaging from reactance (C. H. Miller et al., 2007) and TMHM standpoints (Pyszczynski et al., 1999; Routledge et al., 2004) by separately considering their respective influences; recently, these two perspectives were combined, and death awareness has been

demonstrated to mitigate freedom threat in the context of self-protective risk messages (Bessarabova & Massey, 2020).

In the test of the TMHM alongside TPR in the context of skin protective behaviors, mortality salience mitigated freedom-threat perceptions. Findings were consistent with a previous investigation (Bessarabova & Massey, 2020) into the effects of death awareness in overcoming the inhibitory effects of reactance when exposed to freedom-limiting messaging. As predicted in H2, mortality salience led to higher intentions to purchase a high-SPF lotion and generated less threat to freedom perceptions than compared to the high-threat-control condition. In short, mortality salience mitigated reactance in the face of an otherwise highly freedom threatening message. This finding serves as another confirmation that death awareness is likely a boundary condition for TPR. Since reactance mitigation as a result of death awareness serves to alleviate anxiety (Bessarabova & Massey, 2020), combining autonomy-limiting language with death awareness increases intentions to follow message recommendations as, in such a scenario, the threat of dying presents itself as a more immediate concern than threats to autonomy.

Theoretical and Practical Implications

This study integrated and extended two theories—TPR and TMHM—to the topic of skin protective behaviors and skin cancer prevention messaging, effectively replicating how death awareness can mitigate reactance. These results further support the notion that mortality salience serves as a boundary condition for psychological reactance whereby an existential threat overrides threat-to-freedom restoration behaviors typical of TPR. When people were made aware of their death, they were more likely to engage in skin protective behaviors such as wearing sunscreen despite an otherwise forceful, freedom-limiting message. This research has practical implications for improving the effectiveness of skin-cancer prevention messaging efforts as well

as other campaigns that employ reminders of death to evoke existential danger.

One such area includes ongoing efforts to combat the COVID-19 pandemic. The proximal effects whereby death awareness can mitigate reactance proves useful in health promotion messaging and can be leveraged in battling anti-vaccination ideologies towards the COVID-19 vaccines. While many risk communicators may deliberately attempt to avoid freedom-limiting, lexically concrete messages such as "You have no choice but to get the COVID-19 vaccine," making mortality salient by strategically placing more emphasis on the multitude of existential threats COVID-19 poses would likely improve message adherence. Since the effects of severe COVID-19 infections are largely out of public eye due to viral transmissivity concerns, many do not have first-hand experience with the virus and therefore lack meaningful associations with negative health consequences of the disease. Without making mortality salient in the minds of message receivers, explicit message with strong warnings and proscriptive recommendations can undermine risk communication efforts and adherence to self-protective behaviors.

Similar approaches can be leveraged to help curb adolescent use of e-cigarettes and the practice of vaping, for example, along with a multitude of other risks and public health concerns. By presenting existential threat alongside direct and actionable albeit freedom-limiting messaging, concerns of maladaptive reactance effects (e.g., boomerang effects; Bessarabova et al., 2013) can be lessened thus bolstering message effectiveness.

Limitations and Future Directions

Although it is important to note how no single study can account for all potential factors driving reactance and terror management effects, the results of this investigation help reinforce earlier work while also setting the stage for future research. This study, second only to

Bessarabova and Massey (2020), will help form a fundamental foundation for a new and exciting era of TPR and TMHM research which will undoubtedly have a plethora of immediate, far-reaching benefits that well exceed the traditional realm of academic discourse. With two studies examining STD prevention and skin protective behaviors, a number of fruitful avenues for future research exist at the intersection of TPR and TMHM remain. One such area in which our scientific understanding of how mortality salience actually mitigates reactance is through expanding the scope of topics and representativeness of the sample. This study consisted primarily of college students from a large university in the South-Central United States. Young adults, particularly in the Southern United States, are generally more focused on having a tanned appearance and, thus, are at a higher likelihood to engage in tanning practices and regard tanning as a more common practice (Bowers et al., 2021; Van Hout & McVeigh, 2019). Although partial support for the hypotheses was found, future investigations with samples where tanning practices are valued to a lesser extent would provide further reliability and validity.

Since reactance can be experienced differently by individuals (Jonas et al., 2009) contextual factors also play a role in how one experiences reactance. When a freedom is perceived to be difficult to restore, more motivation is exerted by an individual experiencing reactance to restore that freedom (Miron & J. W. Brehm, 2006). However, when the threat is perceived to be impossible to restore, motivation will be low despite the psychological discomfort characteristic of reactance (J. W. Brehm, 1966; S. S. Brehm & Brehm, 1981). Thus, in the context of the TMHM, the degree to which an existential threat is perceived as severe can influence subsequent actions. Future research investigating external factors that influence both perceptions of threat severity as well as ease of restoration would provide useful insights for improving risk communication effectiveness. Large groups of individuals with varying

perceptions towards risk mitigation efforts and different levels of motivation to restore personal freedoms present difficulties to risk communicators. Modern risk and crisis communication efforts, such as those surrounding the COVID-19 pandemic, have been heavily influenced by misinformation (Roozenbeek et al., 2020), rejection of science (Hornsey, 2020), and political polarization (de Bruin et al., 2020); and, thus, present themselves as important areas for future intersectionality with TMHM and reactance research to understand sources of perceptual influence.

Lastly, reactance and TMHM research would benefit greatly from further investigations exploring the specific explanatory mechanism(s) driving reactance mitigation, such as information processing and whether the solution is meaningful or whether the time (i.e., how much time, if any, is needed to contemplate action or seek alternatives) and nature of its presentation (i.e., message framing and visual representations) is a better determinant of reactance mitigation. Investigating the potential effects of greater lexical concreteness and direct messaging in situations with existential threats of varying type and immediacy can further identify new risk communication topics in which such considerations can be applied to improve message effectiveness. By determining what elements, whether individual appraisals of threat or distinct messaging features such as persuasiveness and advocated responses best facilitate reactance mitigation, more informed guidance can be provided to risk communicators across a multitude of fields, from severe weather messaging and active shooting alerts, to public health warnings and disease prevention. Likewise, future studies could leverage a similar approach but take an existential threat and place it within a single, freedom-limiting message such as a text-message alert communicating imminent danger. One way in which this could be done would be simulating severe weather alert messages where a threat (approaching hurricane or tornado) is

communicated with freedom-limiting messages. While experimentally it would be challenging, both operationally and ethically, to replicate the experience of an oncoming severe weather threat in its entirety, future efforts could leverage less immediate weather threats (e.g., a hurricane making landfall in 2-3 days) that would still necessitate action in the present to alleviate existential anxiety.

Conclusion

Integrating the TMHM with TPR provides numerous future avenues for research, with considerable benefits to risk and crisis communication. In emergency situations such as the presence of an active shooter or in the face of an oncoming hurricane, individuals are often faced with freedom-limiting alert messages. As a result, defense mechanisms and their respective degrees of conscious awareness of death and reactionary behaviors are of considerable importance in tailoring alert messages to maximize adherence to self-protective claims. Such messages are freedom-limiting out of necessity due to the often serious, direct, and dire threats being addressed. Thus, the findings of this study should be considered in risk messaging campaigns not to abstain entirely from direct, lexically concrete, autonomy liming messaging, but to increase their effectiveness by avoiding unintended reactance effects.

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Footnotes

[1]Although skin cancer as a result of exposure to UV radiation can take many years to develop, many types, such as melanoma, can have severe consequences including death. Per TMHM, health behaviors are suitable for inductions eliciting existential threat as they reference direct effects on the human body. Such references serve as reminders of the inherent creatureness and fragility of the human body (Goldenberg et al., 2000). Such mortality-salience inductions, by brining thoughts of death into focal awareness, act as pertinent reminders of human fragility. In samples comprised of college-aged adults, mortality salience inductions have demonstrated empirical success in arousing death relevant thoughts independent of how deadly the consequences of the message topic (Arndt et al., 2003; Routledge et al., 2004).

[2]Participants received the following instructions: "Suppose we would like to know how much knowledge you have about your major. To answer this question, use a number from zero to infinity. Zero means you have no knowledge at all about your major, and higher numbers represent greater levels of knowledge. If you feel you have moderate knowledge about your major, rate your knowledge as 100. If your knowledge is twice as much as a moderate level, rate your knowledge as 200; if your knowledge about your major is half the moderate level, rate your knowledge as 50. You can use any number from zero on up, such as 18, 193, or 347."

[3]A lexical-decision task as a mortality-salience-induction check was omitted by design as investigations into mortality-salience-induction checks have shown cases in which lexical-decision tasks brought death-thoughts back into focal awareness unintentionally (Hayes & Schimel, 2018). As a result, and in line with previous research (e.g., Arndt et al., 2003;

Routledge et al., 2004), proximal or distal effects were inferred from the outcome variable scores themselves.

[4]Magnitude scales (see Lodge, 1981, for a discussion) are ratio-type scales that range from zero at the origin to infinity. Magnitude scales have shown considerable effectiveness in measurement across a variety of diverse topics across different disciplines. Unlike Likert-type scales and other ordinal measurements, magnitude scales are better suited for interval-level measurement as they are unbound at the upper end, which allows for a more realistic range of responses while avoiding ceiling effects (Lodge, 1981).

[5]Variables measured with magnitude scales are often positively skewed due to the inherent nature of an unbound upper end of the scale. In light of this, all variables other than negative thoughts were winsorized by recoding each variable's scores to a lower value. The majority of variables transformed were winsorized (Tukey, 1962) to either the 95th or 90th percentile, which has substantially improved variable skewness, but did not sufficiently improve violations of normality assumption. As a result, all variables were transformed to further improve normality. Note that transformations affect the data in predictable ways. In a transformation equation, $Y^{*}= (Y+k)^{\lambda}$, where Y is the original variable, Y^{*} is the transformed variable, and k is a constant. Using $\lambda < 1$ is likely to result in a more symmetric distribution for positively skewed data, and using $\lambda > 1$ is likely to result in a more symmetric distribution for negatively skewed data (Fink, 2009). Although transformations affect the scale on which a variable is measured, they do not change the relative differences in indicated responses between people for a given variable (Field, 2013).

[6]For example, the initial skewness of one of the anger items (annoyed) was 14.35 (*SE* = 0.17), indicating a significant departure from normality. Transformed item' skewness became

0.24, showing a substantial improvement. Different transformation formulas were used for different variables to accommodate the specific type of skewness present in a given variable. In this study, threat perception = (winsorized original item + 1)$^{.05}$; anger = (winsorized original item + .01)$^{.01}$; intentions to purchase a high-SPF lotion = (winsorized original item + 1)$^{.3}$ intentions to purchase a low-SPF lotion = (winsorized original item + 1)$^{.3}$; intention to wear sunscreen all year round = (winsorized original item + 1)$^{.2}$;

Table 1.

Means, Standard Deviations, and Bivariate Correlations between All Variables in the Study

Variable Name	*M*	*SD*	1	2	3	4	5	6
1. Perceived Threat [a, b]	0.00	1.00	1.00					
2. Anger [a, b]	0.00	1.00	.56**	1.00				
3. Negative Relevant Thoughts	2.76	2.04	.36**	.42**	1.00			
4. Intention to Purchase a High SPF Lotion [a, b]	0.00	1.00	0.03	0.06	0.09	1.00		
5. Intention to Purchase a Low SPF Lotion [a, b]	0.00	1.00	.16*	.27**	.15*	-0.06	1.00	
6. Intention to Wear Sunscreen All Year Round [b]	37.65	75.63	0.06	0.12	-0.02	.16*	0.07	1.00

*$p < .05$; **$p < .001$

[a] This index was formed by saving the first unrotated principal component.

[b] This variable was transformed

Table 2.

Data Before and After Winsorization and Transformations

		Original data skewness (*SE*)	Skewness after transformations (*SE*)	Original data kurtosis (*SE*)	Kurtosis after transformations (*SE*)
Threat to freedom:	Threaten	1.07 (.17)	0.38 (.17)	-0.02 (.34)	-1.24 (.34)
	Decision	1.40 (.17)	.17 (.17)	1.68 (.34)	-0.54 (.34)
	Manipulated	1.96 (.17)	.57 (.17)	3.64 (.34)	0.00 (.34)
	Pressure	1.35 (.17)	.18 (.17)	1.22 (.34)	-0.32 (.34)
Anger:	Irritated	14.29 (.17)	0.63 (.17)	204.52 (.34)	-1.35 (.34)
	Angry	4.87 (.17)	1.61 (.17)	29.72 (.34)	1.00 (.34)
	Annoyed	14.35 (.17)	0.44 (.17)	206.00 (.34)	-1.48 (.34)
	Aggravated	5.22 (.17)	1.09 (.17)	34.89 (.34)	-0.55 (.34)
Lotion (High SPF):	Banana Boat (SPF 50)	1.52 (.17)	-0.85 (.17)	2.22 (.34)	0.05 (.34)
	Coppertone (SPF 50)	1.57 (.17)	-0.53 (.17)	2.23 (.34)	-0.77 (.34)
Lotion (Low SPF):	Banana Boat (SPF 4)	2.35 (.17)	0.34 (.17)	2.92 (.34)	-0.70 (.34)
	Coppertone (SPF 4)	1.32 (.17)	0.18 (.17)	4.36 (.34)	-1.42 (.34)
	Hawaiian (SPF 8)	2.25 (.17)	0.30 (.17)	0.89 (.34)	-0.64 (.34)
	Neutrogena (SPF 5)	1.98 (.17)	0.34 (.17)	5.09 (.34)	-0.67 (.34)
Behavioral Intention:	Wear Sunscreen All Year Round	3.936 (.17)	0.57 (.17)	19.84 (.34)	-1.26 (.34)