



## Self-esteem buffers the mortality salience effect on the implicit self-face processing



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### ABSTRACT

Previous works on the Terror management theory (TMT) have shown that thoughts of one's own death provoke avoidance of the self-focused state and that self-esteem could buffer the deeply rooted anxiety and fear of death. However, surprisingly little research has examined this issue directly. In Study 1, we investigated 112 healthy adults who completed two explicit self-face processing tasks. High self-esteem group and low self-esteem group were primed to increase mortality salience (MS) or negative affect (NA). Results did not reveal a main effect or any interaction effects between self-esteem and priming on the self-face processing. In Study 2, 116 participants completed both an implicit self-face recognition task and an explicit self-face familiarity identification task. Results showed that in the implicit self-face recognition task, high self-esteem participants responded faster to the self-face than to the friend-face after the MS priming, while participants with low self-esteem did not show such a difference. However, results of the explicit task revealed neither a main effect of priming nor an interaction effect between self-esteem and priming. Our findings indicate that reminders of mortality decrease the reaction times to the self-face in an implicit way and this effect is moderated by people's level of self-esteem.

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### 1. Introduction

From ancient times, humans all know that death is inevitable and are constantly struggling with the inevitable death. The existential concern constitutes one of the basic motivations of human life and influences individuals' thoughts and behaviors significantly (Pyszczynski, Greenberg, & Solomon, 1997). For example, reminders of mortality can increase prosocial attitudes and prosocial behaviors (Jonas, Schimel, Greenberg, & Pyszczynski, 2002). Mortality Salience would make participants' opinions closer to that of in-group members but further away from that of out-group members (Renkema, Stapel, & Van Yperen, 2008). A study showed that subliminal death priming decreased participants' gaze duration towards physical injury image (death is highly accessible) but increased their gaze duration towards threatening images (Hirschberger, Ein-Dor, Caspi, Arzouan, & Zivotofsky, 2010).

Terror management theory (TMT) posits that it is the uniquely human capacity to be self-aware and to know that all living things including humans will ultimately not exist (Greenberg,

Pyszczynski, & Solomon, 1986). Increased self-awareness may contribute to concerns about mortality by facilitating the realization of the inevitability of death (Arndt, Greenberg, Simon, Pyszczynski, & Solomon, 1998). The more aware one is of one's existence, the more salient and inescapable is the problem of possible nonexistence. Because of this relationship between self-awareness and the awareness of death, when people are thinking about their own death, they should be motivated to avoid attention on the self (Arndt et al., 1998).

Several studies have been conducted to test this hypothesis. Behavioral results have shown that mortality salience provokes avoidance of the self-focused state. For example, participants spent less time on contemplating their own death in a self-focus compared to a non-self-focus condition. Mortality salient participants also wrote a shorter story when the task prompted an internal focus on self than when it prompted an external focus on other (Arndt et al., 1998). Behavioral studies have also found that death-related thoughts lead people to avoid physical sensations. For example, after priming mortality salience, participants spent less time submerging their arm into the ice-cold water and also using an electric foot massager (Goldenberg et al., 2006). Researchers have even found support from brain imaging studies. Han, Qin, and Ma (2010) found that the processing of

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death-related words was associated with decreased activity in the insula, a brain region that modulates neural representation of the sentient self-awareness (Han et al., 2010). Moreover, Shi and Han (2013) suggested that the decreased insula activity reflected continuous suppression of the sentient self-awareness during death-relevance judgments (Shi & Han, 2013).

Previous works listed above have suggested that the death-related thoughts would limit people's attention on self; however, the most challenging problem related to these findings is that previous experimental manipulations of self-processing were quite indirect. For example, self-focus state was defined either as the length of time that people spent in a room with a mirror or the amount of words that they wrote in a story with internal focus on self (Arndt et al., 1998). Moreover, another study used either the length of time people submerged their arm in water or the length of time people used a foot massager as a measure of the extent of physical sensation on self (Goldenberg et al., 2006). Finally, the decreased insular activity during death-related thoughts was speculated as the suppression of the self-awareness even though no manipulation of the self was conducted (Han et al., 2010; Shi & Han, 2013). Thus, to our knowledge, there has been no study to date that tested the effect of mortality salience on self-processing directly.

Self-face recognition reflects the process that someone can recognize one's own face by distinguishing it from the other (Northoff et al., 2006). Self-face recognition is an important indicator of self-awareness, and researchers have extensively used mirror self-recognition to investigate the self-consciousness of infants and animals (Amsterdam, 1972; Gallup, 1970; Keenan, Gallup, & Falk, 2003). Generally, people recognize one's own face faster than both stranger's face and familiar other's face (Keyes & Brady, 2010). The implicit positive association (IPA) theory attributes the self-face speed advantage to the positive attribute of self-concept (Ma & Han, 2010). Ma and Han (2009, 2010) also found that this advantage could be weakened by self-concept-threatening task (SCT) and social threat. In the current study, we would like to explore whether mortality salience motivates avoidance of attention on the self-face directly. Given that self-face is faster recognized than other-face, and assuming that mortality salience would harm the specificity of self-processing advantage, we hypothesized that participants will be slower to recognize self-face after the mortality salience priming relative to the control priming.

The second aim of the current study was to explore whether self-esteem could buffer the mortality salience effect on self-face processing. The TMT theory regards self-esteem as a buffer against both the anxiety and deeply-rooted fear of death (Greenberg et al., 1986). Previous studies found that both dispositional and experimentally enhanced high self-esteem was associated with lower levels of defense by denying one's vulnerability to an early death (Greenberg et al., 1993); also, both dispositional and experimentally enhanced high self-esteem decreased levels of worldview defense and death-thoughts accessibility in response to mortality salience (Harmon-Jones et al., 1997). Since self-esteem seems to be able to buffer the deeply-rooted anxiety and fear for death, we hypothesized that high self-esteem participants unlike low self-esteem participants will be able to maintain specificity of the self-face processing advantage even when faced with the mortality salience priming.

To test our hypotheses, we designed Study 1, in which we examined whether mortality salience (MS) could weaken self-face processing advantage and whether self-esteem modulates this effect. After MS priming (which is connected with death) or NA priming (which is connected with negative emotions such as anxiety), both high and low self-esteem participants completed the two most common face recognition tasks: (1) the

face-orientation identification task (judge the face-orientation (left or right) of one specific face (self-face or friend-face) but ignore another face) and (2) the face-familiarity identification task (to judge whether the faces (self, friend, and stranger) were familiar or unfamiliar). We measured the RTs and identified the self-face advantage as the speed advantage to recognize self-face relative to other face. Moreover, many prior behavioral studies indicated that the SCT effect and Boss effect on self-face recognition was more salient or only occurred when responses were provided with the left hand (Ma & Han, 2009, 2010). Therefore, to further explore the possible RTs differences between the left and right hand response, participants conducted all self-face recognition tasks with the left hand and right hand.

## 2. Study 1

### 2.1. Method

#### 2.1.1. Participants

Fifty-six pairs of healthy Chinese undergraduate students, who were gender-matched friends and had known each other more than 1 year, took part in this study as paid volunteers. Twenty-nine paired participants were assigned to mortality salience (MS) group and the others to negative affect (NA) group. Participants were also divided into high self-esteem group and low self-esteem group by mean split of their scores measured by Rosenberg self-esteem scale (mean score: 28.67, standard deviation (SD): 3.08) (Rosenberg, 1965). In total, there were four groups including MS priming and high self-esteem group: MSH (38 participants, 11 males, mean age = 22.16, SD = 1.76), MS priming and low self-esteem group: MSL (20 participants, 4 males, mean age = 21.13, SD = 1.63), NA priming and high self-esteem group: NAH (23 participants, 10 males, mean age = 21.52, SD = 1.41) and NA priming and low self-esteem group: NAL (31 participants, 9 males, mean age = 21.00, SD = 1.65). None of the participants had any previous experience with similar tasks. All participants were right-handed and had normal or corrected to normal visual acuity. Participants gave their written informed consent prior to participation and the research was approved by a local ethics committee.

#### 2.1.2. Stimuli and procedure

**2.1.2.1. Priming task.** There were two sessions in the whole procedure. During the priming task, participants sat in a comfortable chair in a dimly lit laboratory at a distance of approximately 75 cm from the monitor. Each participant was asked to estimate whether he/she agreed with 28 statements in 3.5 min, each statement lasted for 7 s and two consecutive statements were intervened with 0.5 s. The materials for MS and NA prime were consistent with those in the previous studies (Greenberg et al., 1990; Luo, Shi, Yang, Wang, & Han, 2014). All statements used for MS prime were connected with death (e.g. 'If I were dead, my body would be left in mortuary, with pale face.' 'I feel suffering that I cannot escape from death.'). All statements used for NA priming were not connected with death but referred to negative emotions such as anxiety ('I feel anxious about my future life.') and fear (e.g. 'Future fills me with fear.'). In order to assess their feelings of closeness and fear to death, participants were then asked to rate their feelings during the priming task (e.g. 'How close do you feel to death after reading all the sentences and making your judgments?', 'How fearful do you feel about death after reading all the sentences and making your judgments?'). A Likert-type scale was used for all ratings where 0 indicated no effect and 10 indicated maximal effect (e.g. 'extremely close to death', 'extremely unpleasant', 'extremely fearful'). After the priming task, each participant was asked to perform 40 calculations in 5 min, which served as a delay between MS/NA induction and the

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