The impact of death-awareness on sizes of self-representational objects

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Abstract

People seem to have a tendency to increase the relative size of self-representational objects. Prior research suggests that motivational factors may fuel that tendency, so the present research built from terror management theory to examine whether existential motivations—engendered by concerns about death—may have similar implications for self-relevant size biases. Specifically, across two studies (total N = 288) we hypothesized that reminders of death would lead participants to inflate the size of self-representational objects. Both studies suggested that relative to reminders of pain, mortality salience led participants to construct larger clay sculptures of themselves (vs. others; Study 1) and a larger ostensible video-game avatar for the self (vs. others; Study 2).

Keywords: mortality salience; size-bias; terror management theory; self-representation.

The impact of death-awareness on sizes of self-representational objects

In the North End of Boston stands a large statue of Paul Revere, the American revolutionary who in 1775 famously rode through the night to inform coastal towns that 'the British are coming'. Similarly large statues have been erected, over the years, celebrating other prominent and influential figures – from Soviet statues of Lenin to statues of Michael Jackson as part of his 1996-1997 "HIStory" tour. Although there are no doubt various reasons for such larger-than-life representations, they might also partly reflect the influence of deeper psychological motivations. Consider Ancient Egyptian monuments. Around 2550 BCE, Pharaoh Khufu commissioned the construction of what would be the Great Pyramid of Giza. Standing approximately 455ft tall, the mammoth structure serves as the Pharaoh's tomb—an enduring testimony to his self-perceived importance, if not his accomplishments. About 1300 years later, Ramesses II similarly erected statues representing him as much larger than he was, with the largest being the 36ft tall "colossal statue". Scholars have suggested these structures are likely reflections of the Pharaohs' attempts to aggrandize their cultural legacies beyond death (e.g., Trigger, 1990).

Ancient Egyptian efforts are thus potentially striking examples that efforts to represent the self may in part be tied to existential concerns about mortality. However, little research has examined the possible motivational concerns that might lead people to depict themselves in ways that "loom large". The present research builds from terror management theory (TMT; Greenberg, Solomon, & Pyszczynski, 1986), and reports two studies to investigate the awareness of death as one possible motivational factor that may lead people to increase the relative size of self-representational objects.

Terror management theory

TMT draws largely on the work of cultural anthropologist Ernest Becker (e.g., 1973; 1975) and proposes that humans are motivated to manage the awareness of death that largely resides outside of conscious attention. From this perspective, such concerns underlie in part people's propensity to view themselves as having value (self-esteem) within their seemingly permanent cultural system (cultural worldview). TMT suggests, for example, that the awareness of death motivates people to strive for the impression that their activity will achieve a lasting legacy among current and future generations, in domains such as the future of one's family, business, service/charities, science, education, healthcare, government, art, sports, or any number of other available spheres.

A common strategy for testing the empirical viability of TMT has been the *mortality salience* (MS) hypothesis (Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989), which holds that if cultural worldviews and self-esteem help manage the awareness of death, then increasing MS will motivate people to strive to accrue self-esteem and adhere to and defend their cultural worldviews. As just a few examples, MS has been shown to increase efforts to defend worldviews (e.g., political beliefs, McGregor et al., 1998) and increase self-esteem striving in domains from risk taking (Hart, Schwabach, & Solomon, 2010) to materialism (Kasser & Sheldon, 2000). However, while considerable literature highlights the influence of MS on motivations to bolster one's self-relevant cultural value, little research has considered how this motivation might impact the sizes of one's self-representational depictions.

TMT and size of self, influence, and cultural value

Becker (1975) himself noted that many societies allow people to symbolically aggrandize the self, boosting one's social prominence and influence into the future, thereby helping to

symbolically cope with impermanence. One thread seemingly stitched into many cultural fabrics is that people often attempt to champion value through increased size—attempting to make a "big" splash. Interestingly, the Old English term 'great' originally meant "large" or vast – similar to the Old Frisian *grāt*, Old Dutch *groot*, Old Saxon *grōt*, Old High German *grōz*, and German *gross* -- all meaning some variant of 'large' size. However, by the mid-19th century, the word came to also mean 'good' or 'important' (OED Online, 2017), and nowadays connotes an intuitive association between large and good/valuable. And while of course not limited to American culture, the USA provides a particularly relevant example of the ways that the size of self-relevant objects is associated with cultural importance: Americans have been busy acquiring some of the largest self-relevant objects in the world, such as televisions, refrigerators, and vehicles (Heaton, 2011; ABC news, 2005); they have steadily increasing sizes of food portions, homes, and bras (Walmsley, 1986; Young & Nestle, 2002); the American lexis is chock full of phrases such as the "big idea", the "big day", and the "big game"; employees call their bosses "the big cheese," and politicians rally their supporters with promises of "a bigger and better America" (Mitt Romney, 2012).

Research on the relationship between size and value supports a general size-value bias, finding that positive (vs. negative) words presented in larger (vs. smaller) font were evaluated as positive more quickly (Meier, Robinson, & Caven, 2008). Further, large size or tall stature is often linked with a host of positive associations. A sort of 'height-halo effect' seems to exist, such that for example, taller presidents are seen to be greater, are more likely to be re-elected, and win more votes (Stulp et al., 2013).

Other research suggests motivational factors can influence people to exaggerate the size of objects with (self) relevant value (Bruner, 1957; Veltkamp et al., 2008). For example, studies

show that: economically disadvantaged (vs. advantaged) children estimated coins (vs. cardboard discs) as larger (Bruner & Goodman, 1947); that dehydrated people perceived a glass of water as larger (Veltkamp et al., 2008); and that dieters exposed to tempting food primes saw the food as larger (Van Koningsbruggen, Stroebe, & Aarts, 2011). Additionally, from the theoretical framework of the self-expansion model (e.g., Aron & Aron, 1997), people are motivated to expand their self to enhance capabilities and gain new resources. And as people indicated having larger self-concepts (as indexed by more descriptives of 'who they were today' in blank spaces), they evinced greater self-efficacy (the feeling that one is capable of enacting behavior to achieve a particular outcome and exercise their competencies; Mattingly & Lewandowski, 2013).

Recent research has found that awareness of mortality can contribute to an inflated sense of cultural value and worth (self-esteem). For example, reminders of death have been shown to increase agreement with positive feedback (Dechesne et al., 2003) self-serving attributions (Mikulincer & Florian, 2002), and self-enhancement (Landau & Greenberg, 2006). And, importantly, emerging work shows that MS can even influence judgments of the size of certain culturally-relevant objects. Specifically, Polish participants reminded of mortality viewed coins and bills as larger —presumably because the cultural importance of money makes it motivationally relevant to symbolic transcendence of mortality (Zaleskiewicz, Gasiorowska, Kesebir, Luszczynska, & Pyszczynski, 2013). Still other lines of work further converge on the potential connection between size, value, and concerns about mortality. Dunn and Duadagno (2012) have suggested males are more likely to select videogame avatars with a larger chest breadth relative to females because of the connotations of strength or power; feeling powerful in turn can help to reduce anxieties about mortality (Belmi & Pfeffer, 2016). Thus, across a variety

of domains, valued objects (such as the self) may be judged or preferred as spatially larger, and this tendency may be exacerbated under certain motivational states.

Together, these considerations suggest that a) the awareness of death motivates people to pursue a sense of social prominence and value; b) increased stature and size is frequently socially valued; c) and motivational orientations, including the awareness of death, can lead people to judge valued objects as larger. However, no research has yet explored the possibility that death awareness may motivate people to increase the size of objects representing themselves.

The present research

The present research investigates the motivational impact of awareness of mortality on the sizes of self-representational objects, or avatars. Specifically, in Study 1, participants were exposed to either MS or control condition topic, and then prompted to use a modeling clay to physically construct a statue of themselves (vs. other people). In Study 2, MS was again manipulated, and then participants were given the chance to craft a digital representation of themselves (vs. other people) as a customized video-game avatar. Study 2 also asked participants to select the size of the USA from an array of map outlines to determine if the aforementioned size biases extend to objects or identifications associated with the self.

Study 1

Study 1 examined the hypothesis that MS would lead to larger representations of the self (vs. of others). To test that hypothesis, we created a task in which participants used plasticine sculpting clay (Play-Doh) to craft figures of either themselves or of another person. The clay sculpting task allowed participants to create figures using as little or as much of the material as they desired. The finished figures could then be weighed to quantify their size[1]. Following TMT,

[1] The weight of material used for the figure was the primary DV. Other metrics of size were considered, but not used given complications in their assessment. Figure size could, for example, be calculated by area (maximum height x

if MS motivates people to pursue a symbolically permanent legacy through social value and influence, and if people can broadcast their value and increase their influence with larger self-representational objects, then MS should lead participants to create larger (i.e., heavier) self-representational sculptures of themselves but not necessarily of other people.

Method

Participants.

One hundred-seven undergraduate students (age: M = 18.74, years, SD = 1.51; 29 male, 78 female) participated in exchange for course credit. Participants were randomly assigned to condition in a 2 (MS vs. pain) x 2 (sculpture: self vs. other) experimental design. Sample size was based on recommendations at the time the study was run to have 20 participants per cell minimum (Simmons, Nelson, & Simonsohn, 2011). We return to this issue in Study 2.

Materials and Procedure.

A cover story explained that the study examined personality and product preferences. Participants were given a packet of materials which would instruct them, when appropriate, to interact with a computer (to time their activity) and open a manila envelope containing a tub of orange sculpting clay (compound net weight of 5 oz.) located on the desk.

Mortality salience. A method extensively employed in TMT studies was used to manipulate death thoughts (Burke et al., 2010; for meta-analytic review). Participants responded to two open-ended questions, "What do you think will happen to you when you die?" and "What do you think happens to you physically as you die." The control condition asked parallel questions about pain: "Briefly describe the emotions that the thought of being in pain arouses in

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width x depth), but this was not a viable metric given the wide variety of figure poses (e.g., some with arms out vs. down by side) and amount of unused space between limbs. Further, amount of a given material is positively correlated with size, holding spread of material constant. Thus we reasoned weight of figure provided a more accurate metric of size.

you" and "What do you think happens to you physically when you experience pain". Pain was used as a control topic as it is a negative experience and thus allows for a test of whether effects are due simply to considerations of something negative vs. a more distinct effect of the activation of mortality-related cognition.

Distraction and Affect. The 60-item positive and negative affect schedule (PANAS; Watson & Clark, 1999) and a brief 3-5 minute reading task (an excerpt taken from Albert Camus' *The Growing Stone)* provided the task-switching distraction that facilitates distal terror management effects (see Pyszczynski et al., 1999). Inclusion of the PANAS also can inform whether the MS manipulation differentially influenced affect, and perhaps especially fear-related affect (see Lambert et al., 2014), relative to the aversive control condition.

Sculpture manipulation and measurement. Next, participants were instructed to turn their attention to a computer monitor in front of them (using MediaLab v.2002 software, Jarvis 2006), where they encountered the following instructions for the sculpting task: "Inside the packet in front of you there is a tub of Play-Doh and a plastic knife, fork, and spoon. Please remove these from the packet now but do not open the Play-Doh. Please press continue." The next screen read "We now want you to create a Play-Doh version of yourself [a person who is not you]. You may use the plastic utensils to add detail to your figure. You may spend as much time as you like crafting yourself [the person]. You may use as much Play-Doh as you think you need. Please press continue and begin crafting yourself [a person]." The utensils (e.g., plastic fork) were included to aid flexibility in the aesthetics of the representation, and encourage variability in amount of material used. The next screen read "You should now be crafting yourself [a person]. When you are completely finished please press continue." MediaLab recorded time spent sculpting. After sculpting and pressing continue, the final screen read "Please place your Play-

Doh figure to one side. Do not destroy/damage it. On the following screens you will see some questions, please answer them as honestly as possible. Please press continue." The computer then administered the demographics questionnaire, including self-report measures of height and weight (to allow for calculation of BMI).

Results and Discussion

The weight of each figure (grams) was examined via a 2 (MS vs. pain) x 2 (sculpture: self vs. other) ANOVA. BMI and time spent crafting were included as covariates in the model (all of which were unaffected by the main effects or the interaction, Fs $\leq$ 2.34, ps $\geq$ .23). There was no main effect of MS, $F(1, 95) = .61$, $p = .44$, $\eta_p^2 = .01$, nor the self/other sculpture manipulation, $F(1, 95) = .52$, $p = .47$, $\eta_p^2 = .01$. As depicted in Figure 1, the hypothesized two-way interaction emerged, $F(1, 95) = 9.28$, $p < .01$, $\eta_p^2 = .09$[2] (see supplementary analyses for analyses without covariates included and exploratory measures).

Pairwise comparisons showed that when participants were asked to sculpt themselves, they used more clay to do so in the MS condition ($M = 106.71$, $SD = 35.47$) than in the pain condition ($M = 78.63$, $SD = 32.56$) ($t[49] = 2.53$, $p = .01$, $d = .72$). When tasked with sculpting another person, there was no statistical difference in the amount of clay used in the MS condition ($M = 76.92$, $SD = 40.38$) and the pain condition ($M = 93.58$, $SD = 41.16$) ($t[48] = -1.62$, $p = .11$, $d = .47$); in fact, a not-significant trend suggested less clay was used in the MS (vs. pain) condition. Looked at differently, after MS, participants used more clay to sculpt the self vs.

[2] Because there is reason to consider that females may wish to be viewed as smaller after death reminders to meet cultural standards for being attractive i.e., being slim (Goldenberg et al., 2005), we also tested whether sex moderated effects. Although there was a trending main effect of sex, $F(1,93) = 3.69$, $p = .06$, $\eta_p^2 = .04$, such that males (vs. females) created larger figures of themselves and other people, there was no three-way interaction, $F(1, 93) = 2.39$, $p = .13$, $\eta_p^2 = .03$.

another person (t[48] = 2.61, p = .01, d = .75); that difference did not occur in the pain condition (t[49] = -0.68, p = .50, d = .19).

Affect. Because the PANAS was administered after the MS manipulation, but prior to the self-other manipulation, affect was analyzed using a one-way (MS vs. pain) ANOVA. There were no effects of MS on positive affect (α =.87), F(1, 105) = .32, p= .58, η_p^2 < .01, negative affect (α =.83), F(1, 105) = .01, p = .91, η_p^2 < .01, or the fear subscale (α =.73), F(1, 105) = 1.26, p = .26, η_p^2 = .01.

Study 1 supported the hypothesis that after being reminded of mortality, people would use more clay when sculpting a physical representation of the self (vs. another person). However, Study 1 leaves room for improvement in at least two ways. First, the study was conducted based on recommendations at the time for sample sizes, whereas recent discussions in the field have prompted researchers to replicate their studies at higher power. Second, the playdoh task used is novel and, although theoretically driven and conceptually relevant, it had not been previously validated in other research assessing how people may represent the self. Study 2 was designed to improve on each of these issues.

Study 2

First, Study 2 shifted from using a novel playdoh crafting task to a previously-validated videogame avatar creation task. Previous research has studied a number of self-associated processes by asking participants to craft their own videogame avatars; for example: self/avatar consistency (Ratan & Dawson, 2015); ideal-self manifestations (Bessiere, Seay, & Kiesler, 2007); avatar identification and its influence on implicit self-perceptions (Klimmt et al., 2010); and the selection of avatar body size (Dunn & Guadagno, 2012). Second, Study 2 aimed to increase the sample size in a conceptual replication of Study 1.

Study 2 also examined an additional question: Whether the influence of MS on self-representational size biases would extend to valued self-related objects. William James (1890) argued that the self can extend to objects linked to the self (i.e., "extended self"). For example, Belk (1988) posits that people "transcend the immediate confines of their bodies by incorporating into their identities objects from their physical environment. This conceptualization implies that the self is spatially enlarged by such extensions; that our possessions make us bigger people" (p. 669). Therefore, in addition to the self-representational avatar crafting task, given that Study 2 was conducted with American participants we also measured potential biases in the estimated size of an "extended self"-related object – the outline of the USA on a global map.

Study 2 thus hypothesized that MS would lead people to increase: 1) the size of a virtual avatar of themselves (but not necessarily of others); and 2) the relative size of the USA on a map.

Method

Participants and minimum sample size.

Meta-analyses of mortality salience effect sizes were consulted to anticipate the sample sizes necessary to achieve a sufficient level of power (.80) to detect MS effects within each avatar condition, should such effects be present. Burke, Martens, and Faucher (2010) found an overall MS effect size of $r = .35$ ($d = .75$) on a broad range of studies using various self-relevant worldview-defense outcomes (e.g., defense of national identity, sports team affiliations, physical aggression). The power analysis (G*Power; Faul, Erdfelder, Buchner, & Lang, 2009), assuming $d = .75$, prescribed a minimum of 29 participants per each of the four conditions, for a *minimum* total sample size of 116 participants.

We aimed to exceed this minimum to ensure sufficiently powered investigation, and thus aimed to collect data from 300 participants. Amazon Mechanical Turk workers were solicited; 300 were successfully recruited, however 19 dropped out midway through the survey leaving a final sample of 281 (age: M = 33.78 years, SD = 10.1; 165 male, 116 female). The 19 dropouts did not differ by condition. Participants were recruited from the USA, compensated $.50, and were randomly assigned to condition in a 2 (MS vs. pain) x 2 (avatar: self vs. other) experimental design.

Materials and Procedure.

The study was listed on the Amazon Mechanical Turk site as 'Exploring personality and attitudes: series 1' and included a cover story explaining that the survey was a 'study on people's personality and other psychological attributes'.

Mortality salience. As in Study 1, participants were prompted to write about death in the MS condition, or to write about pain in the control condition.

Distraction and Affect. Similar to the previous study, participants completed the distractor task (Growing Stone reading passage) and this time the 20-item PANAS (Watson, Clark, & Tellegen, 1988) measure that also included additional fear items suggested by Lambert et al. (2014) to tap the potential impact of MS on fear affect (fearful, afraid, frightened, scared).

Avatar manipulation and measurement. Next, participants were shown a screen that stated "We now want you to create a character that will represent you [another person] in an online video game that you may be asked to play later on. Start by selecting your character's name, size, eye color, and hair color". Participants then entered a name for the character before selecting the avatar size. For the size, participants were presented with a row of ten outlines of a unisex human, smallest to largest, each one increasing in size by 10% per iteration. Each outline

was pictured against a pixelated outdoor scene, as one might find in a video game, to provide a frame of reference. Each outline was numbered (1 = smallest, 10 = largest), with no "correct" size, and participants responded to the item "I want my [their] character's size to be (1-10)". To bolster the cover story that the task was about video game avatars, participants also selected from 24 different eye colors, and eight different hair colors. Once these tasks were complete the participant advanced to the next screen which read "Thank you for creating the video-game character. We may contact you again for another study involving video-games in the future. Please click the 'next' button to complete a few more questions".

USA size task. The next task was the extended-self object size bias measure. This task instructed participants "Below is a map of the world with the USA cut out of it. Please select, from the images below, which outline of the USA you think is the correct one." The image at the top of the screen was a world map with the outline of the USA removed. The lower portion of the screen presented eleven outlines of the continental USA, arranged smallest to largest and numbered (1 = smallest, 11 = largest), increasing/decreasing in size by 10% per iteration; the middle outline (number 6) was the proportionally "correct" size relative to the map. Participants responded to the item "I think the correct size of the USA is (1-11)".

Participants also completed demographic information at the end of the study which included a 10-point Likert type item "How much do you agree with the phrase "being an American is an important part of my identity" (*1- not at all, 10 – very much so*). This was included to examine whether potential MS induced biases in size estimations of the USA were moderated by group identification.

Results and Discussion

Avatar size. Avatar size was examined via a 2 (MS vs. pain) x 2 (avatar: self vs. other) ANOVA. There was no main effect of MS, $F(1, 277) = .87$, $p = .35$, $\eta_p^2 < .01$, nor avatar self/other manipulation, $F(1, 277) = .67$, $p = .41$, $\eta_p^2 < .01$. As depicted in Figure 2, the hypothesized two-way interaction emerged, $F(1, 277) = 7.72$, $p = .006$, $\eta_p^2 = .03$[3].

Pairwise comparisons showed that when participants were asked to create a character for themselves, they selected a larger avatar in the MS condition ($M = 6.88$, $SD = 1.84$) than in the pain condition ($M = 5.98$, $SD = 2.25$) ($t[129] = 2.54$, $p = .01$, $d = .44$). When asked to select the size of a character for another person, there was no statistical difference in the size of the avatar selected in the MS condition ($M = 6.01$, $SD = 2.29$) and the pain condition ($M = 6.46$, $SD = 1.61$) ($t[148] = -1.35$, $p = .177$, $d = -.22$). Looked at differently, participants selected a larger avatar for themselves vs. another person in the MS condition ($t[133] = 2.49$, $p = .013$, $d = .43$) but not in the pain condition ($t[144] = -1.42$, $p = .158$, $d = -.23$).

USA size. The size of the selected USA outline was examined via a 2 (MS vs. pain) x 2 (avatar: self vs. other) ANOVA. There was no main effect of MS, $F(1, 277) = .26$, $p = .61$, $\eta_p^2 < .01$, avatar self/other manipulation, $F(1, 277) = .01$, $p = .91$, $\eta_p^2 < .001$, nor two-way interaction, $F(1, 277) = 2.28$, $p = .13$, $\eta_p^2 = .01$.

We also examined the potential for MS to interact with American identification, using the method suggested by Aiken and West (1991) for probing interactions between continuous and categorical factors: we conducted a two-way multiple regression analysis, entering MS and US identification in the first step and the interaction between MS and US identification in the second

[3] We again tested whether sex moderated effects. There was again a main effect of Sex, $F(1, 273) = 10.99$, $p = .001$, $\eta_p^2 = .04$ such that males (vs females) selected larger avatars of themselves and other people, but no two-way interaction of MS and Sex, $F(1, 273) = .29$, $p = .59$, $\eta_p^2 < .01$, and no three-way interaction with the build self or other task, $F(1, 273) = .19$, $p = .66$, $\eta_p^2 < .01$

step. Selected USA size was positively associated with American identity, β = .23, $t(277) = 2.58$, p = .01, but was not associated with MS, β = .14, t(277) = .94, p = .35, or the interaction, β = -.11, $t(277) = -.69$, p = .49.

Affect. Because the PANAS was administered after the MS manipulation, but prior to the avatar self-other manipulation, affect was analyzed using a one-way (MS vs. pain) ANOVA. Like Study 1, there were no effects of MS on positive affect (α = .83), $F(1, 279) = .59$, p = .44, $\eta_p^2 < .01$, negative affect (α = .85), $F(1, 279) = .02$, p = .88, $\eta_p^2 < .01$, or the fear subscale (α = .88), $F(1, 279) = .16$, p = .68, $\eta_p^2 < .01$.

General Discussion

The present studies were grounded in the idea that awareness of mortality motivates people to cultivate a sense of permanence by striving for greater self-esteem and to bolster and protect their cultural worldviews, becoming a valued part of a seemingly permanent cultural enterprise (e.g., Greenberg et al., 2015). To the extent that perceptions of being larger may contribute to these goals, we reasoned that reminders of death should increase the size of self-representations. Two studies provided support for this hypothesis. In Study 1, MS (vs. control) led participants to construct larger sculptures of themselves but not of other people. In Study 2, which used a more validated measure of self-representation and a larger sample, MS (vs. control) led participants to select larger virtual avatars of themselves, but not of other people. The present findings thus converge with previous TMT research indicating that MS can cause people to view valued objects, such as currency, as larger (Zaleskiewicz et al., 2013), and more broadly with research showing that objects are judged as larger when facilitating goal attainment (e.g., Bruner, 1957; Veltkamp et al., 2008).

Additionally, interfacing TMT with the writings of both William James (1890) and Belk (1988), who each suggested the self extends to include ones' objects and possessions, we hypothesized that MS would have a similar effect on size estimates of self-associated objects, such as one's nation. However, Study 2 found no effect on a measure of the estimated size of a presumably self-associated object—the borders of the USA on a world map. One possible reason for the absence of this effect may be that a world map featuring the USA borders may have been quite familiar to American residents, who may have easily recognized the center size option (number 6) as the correct size, thereby suppressing any variation in size estimates. However, this possibility is not supported by the data, as USA size estimations spanned the full response continuum (1-11) with standard deviation of 3.03, suggesting that variance was not suppressed by an obviously correct answer. Alternatively, the absence of this effect may pertain to the dynamics of terror management processes: evidence shows that engaging in defensive reactions, such as bolstering self-esteem, mitigates concerns about mortality and eliminates the need for further defenses (Arndt et al., 1997; Jonas & Fischer, 2006; McGregor et al., 1998; Schmeichel & Martens, 2005). If participants effectively defended against death awareness by increasing the size of their self-representations, eliminating the need for subsequent defensive reactions, then there would be no need to also exaggerate the size of the USA borders. Of course, this is just one of a number of potential factors that could be involved, and ultimately the null effects on this measure offer little in terms of specific insights.

Limitations and future directions

Although the present work offers the potential for novel insights about the role of existential motivation in representation of self, several remaining issues raise promising avenues for future research.

Object valence. Although the present findings were inspired by, and are consistent with, the idea that MS would lead people to attempt to bolster self-esteem (perceived symbolic permanence) by enhancing their relative physical prominence and implied social value, the present studies do not reveal such as the operative motivation. One issue that merits consideration is whether reminders of mortality increased self (but not other person) size representations, or whether the thought of pain perhaps reduced these representations. Although we are not aware of any theory that would explicitly make such "pain-based" predictions, perhaps the thought of pain shifted attentional resources or otherwise reduced concern with the self. Note, however, that there was no difference between self and other representation after pain salience in either study. Thus, it is not readily apparent how a pain based explanation could explain the present findings. Nonetheless, future research could explore this possibility.

If mortality thought was indeed a catalyst in these effects, better documentation of the underlying motivations that were elicited and lead to self-representational size judgments is an important direction for future work. Given research suggesting that MS leads people to view culturally-valued items as larger (e.g., currency, Zaleskiewicz et al., 2013), and given that most people have relatively high self-esteem (e.g., Robins, Hendin, & Trzesniewski, 2001) it could be that MS led participants to represent themselves as larger because many of them viewed themselves as culturally-valued. If so, then it would suggest that MS should lead to increased self-representational size only among those with moderate to high self-esteem, whereas it should lead to *decreased* self-representational size among those with low self-esteem. Indeed, research suggests death reminders can motivate people low in self-esteem to reduce self-awareness as a means to reduce mortality concerns (Wisman, Heflick, & Goldenberg, 2016). If this is the case, one way to manage existential concerns for those low in self-esteem might be to 'escape the self'

by reducing their perceived size. This logic could also be applied to extended-self items. If one positively values the company they work for, their nation, their religion, etc., then MS might lead one to exaggerate the size of such extended-self objects as their company logo, their national flag, or religious symbols; but if one dislikes those self-associated aspects, then MS might lead one to minimize the size of those extended-self objects. And, likewise, MS may lead people to minimize the size of self-esteem undermining or culturally-threatening objects, such as a competitor company's logo, an enemy's national flag, or a rival religion's symbol. This possibility may also help explain why MS had no effect on the size of the USA borders—perhaps there was much variation in whether USA residents view the USA positively or negatively, aside from the issue of American identity. As the present research did not measure self-esteem nor opinions about the USA, we can only speculate about these possibilities, and the USA-size task offers little in the way of any specific conclusions.

Size and value. It is also important to emphasize that the existentially motivated goal to represent the self as larger may not be an invariable uniform result. People sometimes place more cultural value on smaller items, such as waist lines, carbon footprints, or computers and technology—especially to the extent they value aesthetics, environmentalism, or portable electronic convenience. Sometimes less is more. It is likely that the nature of existential size biases will often depend on the cultural value associated with a given domain or object.

On another note, it is worth considering whether people might also view motivationally-relevant obstacles as larger, reflecting more focused attention to those items, as people attempt to eliminate the obstacle hindering goal completion. For instance, if non-conscious awareness of death motivates the goal to maintain a sense of self-esteem within one's seemingly permanent cultural worldview, encountering an "enemy" nation that threatens the worldview may lead to

that nation being seen as an impediment to the goal of bolstering ones worldview, and so people may view it as larger (Cohen, Jussim, Harber, & Bhasin, 2009) until they perhaps diplomatically, economically, or militarily resolve the threat.

Cultural variation. Finally, a generative direction for future research may also consider cultural influences on the nature of these motivated biases. As mentioned at the outset, the USA is a particularly vivid example of a country in which bigger is often viewed as better, but such biases may vary culturally. One potentially relevant cultural dimension is individualism vs. collectivism. Because some Americans may be more individualistic (Gilovich & Savitsky, 1999; Markus & Kitayama, 1991), and/or believe they are better and more deserving of praise than others (Beer & Hughes, 2010), they may be more likely to increase self-representational depictions following MS. Such individualists may even be more prone to shrinking others and others' extended-selves to attain feelings of worth, given that disparaging others can by contrast function to bolster self-esteem (Fein & Spencer, 1997). In comparison, those in more collectivist cultures, within the USA or abroad, who value others and see the self as more socially embedded, might inflate others, or shrink the self, when faced with cognitions about mortality. Future research might aim to probe these possibilities.

Conclusion

The present work suggests that death awareness can cause people to craft larger sculptures and digital avatars of themselves, but not necessarily other people. This finding was consistent with the idea that MS leads people to attempt to mitigate death concerns by seeking a sense of cultural value and permanence—in this case, presumably by bolstering their relative physical prominence and implied social stature.

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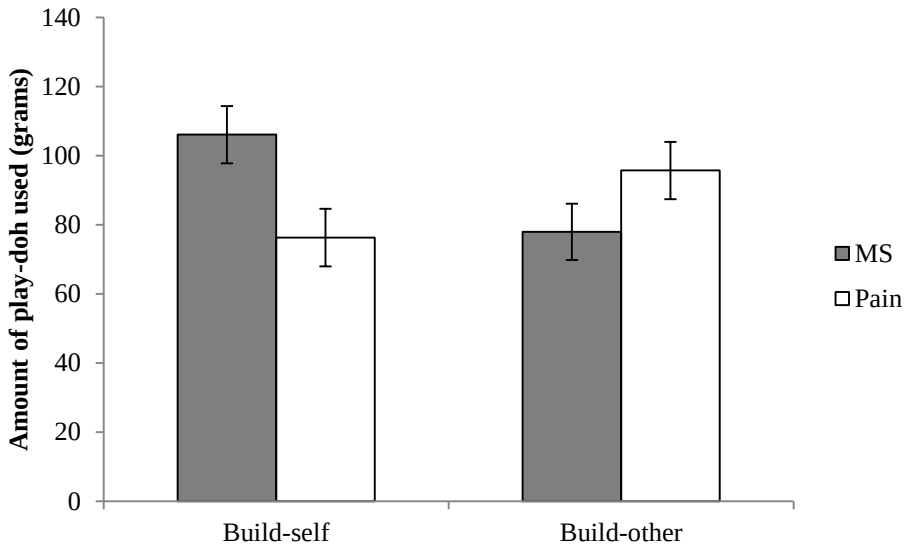

Figure 1. Two-way interaction between MS/pain and self/other sculpture task on amount of Play-Doh used (Study 1).

Note. Error bars represent standard errors.

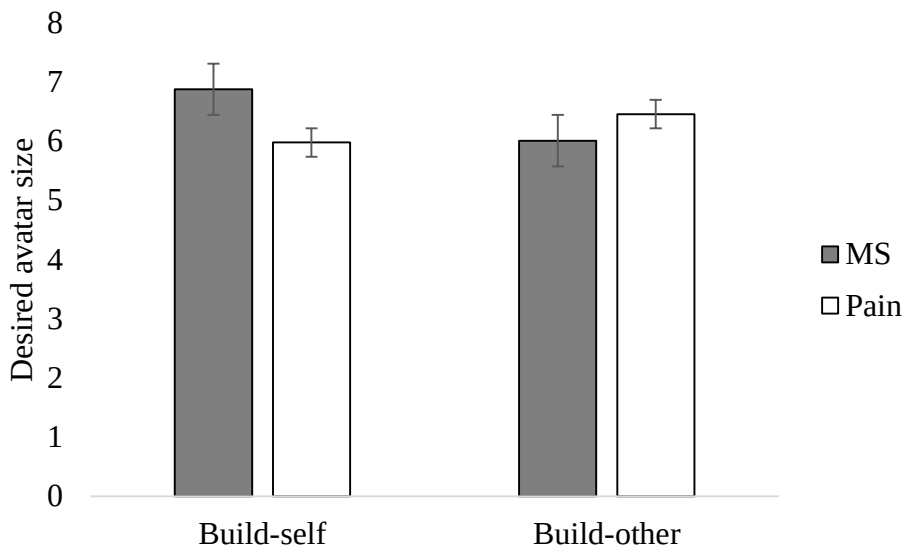

Figure 2. Two-way interaction between MS/pain and self/other avatar task on chosen avatar size (Study 2).

Note. Error bars represent standard errors.

Supplementary analyses – Study 1 without BMI and crafting time covariates included

The weight of each figure (grams) was examined via a 2 (MS vs. pain) x 2 (sculpture: self vs. other) ANOVA. There were no main effect of MS, $F(1, 97) = .64$, $p = .42$, $\eta_p^2 = .01$, or the self/other sculpture manipulation, $F(1, 97) = .34$, $p = .56$, $\eta_p^2 = .01$. As depicted in Figure 1, the hypothesized two-way interaction emerged, $F(1, 97) = 10.14$, $p < .01$, $\eta_p^2 = .09$.

Pairwise comparisons showed that when participants were asked to sculpt themselves, they used more clay to do so in the MS condition ($M = 106.05$, $SD = 35.47$) than in the pain condition ($M = 76.28$, $SD = 32.56$) ($t[49] = 2.83$, $p < .01$, $d = .81$). When tasked with sculpting another person, there was no statistical difference in the amount of clay used in the MS condition ($M = 77.91$, $SD = 40.38$) and the pain condition ($M = 95.69$, $SD = 41.16$) ($t[48] = -1.67$, $p = .10$, $d = -.48$). Looked at differently, participants used more clay to sculpt the self vs. another person in the MS condition ($t[48] = 2.65$, $p < .01$, $d = .76$) but not in the pain condition ($t[49] = -1.84$, $p = .07$, $d = -.52$).

Supplementary analyses – Study 1 implicit self-esteem exploratory measure

Prior to completing the experimental manipulations, participants completed a measure of implicit self-esteem based on the 'name-letter effect' (e.g., Nuttin, 1985). This effect suggests people show a preference for their own initials relative to other letters of the alphabet. As such, participants read the instructed "Please write down your ratings next to each letter for how beautiful you find it" and responded on a Likert type scale (*1 – not at all beautiful, 10 – very beautiful*). The weight of each figure (grams) was examined via a multiple regression interaction analysis, examining potential moderation between MS vs. pain, building the self vs. other, and high vs. low implicit SE, following the method suggested by Aiken and West (1991). The measure was not found to interact with any of the manipulations, all *p*s > .276.

Note that these analyses are not included in the main document for several reasons. First, given sample size, we were underpowered to test for a three way interaction so any effects (or lack thereof) could be misleading. Second, since running the study there has emerged several articles debate the validity of the measure and what it is actually tapping into (e.g., Hoorens et al., 2015). Finally, this measure was included for exploratory purposes and was not central to the hypotheses we were targeting. As such, any significant results would constitute 'fishing'.