Ambivalence Toward the Body: Death, Neuroticism, and the Flight From Physical Sensation

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Based on terror management theory, the authors suggest that ambivalent reactions to the human body are partially rooted in the association of the physical body with inescapable death and that individuals high in neuroticism are particularly vulnerable to such difficulties. Three experiments demonstrated that priming thoughts about one's death leads individuals high in neuroticism to flee from physical sensations, including pleasurable ones. In response to mortality salience, highly neurotic individuals spent less time submerging their arm in ice-cold water and using an electric foot massager but did not avoid stimulation in nontactile modalities (i.e., listening to music). The discussion highlights the role of existentially motivated self-repression in inhibitions surrounding the body.

Keywords: *mortality salience; neuroticism; physical sensation; inhibition*

The physical body is the vehicle through which we experience many of life's most basic pleasures. These include, but are not limited to, sexual pleasure, the touch of another human being, the feel of warm sun or a refreshing swim, the taste of one's favorite food, and the smell of a flower or one's morning coffee. Nonetheless, it is also clear that the body can be a source of anxiety, shame, and even disgust and, further, that some individuals, especially those high in neuroticism, seem particularly prone to experiencing such negative reactions. Following existential theorists such as Ernest Becker, Norman O. Brown, and Otto Rank, Goldenberg, Pyszczynski, Greenberg, and Solomon (2000, see also Goldenberg, 2005) posited that ambivalence toward the human body stems from a desire to deny our physical nature and that this motivation to distance ourselves from the rest of the natural world is ultimately rooted in a core human fear of death. Although our position implies that the threat associated with the physicality of the body extends to any aspect of the body that can remind people of their physical animal nature, to date, research has investigated these effects only within the domains of sexuality and disgust-eliciting stimuli. Evidence that death concerns increase ambivalent reactions to the human body in domains in which cultural inhibitions do not exist would support the position that ambivalence toward the body is rooted in the existential contradictions inherent in our mortal animal nature rather than in response to cultural norms regarding sexuality and the body. Toward this end, the research reported in this article examined the effects of mortality

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reminders on reactions to tactile sensations as a function of neuroticism.

THE BODY PROBLEM

Philosophical, religious, and psychological thinkers have long viewed the human body as a weakness to be controlled or transcended. Ancient Greek philosophers extolled the virtues of intellectual life over passionate life (e.g., Aristotle and Plato). Judeo-Christian theologians argued that the body was weak and prone to decay, whereas the soul was eternal; the capacity to exert one's will over the immediate needs of one's body or "temptations of the flesh" was viewed as a primary difference between humans and animals. Although some Eastern religions have been more tolerant of bodily pleasure, these belief systems often view physical ecstasy as a vehicle through which one can transcend the body and attain enlightenment (Ellwood & Alles, 1998). Although beliefs and perceptions about the body vary, virtually all cultures throughout history have instituted norms, rituals, restrictions, and taboos concerning various aspects of the human body (Haidt, Rozin, McCauley, & Imada, 1997). This seems especially true of one of the body's most appealing capacities: sexual pleasure.

Since the enlightenment, the most popular and long-standing conceptualization of why the body and sex are so often problematic is that the civilizing forces of culture impose restrictions on the innate tendencies of the individual. From this perspective, the regulation is imposed primarily from outside the self and the individual is prevented from enjoying total freedom and happiness. This basic theme resonates in the work of scholars throughout the ages (e.g., Hobbes, Levi-Strauss, Marcuse, and Rousseau). Within psychology, these ideas are illustrated by Freud's (1930/1961) conceptualization of human life as an ongoing battle between the pleasure and reality principles, between the child's instinctual urges and the need to please his or her parents, master toilet training, and, for the boy, avoid castration and between the adult's sexual desires and the restrictions of morality imposed by culture.

Brown (1959), however, argued that "to say that reality or the reality principle causes repression defines the problem rather than solves it" (p. 9). Tracing human ambivalence concerning the body and sex back only to cultural forces begs the question of why virtually all cultures have the need to regulate bodily and sexual functions. Existential thinkers before and after Freud viewed psychic suffering as ultimately originating not in the demands imposed on the individual from without but on those he or she imposes on himself or herself from within. "Children toilet train themselves," Brown (1959, p. 120) said. Referring to the need for structure and rules to live by, Rank (1936/1976) suggested that people "create out of freedom, a prison" (p. 13). Becker (1973) synthesized the views of these and other theorists into a set of ideas that form the basis for our analysis of why the human body is so often a problem. He agreed with Freud that culture was built on repression and that the human body was a particular problem needing to be repressed, but he took the next step and suggested that this was true "not because man was a seeker only of sexuality, of pleasure, of life and expansiveness, as Freud thought, but because man was also primarily an avoider of death" (p. 96). From an existential perspective, humans repress their own physical experience, pleasure, and sexuality because these things are inherently threatening.

TERROR MANAGEMENT THEORY

Humans must face the vexing existential situation of being born into life, apparently biologically and psychologically programmed to maintain it yet cognizant of the irrefutable fact that inevitably all life, including one's own, will come to an end. Consequently, human beings are strongly motivated to defend against this potentially terrifying realization. Following Becker, terror management theory (e.g., Greenberg, Pyszczynski, & Solomon, 1986) specifies culture as the primary instrument though which this death denial is implemented by imbuing life with symbolic meaning and providing standards of value through which people can attain a sense of personal value and significance, commonly referred to as self-esteem.

These ideas were integrated into an empirically testable theoretical framework by Greenberg et al. (e.g., 1986), who have demonstrated (for a review, see Greenberg, Solomon, & Pyszczynski, 1997) that consideration of mortality causes people to engage in a wide array of defenses that bolster a sense of meaning and self-esteem. For example, after a reminder of mortality (mortality salience [MS]), people respond with negative attitudes and aggressive actions toward those who disagree with the tenets of their cultural, political, and religious beliefs and values and respond positively toward those who agree with and uphold these beliefs and values. MS also leads people to strive harder to live up to cultural standards by engaging in behaviors that bring value to the self and attending to aspects of the self that are valued.

According to this analysis, the physical nature of the human body poses a potent threat to our species' attempts to deny death by imbuing our lives with abstract meaning

and value. How can one exist on a symbolic plane when one's physical body provides a constant reminder that we are made up of corporeal matter, prone to deterioration and death? In support of our position, Goldenberg et al. (2001) have shown that when reminded of death, people respond more negatively to allegations that human beings and animals are biologically similar and more positively to the idea that human beings have capacities and potentials that make us fundamentally different from other animals. Further support for the idea that ambivalence associated with the human body is rooted in the problem of death was provided by a second experiment demonstrating that people are more disgusted by bodily products after thinking about their own death. More recently, Cox, Goldenberg, Pyszczynski, and Weise (in press) showed that priming people with pictures of disgust-eliciting stimuli (e.g., an unflushed toilet) increases the accessibility of death-related thoughts.

These findings support Becker's (1973) contention that "the body is a universal problem to a creature who must die" (p. 164). Symbolic culture transforms nature and provides a means through which people can feel that they are transcending it. But we can never fully transcend our physical body. It betrays us with its dependence on the consumption of food, the expulsion of its excrement, and with its vulnerability to injury, illness, aging, and death. Eric Fromm (1955) poignantly summed up the problem when he wondered "why most people did not go insane in the face of an existential contradiction between a symbolic self, that seems to give man infinite worth in a timeless scheme of things, and a body that is worth about 98 cents?" (p. 34).

NEUROTICISM

Well, perhaps some do—go a little insane, that is. Individuals who are high in neuroticism struggle more than most: They are at increased risk for anxiety disorders, depression, suicide, eating disorders, divorce, alcohol abuse, and other chemical dependencies (e.g., Roberts & Kendler, 1999). Most theorists and researchers converge on the idea that neurotics are predisposed to these difficulties because they are emotionally hyperreactive and therefore unstable (probably due to biological predispositions, e.g., Gray, 1982; Eysenck, 1967, although the etiology is not well understood, e.g., Claridge & Davis, 2001). These qualities of neuroticism suggest that the mechanisms necessary for successful defense against existential concerns would be more difficult for individuals high in neuroticism. Specifically, the ability to maintain a sense of meaning and value would be more difficult for individuals who are emotionally labile and prone to negative interpretations of events. Consistent with this notion, negative correlations have been shown between neuroticism and perceptions of the world as meaningful (Gibson & Cook, 1996) and also between neuroticism and self-esteem (e.g., Roberts & Kendler, 1999). Individuals high in neuroticism also have been shown to suffer more from anxiety about death (e.g., Loo, 1984). These empirical findings are consistent with Becker's (1973) thinking, in which neuroticism is viewed as entailing a narrowing and shutting off of experiences: "It is life itself which awakens [fear of death]" and thus the neurotic individual more than others "must shrink from being fully alive" (p. 66). Findings that neurotic individuals are especially prone to use avoidance coping strategies (e.g., Endler & Parker, 1990) and pursue avoidance-oriented rather than approach-oriented life goals (Elliot, Sheldon, & Church, 1997) fit well with such theorizing. These findings also are generally consistent with the theorizing of many psychodynamically influenced thinkers, such as Alfred Adler and Karen Horney, who converge on the idea that neuroticism is characterized by defensive rigidity; we, of course, differ from most psychodynamic theorists in what we believe neurotics are defending against.

All of these perspectives on neuroticism imply that neurotics should be particularly likely to have problems with their physical bodies because the symbolic modes of defense (meaning and value) that function to obscure the threatening link between the body and death are more tenuous for such persons. Correlational research suggests that neurotic individuals have more difficulties maintaining satisfaction with their bodies (e.g., Davis, Dionne, & Lazarus, 1996) and are more prone to disgust associated with their physicality (Haidt, McCauley, & Rozin, 1994) and sex (Eysenck, 1971). Other research reveals that neurotics are more attentive to their bodies' physical symptoms and are more likely to interpret them as pathological (e.g., Costa & McCrae, 1985). Consistent with these ideas, Goldenberg, Pyszczynski, McCoy, Greenberg, and Solomon (1999) demonstrated that individuals high in neuroticism are threatened by the physical, but not romantic (and thus culturally meaningful and valued), aspects of sex. The hypothesis that the physical aspects of sex are threatening for high neurotics because of mortality concerns was supported by the finding that after thinking about physical aspects of sex, death-related thoughts increased in accessibility for high but not low neurotics. Goldenberg et al. (1999) further demonstrated that the problem with physical sex for high neurotics is likely a problem with meaning; when such individuals were primed with thoughts of love

prior to contemplating the physical aspects of sex, the increase in death-thought accessibility found in the absence of such love-priming disappeared. A third experiment showed that reminders of death decreased the appeal of the physical aspects of the sexual experience for high neurotics and there was a marginal trend for low neurotics to actually report greater interest in physical sex after death reminders.

NEUROTICISM, DEATH, AND PHYSICAL SENSATION

Although these findings suggest that neuroticism moderates the impact of reminders of death on how people cope with their physical bodily nature, there is still some ambiguity as to the precise nature of the problem for neurotic individuals. In the Goldenberg et al. (1999) studies, it is unclear whether the neurotic discomfort with the physical body stems from difficulties with one's physical nature per se, as argued above, or from cultural prohibitions surrounding bodily functions. In a sense, this is a "chicken or egg" type of problem because, on one hand, we suggest that cultures impose restrictions on the body because of the reminder of human physicality and creatureliness that the body provides but, on the other hand, according to TMT, clinging to cultural guidelines in and of themselves (including norms regulating the body and sex) should provide protection from existential concerns. The current research was designed to provide a more direct test of the hypothesis that it is the physicality of the body, and not merely cultural norms, that accounts for the neurotic tendency to distance from the physical body in response to mortality reminders. From our perspective, discomfort with the body stems directly from existential concerns, and therefore, we would expect mortality reminders to alter people's reactions even to physical experiences for which there are no taboos. To assess this line of reasoning, the present research investigated the effects of MS and neuroticism on reactions to tactile sensation.

STUDY 1

Study 1 was designed to provide an initial test of our hypothesis by examining the effect of MS on reactions to the physical sensation created by submerging one's arm in extremely cold water. We reasoned that the extreme stimulation of a cold-presser task would make people more aware of their physical bodies and hence be particularly threatening to neurotic individuals who have been primed with thoughts of death. Because gender differences have been found in research using the cold-pressor task (e.g., Rollman & Lautenbacher, 1993), we limited participants to women in this first study.

Method

PARTICIPANTS

One hundred and twenty-one undergraduate female psychology students at a university in Colorado volunteered in exchange for course credit. No participants reported medical conditions or treatments that made them unsuitable for participation (e.g., medication, concurrent pain, pregnancy).

PROCEDURE

Upon arriving at the laboratory one at a time, participants were greeted by a female experimenter who explained that they would be participating in two short studies: a personality questionnaire and an assessment of how individuals respond to physical sensations. After completing "Study 1," in which MS was manipulated, participants were asked to submerge the arm that they did not predominantly write with in cold water "for as long as is comfortable, but at least 3 seconds." They were told that different individuals find the experience "exhilarating, uncomfortable, pleasurable, or unpleasant." No indication was given that a longer duration was indicative of more desirable performance. Participants were then asked to complete a questionnaire assessing their response to the water experience.

APPARATUS AND MATERIALS

Neuroticism. Participants' level of neuroticism was assessed using the Neuroticism subscale of the Eysenck Personality Inventory (Eysenck & Eysenck, 1967). Neuroticism scores were computed by summing the number of affirmative responses on the 23-item measure. The scale was found to have satisfactory reliability ($\alpha = .83$).

Mortality salience. The MS manipulation consisted of two open-ended questions about participants' own death (see Goldenberg et al., 1999). Parallel questions about failing an important exam were used to control for the priming of generally aversive thoughts that are unrelated to the problem of death. Two filler measures followed the manipulation to corroborate the personality questionnaire cover story and to provide a delay and distraction prior to the introduction of the dependent measure (e.g., Greenberg, Pyszczynski, Solomon, Simon, & Breus, 1994).

Tactile stimulation. For the cold-pressor task, participants were asked to submerge their forearm to the elbow in a cooler containing 15 liters of cold water.

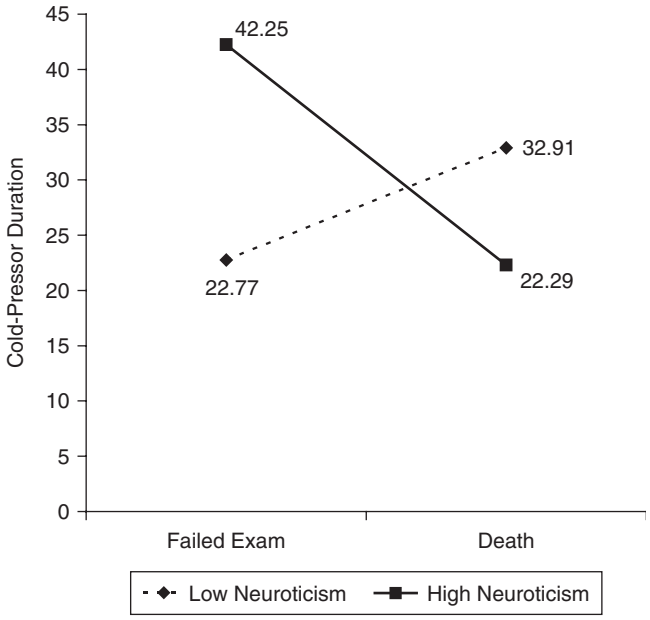

Figure 1 Cold-pressor duration as a function of mortality Salience and neuroticism.

Consistent with Christenfeld (1997), the temperature of the water was maintained at 1° to 4° Celsius (M = 2.733, SD = 1.04) by adding additional ice as needed. A 300-s ceiling utilized in other cold-pressor studies (e.g., Baker & Kirsch, 1991) was adopted as a safety precaution, although no participants needed to be stopped. Duration of submersion was measured with a concealed stopwatch surreptitiously held in the pocket of the experimenter.

Water experience questionnaire. A water experience questionnaire assessing participants' subjective evaluation of the experience followed the cold-pressor task. This measure consisted of two components: five positive (e.g., *invigorating*) and five negative (e.g., *distressing*) adjectives. A principal components analysis revealed two components based on an eigenvalue of 1 criterion. Both components had acceptable internal reliability (αs = .87).

Results

To determine whether neuroticism interacted with reminders of mortality to influence the amount of time participants kept their arm submerged, we conducted multiple regression analyses with MS and centered neuroticism scores entered first, followed by the product term.[1] There were no main effects (ps > .27); however, the hypothesized MS × Neuroticism interaction was significant, b = 3.07, SE = 1.19, t = 2.58, p = .01. To deconstruct this interaction, we assessed cold-pressor duration as a function of MS at 1 SD above and below the mean of neuroticism. As can be seen in Figure 1, the high-neuroticism participants in the MS condition spent less time immersing their arms in water compared with high neurotics in the control condition, b = 19.96, SE = 8.22, t = 2.43, p = .02. The low-neuroticism participants revealed the opposite trend, although not significantly, p = .22.

We also examined participants' responses on the water experience questionnaire. A paired-sample t test revealed that participants found the experience to be equally positive and negative, $t(121) = -.58$, p = .56. Results of multiple regression analyses conducted on the positive and negative emotions subscale revealed a main effect of neuroticism on both positive (b = .03, SE = .015, t = 1.96, p = .05) and negative emotional reactions (b = .035, SE = .016, t = 2.20, p = .03) to the water experience. The pattern of these effects was such that individuals high in neuroticism found the water experience to be both more positive and more negative than individuals lower in neuroticism. There were no MS effects on reported reactions to the water experience (ps > .55) or any significant interactions (ps > .19). Additional regression analyses controlling for positive and negative reported reactions resulted in the same significant interaction between MS and neuroticism on cold-pressor duration (ps < .007).

Discussion

Study 1 demonstrated that reminders of mortality led individuals high in neuroticism to avoid the physical sensation provided by ice-cold water. Low neurotics, on the other hand, were not significantly affected by MS. Combined with previous findings that MS leads high-neurotic individuals to find the physical aspects of sex less appealing and that thinking about the physical aspects of sex makes death-related thoughts more accessible for high neurotics, these findings suggest that the neurotic uneasiness with the human body may indeed be rooted in concerns about death. In contrast to the previous findings, however, it is unlikely that cultural norms play a role in the tendency to avoid the sensation measured in this experiment.

Although there was a tendency for individuals high in neuroticism to evaluate the water experience with greater emotional reactivity (consistent with research indicating that neurotic individuals are more emotionally reactive to both positive and negative stimuli, e.g., McFatter, 1998), there was no effect of MS or an MS × Neuroticism interaction on perceptions of the stimulation. This suggests that the same level of perceived

stimulation can be more or less appealing or threatening as a function of the salience of death rather than the alternative explanation that MS altered the sensual experience of the stimulation. This also suggests that it is unlikely that our findings could be attributed to perceptions of negative affect associated with the task.

Of course, the stimulation in our experiment, although not entirely aversive, presumably did have aversive qualities and, thus, perhaps it is not surprising that reminders of death lead neurotic individuals to avoid it. Aversive stimulation may signal danger and thoughts of death may increase the tendency of those who are especially fearful of danger to avoid such stimuli. Stronger support for our theoretical perspective would be provided if neurotic individuals also avoid pleasant sensations after being reminded of their mortality. If MS led neurotic individuals to prohibit themselves from pleasurable activities for which there are no cultural sanctions or taboos, it would be compelling evidence against this alternative interpretation.

STUDY 2

In Study 2, our goal was to replicate the findings of Study 1 with a pleasurable physical sensation. Therefore, we conducted a similar experiment in which rather than immersing their arms in ice water, individuals were asked to use a foot massager. We hypothesized that high neurotics would spend less time using the massager after MS. We also sought to expand the generalizability of Study 1 by including both male and female participants, conducting the experiment in a different geographical location and using a different control condition for comparison with MS.

Method

PARTICIPANTS

Participants were 80 undergraduate psychology students (47 women) at a university in Idaho who participated for course credit.

PROCEDURE

As in Study 1, the experiment was depicted as two separate studies: a personality questionnaire followed by a marketing study. After the questionnaire, the experimenter explained that she was gathering data on reactions to a new foot massager for a national marketing organization in exchange for financial research support. Participants were instructed take off their shoes (but leave their socks on—all were wearing socks) and to "try out this foot massager for a minimum of 15 seconds, after that it is completely up to you how long you would like to use it." The experimenter turned on the foot massager and waited for the participant to put his or her feet on the massager. When participants turned off the foot massager, or removed their feet, the experimenter stopped a concealed stopwatch and left the cubicle so that the participants could complete an evaluation of their experience.

APPARATUS AND MATERIALS

Neuroticism. Participants' level of neuroticism was again obtained with the Eysenck Personality Inventory.

Body self-esteem. We also included Franzoi and Shields's (1984) measure of body self-esteem to test whether the effects in our study could be attributed to a tendency to distance from the physicality of the body, as we hypothesized, or instead, to esteem concerns associated with the body. The scale measures feelings about 35 different aspects of the body, reflecting both competence and appearance, on a scale of 1 to 5. The composite scale had high internal reliability ($\alpha = .89$).

MS. The MS induction consisted of the same two open-ended questions about participants' own death used in Study 1. However, in this study, we used "experiencing dental pain" as our aversive control condition to further test whether our effects were specific to concerns about mortality rather than concerns about physical discomfort or pain.

Self-reported affect. The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) followed the MS manipulation. This measure consists of two subscales, positive and negative affect, consisting of 10 items each. The measure was included to serve as a delay and distraction and also to assess and control for any effects of negative affect on high- and low-neurotics' reactions to reminders of their mortality.

Tactile stimulation. The appeal of pleasurable stimulation was operationalized with a commercially available foot massager (Homedics brand: Foot Pro Ultra model). The massaging sensation resulted from a plastic vibrating platform on which participants rested their feet. During the stimulation period, the massager was turned on high intensity. An experimenter surreptitiously recorded the time participants spent with their feet in contact with the vibrating massager.

Massager evaluation. To assess whether the massager was in fact pleasurable to the participants, a marketing evaluation asked, "How much did you like using the foot massager?" and "How pleasant did you find the sensation?" Responses were assessed on a 9-point scale.

Results

To determine whether neuroticism interacted with mortality reminders to influence the amount of time

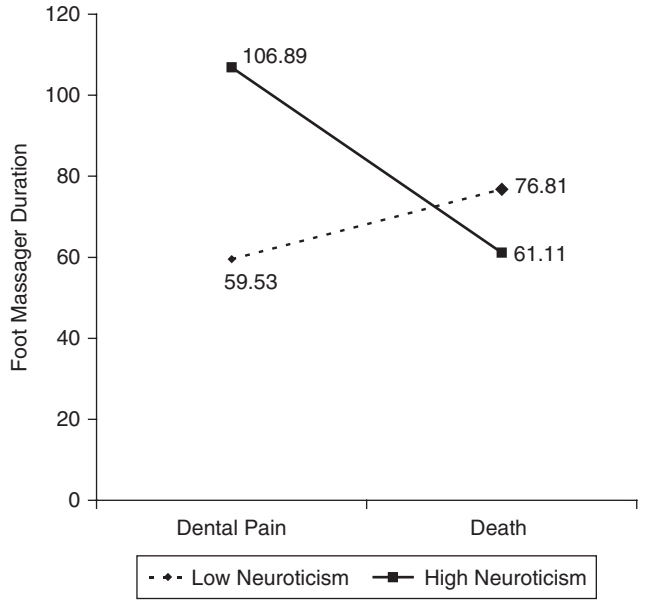

Figure 2 Foot massager duration as a function of mortality salience and neuroticism.

participants used the foot massager, we conducted multiple regression analysis with MS and centered neuroticism scores followed by the product term.[2] There were no main effects (*p*s > .22); however, there was an interaction between MS and level of neuroticism (b = 5.83, SE = 2.87, t = 2.03, p = .04). We examined this interaction by assessing the effects of MS at 1 *SD* above and below the mean neuroticism score. As can be seen in Figure 2, individuals high in neuroticism spent less time using the foot massager after MS (b = 45.78, SE = 21.93, t = 2.09, p = .04); individuals low in neuroticism did not (p = .42). No effects were found for body-esteem when substituting it for neuroticism (*p*s > .60).

We also assessed the effects of MS and neuroticism on negative affect and found that consistent with prior research (e.g., Goldenberg et al., 1999) and all major theoretical perspectives on neuroticism, individuals high in neuroticism reported higher levels of negative affect than those low in neuroticism (b = .065, SE = .011, t = 5.88, p < .001). There was also a significant interaction effect revealing that the difference in negative affect between high and low neurotics became more pronounced after MS (b = –.057, SE = .021, t = –2.70, p = .007). Although not explicitly predicted, this finding suggests that neurotic individuals may be experiencing an affective response to MS that is not subjectively experienced but merely a potential in nonneurotic individuals (cf. Pyszczynski, Greenberg, & Solomon, 1999). We therefore conducted further analysis to determine whether this subjective experience of negative affect mediated our results. We used AMOS statistical software to follow Shrout and Bolger's (2002) recommendation for assessing mediation by formulating bootstrapped samples to derive confidence intervals around the regression coefficients and tested for mediated moderation implementing the procedure outlined by Muller, Judd, and Yzerbyt (2005). The results revealed that the MS × Neuroticism interaction on massager duration remained statistically significant when controlling for negative affect and the interaction between negative affect and neuroticism (b = 5.50, SE = 3.66, CI_L = .125, CI_U = 14.13, p = .04). This suggests that subjectively experienced negative affect did not mediate the interactive effects of MS and neuroticism on the appeal of physical sensation.[3] We also explored whether there were any effects for the positive affect subscale of the PANAS and found only a main effect of MS decreasing positive mood (b = –.484, SE = .183, t = –2.64, p = .008) but no effects of neuroticism or any interactions (*p*s > .15).

Last, to confirm that the foot massager was pleasurable, we looked at participants' responses to the marketing evaluation items asking how much they liked using the foot massager and how pleasant they found the sensation. The means for these two items, respectively, were 6.91 (*SD* = 2.32) and 7.04 (*SD* = 2.13) on a 9-point scale; 79% rated it on the upper end (6-9) of the liking response scale and 82% found the massager sensation pleasurable. There were no effects of MS or neuroticism and there was no interaction on the foot massager evaluations (all *p*s > .29). Including the composite of the items as a covariate did not alter the original significant interaction (p = .04). This is further evidence that perceptions of stimulation produced by the foot massager did not mediate the differences in exposure to pleasurable sensation that were observed as a function of MS and neuroticism.

Discussion

The findings from Study 2 provide additional support for our theoretical analysis by showing that individuals high in neuroticism respond to thoughts of death by avoiding even pleasant bodily sensations. These effects were shown to be specific to neuroticism; body-esteem did not similarly moderate our results. Our conceptualization further specifies, however, that the effects of death reminders on high neurotics should be specific to activities that can remind people of their physical nature. To test this idea, Study 3 was designed to assess whether MS leads high neurotics to distance from tactile sensation but not other sensations that are less likely to make the physical body salient.

STUDY 3

In Study 3, we replicated the procedure of Study 2, except that this time half the participants were asked to sample some music rather than the foot massager. Although listening to the music is a sensation, it is one that is perceived more as an experience of events in the world rather than as localized in the body as with touch. By comparing the music and massage conditions, we could test our idea that the MS-induced avoidance of tactile sensation among high neurotics is due to threats associated with physicality of the task instead of a simple motivation to avoid any activity or sensation after being primed with death. Study 3 also enabled us to test against an additional alternative explanation—that the unusual features of the massager were responsible for the neurotic tendency to use it less after MS. To this end, we selected pleasant but unfamiliar and rather unusual improvisational music for use in our nontactile stimulation control condition and controlled for perceptions of unusualness in our analyses. To further extend the generalizability of our results, we again conducted the research in a new geographical locale with a third MS control condition.

Method

PARTICIPANTS

The sample consisted of 99 (62 women) undergraduate psychology students participating for credit at a Northern California university; 50% were Caucasian, 33% Asian, and the remaining 17% of other or mixed ethnicity.[4]

PROCEDURE

The procedure was similar to Study 2 with the exception that half the participants were asked to sample some music for a new music label. In Study 3, we also took measures to make the massager experience more private by having the experimenter walk away and gauge the duration by the sound of the massager (or music) turning on and off. The only other procedural difference from Study 2 is that in the massage condition of this study, participants were asked to remove their socks because the study was conducted in the early fall when the weather was warm and most students were not wearing socks.

APPARATUS AND MATERIALS

Neuroticism. Again, neuroticism was assessed with the Eysenck Personality Inventory.

Body self-esteem. As in Study 2, we included Franzoi and Shields's assessment of body-esteem to confirm that esteem-related concerns about the body did not parallel the neuroticism findings.

Social desirability. Crowne and Marlowe's (1960) 33-item true-false measure of social desirability was included to assess the tendency to respond in socially desirable ways. Although it is unlikely that self-presentational concerns would be relevant to the finding, because participants thought the study was a marketing survey, they were given privacy, and they were unaware that their behavior was being recorded, we included this measure to be even more confident that participants' behavior was not mediated by concerns about presenting themselves in a socially desirable manner ($\alpha = .76$).

MS. In the experimental condition, participants responded to the same two open-ended questions about death, whereas in the control condition, participants responded to questions about "getting a job after college" to control for worry about a future event.

Self-reported affect. The PANAS followed the MS manipulation, as in Study 2.

Tactile and nontactile stimulation. The procedure for the music condition paralleled the massager condition. The music was a free-form jazz improvisation with a soft upbeat rhythm, extending for approximately 20 min, and was played on a Sony CFD-550 model CD/cassette player set at a comfortable volume. Just as with the foot massager, participants were told which button to push to start and stop the device and they were asked not to touch any other controls.

Unusualness of the experience. In addition to the marketing questions included in Study 2, participants were asked to indicate on a 7-point scale how unusual they found the music/the experience of using the foot massager.

Results

To examine whether we replicated the MS effect as a function of neuroticism and whether such an effect was specific to the massager, we first conducted multiple regression with MS, centered neuroticism scores, and activity condition (massager or music) entered first, followed by all two-way interactions and then the three-way interactions. There was a main effect of neuroticism such that higher neuroticism scores were associated with longer durations overall ($b = 4.11$, $SE = 1.69$, $t = 2.43$, $p = .02$) and a two-way interaction between neuroticism and activity condition showing that the longer durations of the high neurotics were found only in the music and not the massager condition ($b = 6.87$, $SE = 3.37$, $t = 2.04$, $p = .04$). These findings were qualified by the hypothesized three-way interaction between

MS, neuroticism, and type of activity ($b = -13.78$, $SE = 6.62$, $t = -2.08$, $p = .04$).

To examine the possibility that the unusualness or novelty of the tactile versus music experience was responsible for the tendency of the high neurotics to distance from the sensation of the massager after MS, we ran the above analyses controlling for how unusual participants perceived the experience to be. Participants did think the massager was more unusual than listening to the music ($b = -1.80$, $SE = .463$, $t = -3.88$, $p < .001$), and high neurotics were more likely to believe this to be the case ($b = -.193$, $SE = .088$, $t = -2.20$, $p = .03$); however, when controlling for perceptions of unusualness, we found the same significant pattern of results for our three-way interaction ($p = .04$) as well all other effects. Therefore, our findings cannot be attributed to the unusual nature of the foot massager (note also that there was no three-way interaction on unusualness, $p = .87$). However, because we hypothesized effects of our variables when controlling for unusualness of the tasks, we report all analyses controlling for perceptions of unusualness.[5]

To explore the three-way interaction, we conducted separate multiple regression analyses on the massager and music conditions. In the music condition, there was only a main effect of neuroticism ($b = 10.92$, $SE = 4.35$, $t = 2.51$, $p = .01$), with individuals high in neuroticism listening to the music longer. Of importance, there was no interaction between MS and neuroticism ($p = .26$). In the massager condition, however, we replicated the MS × Neuroticism interaction ($b = 7.44$, $SE = 3.75$, $t = 1.98$, $p < .05$). In Figures 3 and 4, we plot the intercepts for the interaction between MS and level of neuroticism for the massager and music, respectively. As can be seen in the figures, individuals high in neuroticism spent less time using the foot massager (but not listening to music) in response to MS. This difference between the MS and control condition among the participants using the foot massager was significant at 1 *SD* above the mean for neuroticism ($b = 55.47$, $SE = 28.22$, $t = 1.97$, $p < .05$) but not for participants 1 *SD* below the mean ($p = .44$).[6]

We also tested whether social desirability concerns could account for our findings. As expected, replacing neuroticism with social desirability yielded no significant effects on the three-way interaction for the entire data set ($p = .61$) or on the two-way interaction within the massager condition ($p = .58$). Furthermore, controlling for social desirability did not affect either of these significant patterns of findings for interactions with neuroticism (ps = .037 and.047, respectively). In addition, once again, there was no three-way interaction with body-esteem ($p = .81$) or two-way interaction within the massager condition ($p = .38$).

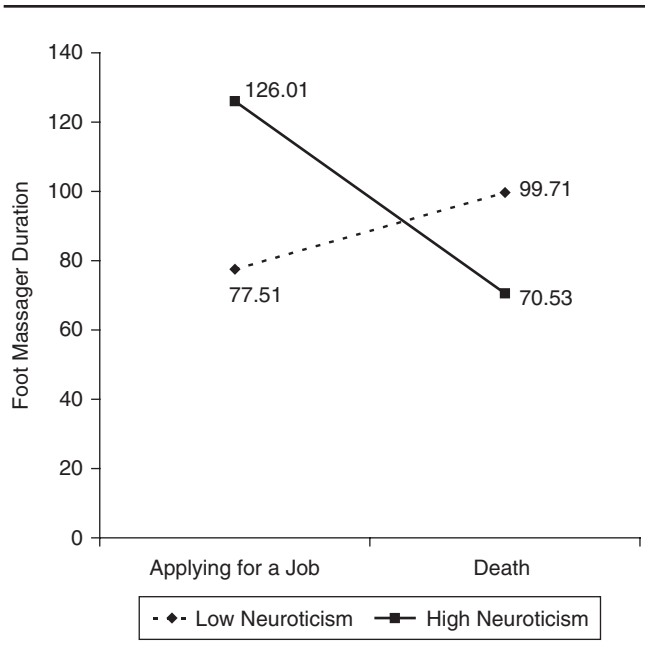

Figure 3 Foot massager duration in study 3 as a function of mortality salience and neuroticism.

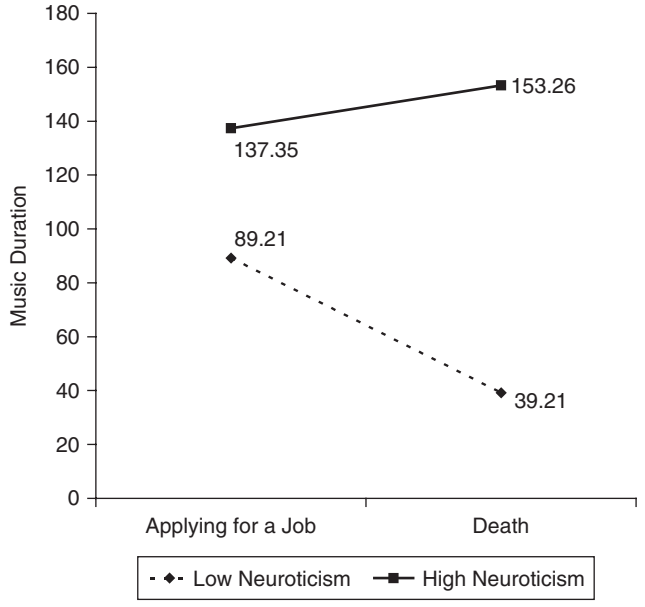

Figure 4 Music duration in study 3 as a function of mortality salience and neuroticism.

We also explored whether there was an effect on negative affect as in Study 2. In this study, we found a main effect of neuroticism (high neurotics reported more, $b = .047$, $SE = .011$, $t = 4.40$, $p < .001$) and a main

effect of MS (thinking about death led to more, $b = .241$, $SE = .112$, $t = 2.16$, $p = .03$), but there was no interaction between any of our variables on negative affect ($ps > .21$, and particularly no hint of a three-way, $p = .56$), and there were no interaction effects on positive affect, only a main effect in which neurotics reported less ($b = -.034$, $SE = .015$, $t = -2.27$, $p = .02$). Although there is no evidence of affective mediation (because negative affect was not related to our interaction effect), we nevertheless reran our original analyses controlling for negative affect and found the same significant pattern of results for our three-way interaction ($p < .05$) and two-way interaction in the massager condition ($p = .04$).

Finally, we examined participant responses to the marketing items assessing liking of the massager/music, which revealed a tendency for participants to like the massager more than the music ($b = -.768$, $SE = .424$, $t = -1.81$, $p = .07$). Mean scores for liking were 6.25 ($SD = 1.90$) on a 9-point scale in the massager condition compared to 5.49 ($SD = 2.32$) for the music, attesting to our assumption that the massager was indeed pleasurable.

Discussion

The findings of this last study provide further converging evidence that individuals high in neuroticism respond to reminders of their mortality by avoiding tactile sensation. Of importance, this study ruled out the possibility that high neurotics would distance from any activity or sensation after being reminded of death because they did not listen to music less. Study 3 also ruled out the alternative explanation that it was the unusualness of the foot massager experience that was causing the more neurotic individuals to avoid the massager after contemplating their mortality. Finding no effect of social desirability, we can be increasingly confident that the findings are not on account of self-presentational concerns or social norms associated with use of the foot massager.

GENERAL DISCUSSION

In the three studies reported in this article, reminders of mortality led individuals high in neuroticism to avoid physical sensation. In Study 1, MS led high-neuroticism participants to avoid the unpleasant sensation of submerging one's arm in icy water. In Study 2, MS led high-neuroticism participants to avoid the pleasurable sensation produced by an electric foot massager. In Study 3, the foot massager findings were replicated and shown to be specific to activities that are tactile in nature. Although the findings of Study 1 might be interpreted as reflecting a tendency for MS to heighten an already acute sensitivity to danger among neurotics, this explanation could not plausibly be applied to the findings of Studies 2 and 3 because there is certainly no danger associated with a foot massage. Perhaps it could be argued that MS simply leads people to avoid experiences they find aversive. However, participants in Studies 2 and 3 clearly rated their use of the foot massager as a pleasant experience and, moreover, high and low neurotics did not differ in their evaluation of how pleasurable the sensation felt. Taken together, the three studies reported here suggest that it is physical sensation itself that neurotics are trying to avoid after mortality has been made salient. Of interest, in each study, MS did not affect perceptions of the sensual experience, and perceptions of the sensation did not correlate with exposure times or mediate the effect of MS on exposure times. This suggests that the effects are not consciously mediated and shows that they are not caused by an effect of MS on subjective individuals' sensory experiences.

Why Flee From the Body?

Why should reminding an individual of their vulnerability to death affect the appeal of physical sensation? The existential perspective offered here suggests that although the physical body is a gateway to many of the most pleasurable aspects of existence, the physical body also can pose an existential threat. Regardless of one's belief about an afterlife, it is certain that physical bodies are destined to die. Therefore, that which makes one feel most acutely alive also has the potential to serve as a reminder of one's vulnerability to decay and death. As Goldenberg et al. (2001) have suggested, the physical, animalistic nature of the human body may account for a variety of forms of queasiness and ambivalence toward body-related experiences and activities.

According to TMT, people avoid confrontation with the existential dilemma posed by their physical nature by spending most of their waking hours immersed in the world of symbols and meaning, a world that divorces them from the physical and animalistic side of their existence. Worries about grades, checkbook balances, the stability of one's marriage, the achievements of one's children, or the many other aspects of the culturally framed dramas that make up our daily lives keep us in blissful denial of our corporeality and associated mortality. Cultures provide further protection against this awareness by giving us abstract meanings with which to interpret our bodily sensations (e.g., it must be love that I'm feeling) and setting standards of value with which to evaluate virtually all of our bodily features. The plethora of articles and books written about how to look our best, to maintain optimal levels of

fitness and performance from our bodies, and to achieve better, longer, quicker, slower, or more intense orgasms all attest to the human quest to find meaning and value in our bodies. From the perspective of TMT, this desire is fueled, at least in part, by the existential dilemma posed by our physical nature. Although this dilemma is kept at bay most of the time, individuals become troubled by their bodies when these many layers of meaning are stripped away (Goldenberg, Cox, Pyszczynski, Greenberg, & Solomon, 2002) or, as in the case of the present studies, when thoughts of death have been made salient and one has a preexisting vulnerability to be especially troubled by their physical nature, as appears to be the case for neurotics.

Why Do Neurotics Flee?

These findings converge with those of Goldenberg et al. (1999) in suggesting that discomfort with the body may be an especially revealing feature of the neurotic personality. Although the etiology of neuroticism is not well understood, and although different researchers have focused on different aspects of neurotic symptomology, an existential TMT analysis can help tie together a constellation of symptoms that would be expected to result when individuals are less successful at defending against core fears associated with mortality. Of course, such a conclusion does not preclude biological predispositions to neuroticism. Biological factors that affect emotional reactivity and cognitive processing could hinder neurotic individuals' ability to defend against death concerns, thus exposing them to a myriad of difficulties, including troubles maintaining a sense of meaning, self-esteem, heightened vulnerability to death anxiety, anxiety in general, depression, and most relevantly, greater ambivalence, disgust, and dysfunction associated with the body and sex.

TMT, along with many other contemporary psychological theories and perspectives (e.g., Alloy & Abramson, 1979; Paulhus & Reid, 1991; Roth & Ingram, 1985), views normal human adaptation as requiring a considerable amount of self-deception and distortion of reality. Although neurotics may appear to engage in greater distortion and bias, it may be that on some level these individuals are actually deceiving themselves less; that is, they may be less able to embed themselves in the cultural drama of meaning in life and value in self posited by TMT and, hence, more in touch with their existential predicament. Taylor and Brown's (1988) review of the literature suggesting that psychologically healthy individuals are prone to self-deception is generally consistent with this view.

One finding that was somewhat surprising in this series of studies was the tendency for high neurotics to more strongly approach tactile experiences in the absence of MS. This baseline difference was unexpected but has been a reliable effect across the present studies as well as the Goldenberg et al. (1999) experiment in which high neurotics appeared more interested in physical aspects of sex in the absence of MS. These findings cannot be attributed to the control topic because the control prime in each study has been varied and Goldenberg et al. used a neutral rather than aversive control condition. Although we do not have a definitive explanation for this tendency, we are not alone in our findings; for example, Eysenck found that neurotics, although more conflicted about sex, actually have a greater sex drive than do people low in neuroticism (Eysenck, 1971), and other research has found high neurotics to be more inclined to abuse drugs and alcohol (e.g., Kilbey, Breslau, & Andreski, 1992). Perhaps neurotic individuals' difficulties with meaning, value, and anxiety may make them especially attracted to that which is pleasurable or intense, such as a foot massage or a piece of jazz music, as long as its association with the creaturely nature of the human body is relatively weak. Reminding neurotic individuals of their mortality may make these associations stronger, more salient, or more troubling and thus lead to the avoidance of tactile sensations and other experiences that provide reminders of our animal nature. Additional research will be needed to more fully understand the nature of the body problem for neurotics and the mediating mechanisms through which death primes are affecting these individuals.

Clues as to what it may be about neurotics that makes them particularly prone to difficulty with the body in response to MS may ultimately be found in differences between neuroticism and other moderators found in TMT research.[7] Although neuroticism and self-esteem are highly negatively correlated (typically about –.50; Judge, Erez, & Bono, 1998), anxiety is more characteristic of high neurotics than of individuals low in self-esteem (e.g., Watson, Suls, & Haig, 2002). Future research should assess whether neurotics' anxiety proneness is instrumental in these effects, perhaps not only making one's defenses against MS more tenuous but also creating a heightened sensitivity to experiences rooted in the body. If neurotics are hypersensitive to sensations of the body, this may explain why not only does MS make them flee but why in the absence of threatening associations with mortality, neurotics may find the physical activities of the body even more rewarding than individuals low in neuroticism.

Beyond Neuroticism

Although the present findings and those of Goldenberg et al. (1999) suggest that MS leads to avoidance of

physical sensation only among those high in neuroticism, Goldenberg et al. (2002) have shown that MS produces this tendency regardless of level of neuroticism among people who have recently been reminded of their creaturely animal nature. Specifically, those studies showed that having participants read an essay focused on the biological similarities between humans and other animals led them to respond to MS by rating the physical aspects of sex as less appealing and to respond to reminders of the physical aspects of sex with increases in the accessibility of death-related thoughts. Thus, although it appears that neurotic individuals are especially prone to ambivalent reactions to their bodies, it seems that when humans' animal nature is salient, even people low in neuroticism are susceptible to difficulties with the body. Consistent with contemporary thinking that neuroticism is a dimension rather than a discrete category, it may be that what differentiates those considered neurotic from others is just a matter of degree. Neurotics may simply have a lower threshold for fears and concerns that plague us all and thus provide an exaggerated illustration of what are really universal dynamics.

Ambivalence Toward the Body

Clearly, people are not uniformly and unambiguously repulsed by their bodies or the physical sensations that bodies produce. The body is not only a threat but has many clearly appealing aspects; our analysis implies ambivalence but certainly not unidimensional repulsion toward our physical nature. Most obviously, sexual pleasure is one of the most desired and sought out experiences in all of life, and of course, many people pay considerable sums of money to have their body massaged (they sometimes pay for sex, too). Some individuals purposely expose themselves to extremely intense, and even painful, bodily experiences, such as swimming or skiing in exceedingly cold temperatures, exercising to the point of exhaustion, tattooing, or body piercing, just to name a few. Even the bodily functions that are usually viewed as the most repulsive, such as moving one's bowels, can produce a pleasant feeling of relief.

We can see in this research that individuals low in neuroticism did not distance from physical sensation when they were primed with thoughts about death; there was even some tendency for low-neurotic individuals to approach physical sensation in response to MS. This finding is consistent with the pattern of results for low neurotics in Goldenberg et al.'s (1999) research on the appeal of sex, and we suspect it can be accounted for by the life-affirming properties of extreme tactile sensation (and sex) as a means of coping with mortality concerns in the case of individuals who are not so threatened by their physicality.

The fact that we have yet to find a significant increase in the appeal of physical sensation for low neurotics in response to MS may bolster the point that people scoring low on neuroticism are really still somewhat neurotic. Note that Freud and Becker (among others) have suggested that all of civilization, Western in particular, is inherently neurotic in that culture is designed to shield us from the source of core fears and does so by instituting varying types of repression. But our pattern of results, in which neuroticism is conceptualized as a continuous variable that interacts with mortality concerns to affect the appeal of physicality, suggests that people lower on the continuum of neuroticism might respond to mortality concerns by more strongly embracing the physical body and the pleasant things that it has to offer.

What Came First, the Inhibition or the Civilization?

The studies reported here take us one step further toward understanding why people are often so inhibited when it comes to so many aspects of their bodies. Although Goldenberg et al. (1999) have shown that neurotics respond to reminders of their mortality by viewing the physical aspects of sex as less appealing, until now, those findings were open to the explanation that neurotic individuals were simply responding to cultural norms and taboos regarding sexuality rather than responding to something inherently threatening in the physical nature of sex. Because there are no clear cultural norms surrounding putting one's arm in icy water or using a foot massager platform, a cultural taboo explanation seems unable to account for the present findings; the absence of a relation between these tendencies and social desirability concerns further reduces the plausibility of a cultural norm interpretation. Rather, these data provide the most direct support to date for the idea that inhibitions result not merely from civilizing pressures but also from self-repression and that this self-repression is at least partly motivated or exacerbated by existential concerns. These findings also are consistent with the idea that existential factors may fuel many of the cultural restrictions and repressive forces that exert pressure on individuals' bodily and sexual experiences.

Conclusion

In the words of Ernest Becker (1973), "The irony of man's condition is that the deepest need is to be free of the anxiety of death and annihilation; but it is life itself which awakens it, and so we must shrink from being fully alive" (p. 66). The present findings suggest that people, especially those high in neuroticism, have ambivalent reactions toward their bodies because of the indelible

link between the physical nature of the body and the awareness of death. We think that this existential problem is at least partially responsible for individual inhibitions (and possibly, cultural restrictions) of the body and its sensual experiences. Clearly, one's body can be the source of immense pleasure, but it is also the vehicle through which life passes unto death. For this reason, under some conditions, even pleasurable sensations may not be freely embraced.

NOTES

1. We conducted all analyses using AMOS; doing so enabled us to formulate bootstrapped samples to test for mediation of negative affect in Study 2.

2. Preliminary analyses revealed that gender did not moderate the predicted pattern of results and thus was not further investigated.

3. The interaction also remained statistically significant using traditional (nonbootstrapped) regression analyses.

4. Ethnicity was not assessed in Studies 1 and 2. However, the participant pools at the universities where these studies were conducted are almost entirely Caucasian. Study 3, therefore, sampled a population of substantially greater ethnic diversity. We examined whether there was an effect of ethnicity by including Caucasian versus non-Caucasian as a variable in our analyses and found no significant main or interaction effects.

5. The same significant pattern of pairwise comparisons to explicate the nature of the interaction was found with and without unusualness included as a factor in the analysis.

6. We also linked participants' data to a mass online screening completed over the course of the semester (n = 86 of the 99), which included all of the Big Five dimensions of personality (BFI; John & Srivastava, 1999). The three-way interaction including the neuroticism subscale of the BFI approached statistical significance (b = –93.21, SE = 55.50, t = –1.68, p = .09) and we replicated the same significant interaction between neuroticism and mortality salience (MS) within the foot massager condition (b = –67.93, SE = 34.26, t = –1.98, p = .047; and not within the music condition, p = .62). The pattern was identical to that found for Eysenck's neuroticism scale, with high-neuroticism participants decreasing their massage duration as a function of MS (b = 949.39, SE = 469.28, t = 2.02, p = .043). These ancillary analyses suggest that our findings are specific to neuroticism; for the remaining subscales (extraversion, agreeableness, conscientiousness, and openness), there were no three-way interactions (all ps > .25) and no two-way interactions within the massager condition (ps > .20).

7. Our decision to test neuroticism, and not self-esteem, as a moderator was based on prior findings that neurotics are prone to difficulties with the body and findings that neuroticism moderated the effects of MS in our prior body-related research. Although we cannot be sure that self-esteem would not have moderated our results, we suspect that self-esteem may be more relevant to more traditional terror management defenses related to maintaining self-esteem (usually by defending the validity of one's worldview, e.g., Harmon-Jones et al., 1997) rather than in this work where the dependent measure reflects a more general queasiness with the body. The finding that body-esteem did not moderate the findings is consist with this possibility.

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