Journal of Experimental Social Psychology 79 (2018) 394–409

Contents lists available at ScienceDirect

Journal of Experimental Social Psychology

journal homepage: www.elsevier.com/locate/jesp

Money as an existential anxiety buffer: Exposure to money prevents mortality reminders from leading to increased death thoughts

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ARTICLE INFO

Handling editor: Tara MacDonald

1. Introduction

It has long been argued that people are strongly motivated to resolve the conflict between their biologically wired desire to live and their awareness of death's inevitability (Becker, 1975). Social psychologists who put this insight to empirical test documented that people try to provide their life with a sense of meaning through symbolic and cultural means, in order to cope with the knowledge of life's finiteness (Pyszczynski, Solomon, & Greenberg, 2003).

In the present work, we investigate the idea that mere reminders of money can serve an existentially soothing function and help people cope with the psychological terror inherent in their knowledge of mortality. This hypothesis is based on the assumption that money cues, at least for some people, activate self-esteem. Given that self-esteem provides protection against mortality concerns (Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004), we expect that higher levels of self-esteem activated by reminders of money should reduce or eliminate death-thought accessibility in response to mortality salience. With this work, we aim to extend earlier findings showing that the exposure to money might buffer fear of death (Zaleskiewicz, Gasiorowska, Kesebir, Luszczynska, & Pyszczynski, 2013), and provide empirical evidence for how and for whom money acts as an unconscious defense against death thoughts. By demonstrating that money helps people to cope with negative feelings evoked by painful mortality thoughts, our work also offers at least a partial answer to the question of why people persist at materialistic values and goals even when such pursuits are associated with negative consequences for well-being in the long term (Dittmar, Bond, Hurst, & Kasser, 2014; Kasser, 2016).

1.1. Fear of death and its psychological consequences

Humans, unlike other animals, are sophisticated enough in their mental abilities to be aware of the fragility of life and the inevitability of ultimate death. Terror management theory (TMT; for overviews, see Pyszczynski, Greenberg, Solomon, & Koole, 2010; Kesebir & Pyszczynski, 2012) proposes that the awareness of mortality has the potential to generate paralyzing anxiety and that the management of this potential anxiety is essential for effective functioning. According to the theory, people develop an anxiety buffering system that, as long as it is functional, protects against existential anxiety and provides psychological equanimity. The key ingredients of this anxiety buffer are a sense of meaning, security, value, relatedness, and transcendence—ingredients that are typically found in cultural worldviews, self-esteem, and close personal relationships. Because these psychosocial entities buffer against death anxiety, people are highly motivated to seek and maintain them and defend them against threats (Greenberg, Solomon, & Pyszczynski, 1997; Solomon, Greenberg, & Pyszczynski, 1991).

Since the inception of TMT, a large body of research has supported hypotheses generated by the theory (Burke, Martens, & Faucher, 2010). Accordingly, when thoughts of mortality are activated, people become more invested in their cultural worldview, self-esteem, and close relationships. Conversely, when one's cultural worldview, self-esteem or close personal relationships are threatened, anxiety increases and death-related thoughts become more salient in the consciousness (Hayes, Schimel, Arndt, & Faucher, 2010). Reminders of mortality increase hostility toward those who threaten one's cultural worldview (Greenberg et al., 1990; McGregor et al., 1998; Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989), the desire to boost one's self-esteem (Schmeichel et al., 2009), the identification with the ingroup (Dechesne, Greenberg, Arndt, & Schimel, 2000), and commitment to one's romantic partner (Hirschberger, Florian, & Mikulincer, 2002). Boosting self-esteem or validating one's worldview, on the other hand, decreases anxiety and pushes death-related thoughts further from consciousness (Harmon-Jones et al., 1997; Schimel, Hayes, Williams, &

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https://doi.org/10.1016/j.jesp.2018.09.004
Received 7 November 2017; Received in revised form 10 August 2018; Accepted 10 September 2018
Available online 26 September 2018

Jahrig, 2007). Taken together, the TMT literature reveals that death anxiety plays an important role in various life domains (e.g., religion and spirituality, politics, sex, health behavior, consumer behavior, financial behavior) and that it is a fundamental motivational force for the human psyche.

1.2. Fear of death, consumption, and money

Based on the premise that consumption is a highly valued and promoted aspect of the current Western cultural worldview (Baudrillard, 1998; Bauman, 2007), past TMT research has hypothesized that consumption can buffer existential anxiety. In support of this, reminders of mortality have been shown to increase materialistic aspirations and the desire for consumption (for an overview, see Arndt, Solomon, Kasser, & Sheldon, 2004). For example, mortality thoughts increased the desire for high-status luxury products (Mandel & Heine, 1999), escalated people's financial expectations (Kasser & Sheldon, 2000), increased financial success aspirations (Sheldon & Kasser, 2008), and inflated the perceived importance of extrinsic goals, such as wealth, fame and image (Kosloff & Greenberg, 2009). As a whole, evidence points to materialism and consumerism as serving an existentially soothing function for many people in modern Western societies. Paradoxically, this is despite findings showing that saving money protects from existential anxiety much more effectively than spending money (Zaleskiewicz, Gasiorowska, & Kesebir, 2013, 2015) and that valuing money and possessions too much is associated with lower well-being and worse social and academic outcomes (Dittmar et al., 2014; Kasser, 2016).

Becker (1975, p. 81) proposed in his seminal work that humans perceive money as a symbol of power—the power "to increase oneself, to change one's natural situation from one of smallness, helplessness, finitude, to one of bigness, control, durability, importance." In line with this view, researchers started looking into how money as a symbol, and not as a direct instrument of consumption, can soothe death anxiety. Classic sociological and anthropological analyses also emphasize money's symbolic and emotional value that goes beyond its instrumental, purely economic functions (Belk & Wallendorf, 1990; Zelizer, 1994). The view that money does far more for people than just facilitating exchange is corroborated by a growing body of recent research showing that it acts as a psychological resource for interpersonal and intrapersonal regulation, in both adults and children (Gasiorowska, Chaplin, Zaleskiewicz, Wygrab, & Vohs, 2016; Zaleskiewicz & Gasiorowska, 2017; Zaleskiewicz, Gasiorowska, & Vohs, 2018; Zhang, 2009; Zhou & Gao, 2008; Zhou, Vohs, & Baumeister, 2009).

Relying on this body of theory and research, Zaleskiewicz, Gasiorowska, Kesebir, Luszczynska, and Pyszczynski (2013) have hypothesized that money possesses a strong meaning as a buffer against existential anxiety. In a series of experiments, they demonstrated that people reminded of their mortality (compared to controls) attributed a higher value to money. This work also provided a preliminary answer to the question of why mortality reminders intensify the desire for money: Physically interacting with money—both real and play banknotes—decreased self-reported fear of death compared to the control condition. If interacting with money soothes death fear, it stands to reason that people would turn to money in the face of mortality reminders.

1.3. Money as a source of self-esteem and an ingredient of the existential anxiety buffer

As Zaleskiewicz, Gasiorowska, Kesebir, Luszczynska, and Pyszczynski (2013) proposed, money can act as a provider of death-anxiety buffering ingredients such as power, confidence, self-sufficiency, and self-worth, which would explain that mortality thoughts lead to an increased desire for money. A large body of research supports the notion that self-esteem is a key ingredient of the existential anxiety buffer. For example, Greenberg et al. (1992) showed that boosting participants' self-esteem through bogus positive feedback led to lower levels of self-reported anxiety in response to graphic depictions of death. Both experimentally enhanced and dispositionally high self-esteem are associated with lower levels of worldview defense and lower death-thought accessibility in response to mortality reminders (Harmon-Jones et al., 1997). Research also shows that death reminders increase people's striving for self-esteem. In one dramatic illustration of this point, Israeli soldiers engaged in more risky driving behavior after mortality reminders, but only to the extent they derived self-esteem from their driving ability (Taubman Ben-Ari, Florian, & Mikulincer, 1999). Overall, self-esteem is the best documented component of the existential anxiety buffer, and to the extent money acts as a self-esteem provider, it should also be expected to buffer death anxiety.

Prior research has revealed direct and indirect links between money and self-esteem. In a meta-analytic review, Twenge and Campbell (2002) demonstrated that socioeconomic status, operationalized as income, was significantly and positively related to self-esteem. High income might be regarded as a signal of a one's competence, so that a higher salary might lead to self-perceptions of higher adequacy and worthiness as an organizational member (Gardner, Van Dyne, & Pierce, 2004), but also enhance global self-esteem (Goldsmith, Veum, & Darity, 1997). It has also been argued that the abundance of money may—at least to some extent—compensate for the lack of direct indicators of self-worth (Zhang, 2009). Although the abovementioned research shows a relationship between actually possessing money and self-esteem and suggests that actual wealth may buffer death anxiety, to our knowledge, no research investigated whether mere reminders of money could serve as a death anxiety buffer by boosting self-esteem. The present research project empirically examines the idea that money reminders buffer death anxiety by triggering feelings of self-worth.

The support for the thesis that thinking about money might enhance feelings of self-worth is supported by numerous studies conducted in the so-called money priming paradigm (Vohs, 2015; Zaleskiewicz et al., 2018). These studies have shown that exposure to money, compared to a control condition, makes people prioritize efficiency and increases their persistence. Mogilner (2010) documented in a field experiment that participants who were primed with money thoughts when they first entered a café spent more time reading or working on their laptops, and less time talking with other people, talking on their mobile phones, or texting. Similarly, both adults and preschoolers reminded of money have been found to work longer on challenging or unsolvable tasks even when there was an opportunity to ask for help (Gasiorowska et al., 2016; Vohs, Mead, & Goode, 2006). Mukherjee, Manjaly, and Nargundkar (2013), relatedly, showed that participants exposed to money reported stronger feelings of self-efficacy. In other studies, people who counted money declared that they felt stronger than those who counted slips of papers (Zhou et al., 2009), while people who memorized details of a valuable banknote declared greater feelings of agency than those who memorized details from an abstract picture (Zaleskiewicz & Gasiorowska, 2017). Money primes have also been shown to reduce social distress in those who experienced social exclusion, as well as subjective pain caused by holding one's hands in hot water (Zhou et al., 2009).

A sense of self-efficacy and persistent goal pursuit are considered to be closely associated with self-esteem. Self-esteem has been shown to be directly related to self-efficacy (Judge, Erez, Bono, & Thoresen, 2002), feelings of strength (Davis, Bremer, Anderson, & Tramill, 1983), and agency (Wojciszke, Baryła, Parzuchowski, Szymków, & Abele, 2011). High self-esteem has also been found to improve persistence in the face of failure, especially when persistence was an adaptive strategy (Baumeister, Campbell, Krueger, & Vohs, 2003), to predict lower levels of subjective pain (Cannella, Lobel, Glass, Lokshina, & Graham, 2007), and weaker feelings of social exclusion (Leary, Tambor, Terdal, & Downs, 1995). It is possible to interpret the positive impact of money reminders on persistency and self-efficacy as an indirect indication that

they boost feelings of self-worth. This provides additional credence to our expectation that reminders of money will increase self-esteem. Against this background, our main hypothesis is that exposure to money cues will prevent mortality reminders from leading to increased death thought accessibility, and that the psychological process behind it will be that money boosts self-esteem.

2. Overview of studies and intended contributions

We report six studies and one meta-analysis that demonstrate the effect of money cues on death-related cognition and investigate the psychological mechanism behind this effect. Experiment 1 tested whether participants exposed to money would generate fewer death-related words in a word-stem completion task compared to controls. The remaining experiments manipulated both mortality thoughts and money cues to investigate if exposure to money prevents mortality salience from leading to increased death thought accessibility. Experiment 2 tested this hypothesis in a Polish sample. Experiments 3 and 4 we tested the same hypothesis in an American sample and using different manipulations of money priming and mortality salience, but a similar measure of death thought accessibility. In Experiment 3, we also explored the role of self-esteem, sense of control and self-efficacy as potential mediators of the examined effect, showing that only self-worth explained why thinking about money buffers death-related cognition. In an attempt to test further potential mediators, Experiment 4 looked at various affect dimensions, revealing that none of these variables accounted for money's buffering effect on death-related cognition. To conceptually replicate our findings, in Experiment 5 we employed different methods of inducing mortality salience and money thoughts, as well as a different measure of death thought accessibility, again demonstrating that money cues prevented mortality salience from leading to increased death thought accessibility. In this study, we also explored financially contingent self-worth and socio-economic status as potential moderators of the anxiety-buffering function of money. Finally, Experiment 6, conducted in parallel in American and Polish populations, investigated whether the existentially soothing effect of money depends on whether money reminders come before or after mortality reminders. We conclude with a meta-analysis of Experiments 1–6 and show that the buffering power of money on death-related cognition is robust across nationalities, methods of manipulation and the measurement of the DV, and across manipulation order.

Other than providing evidence fortifying earlier findings on the existential buffering effect of money, the current research intends to contribute to the social psychological literature in a couple of ways. Firstly, our work is the first to explicitly demonstrate self-esteem's role in money buffering death-related cognition. Secondly, although the relation between money and self-worth has been widely discussed in the literature (e.g. Hart, 2014; Lea & Webley, 2006; Zhang, 2009), the effect of money cues on self-esteem has never been directly investigated, and our study does that. Thirdly, we extend the TMT literature by showing that merely thinking about money has the capacity to buffer fear of death irrespective of whether these thoughts come before or after mortality salience. Fourthly, by showing that money thoughts help people temporarily in coping with painful feelings evoked by mortality reminders, we offer an explanation for why people might be focusing too much on materialistic pursuits despite their well-documented negative long-term consequences for well-being. A last contribution of the current paper lies in its attempt to generalize these findings cross-culturally. Earlier studies on the existential anxiety buffering function of money have been conducted almost exclusively in a single culture (Poland). Here we test these ideas in a second culture (USA), thereby lending more credibility to their overall validity.

3. Experiment 1

In Experiment 1, we conducted a simple, direct test of the hypothesis that exposure to money cues would decrease death anxiety. Unlike in prior studies on money priming and death anxiety (Zaleskiewicz, Gasiorowska, Kesebir, Luszczynska, & Pyszczynski, 2013), we did not use self-reports or questionnaires to measure death anxiety. Instead, we measured participants' *death thought accessibility* (DTA), which was originally designed to capture level of death thought activation (Hayes et al., 2010, p. 699). We hypothesized that, if money serves an existentially protective function, as we propose it does, participants exposed to money cues should produce significantly fewer death-related thoughts than those not exposed to money.

3.1. Method

3.1.1. Participants and design

As a first step, we calculated the minimum acceptable sample size for our experiment. In their meta-analysis of mortality salience research, Burke et al. (2010) report a moderate ($r = 0.35$) effect of mortality salience. A priori power analyses using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) revealed that given an alpha of 0.05, a conventionally assumed power of 0.80, and the percentage of variance of the DV that can be explained by the MS manipulation based on the effect from meta-analysis ($r^2 = 0.122$), a sample of 58 participants would be required to detect the effect of similar size.

Sixty-nine students (45 women, 24 men; M age = 22.06 years, $SD = 3.776$) at a Polish university participated in this experiment, in exchange for a drink (bottled water or canned soda). Participants were randomly assigned to either a money prime or a neutral prime condition. Collection of data was not continued after data analysis. No data were discarded.

3.1.2. Procedure

Participants were tested individually by an experimenter who was blind to conditions, the aim of the study and the research hypotheses. After agreeing verbally to participate, participants were asked to sign the consent form, and to fill out two paper-and-pencil questionnaires unrelated to the aim of the study.[1] The purpose of these questionnaires was to make the study appear longer and mask its real aim. Next, participants were asked to complete a memory task on a computer screen, which served as the experimental manipulation. As part of this task, they were told that a picture would appear on the screen for 30 s and that they should pay attention to it with the goal of remembering as many details as possible later. After these instructions, participants in the money prime condition ($n = 34$) got to see a picture of both sides of a PLN50 (approximately $13) banknote on the screen, while those in the control condition ($n = 35$) saw an abstract picture that was the same size as the banknote (see Fig. 1 in Supplementary materials). Once 30 s were up, the screen automatically moved to a questionnaire consisting of six multiple choice questions (with four different response options) about the details of the banknote or the picture.

Participants' final task involved completing the paper-and pencil word-stem task that measured the accessibility of their death-related thoughts. Word-stem completion tasks are commonly used in terror management research to assess death thought accessibility (Hayes et al., 2010). Participants in the present experiment were asked to complete 26 word fragments (in Polish). Nine of these words could be completed in a death-related manner. For example, T R _ _ _ A could be completed as *tratwa* (raft) or *trumna* (coffin). The possible death related words were *śmierć* (death), *trup* (corpse), zwłoki (corpse), *żałoba* (mourning), *trumna* (coffin), *martwy* (dead), *groby* (graves), *zgon* (decease), *denat* (deceased). Death thought accessibility was operationalized as the number of words that participants completed in a

[1] One questionnaire measured satisfaction with different aspects of studying, and the other tested whether they derived meaning from studying. The order of the questionnaires was counterbalanced.

death-related manner. Out of the remaining 17 words in the task, another six could be completed in a money-related manner. For example, M _ N _ T A could be completed as *minuta* (minute) or *moneta* (coin). The possible money related words were *złoto* (gold), *dolar* (dollar), *moneta* (coin), *grosz* (penny), *forsa* (dibs), and *żołd* (pay). The number of words that participants completed in a money-related manner served as a manipulation check.[2] The number of words completed in a death-related manner or in a money-related manner was established by one judge (blind to condition, the aim of the study and research hypothesis), on the basis of provided lists.

3.2. Results and discussion

Participants in the money priming and neutral priming conditions did not differ in the number of correct answers they gave in the memory task, $F(1, 67) = 0.605$, $p = .440$, $\eta^2 = 0.009$, nor in the overall number of words they generated in the word-stem task, $F(1, 67) = 0.605$, $p = .439$, $\eta^2 = 0.009$. Moreover, the money priming manipulation appeared to be successful, in that participants in the money prime condition generated significantly more money-related words ($M = 3.529$, $SD = 1.813$) than those in the neutral prime condition ($M = 2.229$, $SD = 1.629$), $F(1, 67) = 9.844$, $p = .003$, $\eta^2 = 0.128$.

Our main hypothesis was that money reminders would decrease the accessibility of death-related thoughts. Supporting our prediction, participants reminded of money generated fewer death-related words ($M = 1.353$, $SD = 1.041$) than participants not reminded of money ($M = 2.171$, $SD = 1.581$), $F(1, 67) = 6.411$, $p = .014$, $\eta^2 = 0.087$.

We also conducted a mediation analysis in PROCESS 3.0 in order to demonstrate that money priming reduced death thought accessibility by virtue of increasing money thoughts. Money priming manipulation served as the IV, number of death-related thoughts as the DV, and number of money-related thoughts as the mediator. We also controlled for the overall number of words generated by the participants. The analyses revealed a significant total effect of money priming on DTA, $b = -0.79$, $se = 0.325$, $t = -2.430$, $p = .018$, and a significant effect of money priming on the number of money-related words, $b = 1.375$, $se = 0.408$, $t = 3.367$, $p = .001$. The number of money-related words and death-related words were also significantly related, $b = -0.201$, $se = 0.095$, $t = -2.105$, $p = .039$. While controlling for the number of money-related words, the effect of money priming on the DTA was no longer significant, $b = -0.513$, $se = 0.343$, $t = -1.496$, $p = .139$. The 95% bootstrapped confidence interval for the indirect effect did not contain zero, 95% boot CI [−0.650, −0.035], confirming the hypothesized mediating role of money thoughts.

To sum up, we found that money cues reduced the accessibility of death-related thoughts. The current results both corroborate earlier findings showing that money cues decrease fear of death (Zaleskiewicz, Gasiorowska, Kesebir, Luszczynska, & Pyszczynski, 2013) and provide a more refined understanding of its mechanism. If exposure to money automatically decreases the accessibility of death thoughts as we demonstrated it does, it would make sense for it to decrease the accompanying death fear. However, in this experiment, we did not manipulate reminders of mortality, so it remained unknown whether thinking about money would still serve as an effective anxiety buffer when thoughts about mortality were made salient. We addressed this issue by manipulating both mortality salience and money salience in the following five experiments. Also, Experiment 1 had been conducted with a homogenous group of undergraduate students from a renowned university. In the next study, we turned to a more diverse community sample.

[2] All methods are available from the authors upon request. We confirm that in the Procedure sections we disclose all manipulations, measures and exclusions used in the experiments as well as the method of determining the final sample size.

4. Experiment 2

To further establish the role of money reminders in thwarting death-related thoughts, Experiment 2 set out to test whether exposure to money would prevent mortality salience from leading to increased death thought accessibility. We manipulated both mortality and money cues, in order to demonstrate that thinking about money has the psychological power to hamper the availability of death thoughts triggered by a controlled procedure. In line with prior work (Hayes et al., 2010), we predicted that mortality cues would increase the accessibility of death thoughts, operationalized as the number of death-related words produced in a word-stem task. Yet our central prediction was that money cues would hamper the accessibility of death thoughts induced by the mortality manipulation. We hypothesized that participants reminded of their mortality and then primed with money would demonstrate less death-related cognitions, and produce significantly less death-related words than those reminded of mortality and not primed with money—as few as participants not reminded of their mortality.

4.1. Method

4.1.1. Participants and design

As a first step, we calculated the minimum acceptable sample size for our experiment. In their review of DTA studies in terror management research, Hayes et al. (2010) report a medium-sized (partial $\eta^2 = 0.10$) interaction effect between mortality salience manipulation and buffering manipulations/measures. A priori power analyses using G*Power (Faul et al., 2007) revealed that given an alpha of 0.05 and a conventionally assumed power of 0.80, a sample of 73 participants would be required to detect the interaction effect size of 0.10.

Seventy-six people recruited from a community sample (50 women, 26 men; $M_{age} = 36.37$ years, $SD = 13.09$) participated in this experiment, in exchange for a candy bar. Participants were recruited opportunistically amongst the employees and clients of one of the public institutions in a large city in Poland within one working week. They were randomly assigned to one of the four experimental conditions in a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) between-participants factorial design. Collection of data was not continued after data analysis. No data were discarded.

4.1.2. Procedure

Participants were tested individually in a room by an experimenter blind to both the aim of the study and the research hypotheses. After agreeing verbally to participate, participants were asked to fill in the consent form. Next, they were randomly assigned to either the mortality salience condition ($n = 38$) or the control condition ($n = 38$). Participants in the mortality salience condition completed the "Death Anxiety Scale" (Templer, 1970) consisting of 12 short statements, to which they responded with a "yes" or "no" (e.g., "I am very much afraid to die"). The aim of this questionnaire was not to measure fear of death, but to activate mortality thoughts. By contrast, participants in the control condition filled out the "Dental Anxiety Scale" consisting of similarly worded items about fear of dental work (e.g., "I am very much afraid of dental work"). Following the manipulation, all participants completed the brief version of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988; Cronbach's α's = 0.799 for positive affect and 0.871 for negative affect).

Next, participants were asked to solve a memory task, similar to the one used in Experiment 1. The purpose of this task was twofold: First, it was meant to push recently evoked thoughts about death out of participants' consciousness. Previous research has established that such delay and distraction tasks following mortality reminders lead to more robust terror management effects (Pyszczynski, Greenberg, & Solomon, 1999). Second, as in Experiment 1, the task served as a money priming manipulation. This time, however, instead of seeing a picture of a banknote on the computer screen, participants in the money prime

condition were handed a PLN50 (approximately $13) banknote by the experimenter, while participants in the neutral prime condition were handed a two-sided abstract picture (same as in Experiment 1) that was the same size as the banknote. Participants were instructed to look at the banknote or picture for 30 s, with the goal of later remembering as many details about it as possible. The experimenter then removed the banknote or picture from view and asked participants to complete the rest of the tasks.

The first task consisted of six multiple choice questions (with five response options, including "I don't know") referring to the details of the banknote or the picture. Finally, participants' death thought accessibility was assessed with the word-stem completion task almost identical to the one in Experiment 1, with the exception that words that could have been completed in a money-related manner had been excluded from the current task. In the present experiment, participants were asked to complete 20 word fragments in Polish, nine of which could be completed in a death-related manner. Death thought accessibility was again operationalized as the number of words the participants completed in a death-related manner.

4.2. Results and discussion

No differences were observed between the MS and control conditions in either negative affect, $F(1, 74) = 0.123$, $p = .726$, $\eta^2 = 0.002$ or positive affect, $F(1, 74) = 2.311$, $p = .133$, $\eta^2 = 0.03$. The manipulations did not affect the number of correct answers in the memory task, $F(1, 72) = 0.162$, $p = .689$, $\eta^2 = 0.002$ for the MS manipulation, $F(1, 72) = 0.647$, $p = .424$, $\eta^2 = 0.009$ for the money priming manipulation, or $F(1, 72) < 0.001$, $p > .999$, $\eta^2 < 0.001$ for their interaction. Also, the two manipulations did not have a significant impact on the overall number of fragments filled out in the word-stem task, $F(1, 72) = 2.312$, $p = .133$, $\eta^2 = 0.031$ for the MS manipulation, $F(1, 72) = 0.036$, $p = .850$, $\eta^2 = 0.001$ for the money priming manipulation, and $F(1, 72) = 0.903$, $p = .345$, $\eta^2 = 0.012$ for their interaction.

We had predicted that money reminders combined with mortality salience would alter the accessibility of death-related thoughts amongst participants. This hypothesis was supported by the results of a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) ANOVA. The main effect of both the money priming condition, $F(1, 72) = 19.828$, $p < .001$, $\eta^2 = 0.216$, and the mortality salience condition was significant, $F(1, 72) = 9.920$, $p = .002$, $\eta^2 = 0.121$. Participants primed with death completed more word fragments in a death related way, and participants primed with money completed fewer words in a death-related way than those in the respective control conditions. However, as predicted, these main effects were qualified by a significant mortality salience × money priming interaction, $F(1, 72) = 4.258$, $p = .043$, $\eta^2 = 0.056$ (Fig. 1).

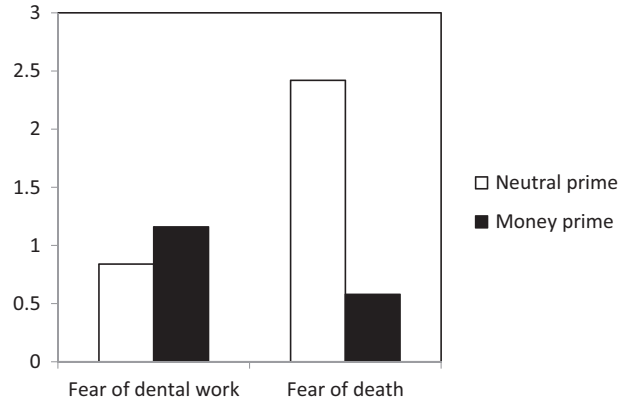

Fig. 1. The number of death-related words as a function of mortality salience and money priming (Experiment 2).

Planned comparisons revealed the predicted effects. In the neutral (non-money) condition, participants reminded of their mortality generated more death-related words than participants not reminded of their mortality ($M = 2.42$, $SD = 1.387$ versus $M = 1.16$, $SD = 1.015$), $F(1, 72) = 13.588$, $p < .001$, $\eta^2 = 0.159$. In support of our central hypothesis, we found that the effect of mortality salience on death though accessibility disappeared when participants were primed with money. Thus, in the money priming condition, no significant difference in the number of death-related words was observed between participants reminded of their mortality and those not reminded of their mortality ($M = 0.58$, $SD = 0.769$ versus $M = 0.84$, $SD = 0.958$), $F(1, 72) = 0.590$, $p = .445$, $\eta^2 = 0.008$. Furthermore, participants reminded of their mortality were significantly less likely to generate death-related words if they had been exposed to money cues than if they had not ($M = 0.84$, $SD = 0.958$ versus $M = 2.42$, $SD = 1.387$), $F(1, 72) = 21.232$, $p < .001$, $\eta^2 = 0.228$.

By showing that money cues prevent mortality reminders from leading to increased death thought accessibility, the results of Experiment 2 provided further evidence for our claim that money is capable of soothing death anxiety. The present study was also notable for being the first study to manipulate both mortality and money cues, thereby offering higher experimental control and increased confidence in the validity of our findings.

5. Experiment 3

The objective of Experiment 3, similar to Experiment 2, was to examine whether exposure to money would prevent death thoughts from becoming more accessible in the face of mortality reminders. Differently from Experiments 1 and 2, however, the present study was conducted on an American sample. We wanted to be able to generalize our findings to a culture beyond Poland, and an American sample was particularly desirable, because a large portion of TMT research has been conducted in the United States, including the studies that revealed materialism and consumption as potential death anxiety buffers.

In the previous experiments, we had used the picture of a banknote in the money priming condition and an abstract picture—a puzzle—as a control to the money priming condition. However, instead of functioning as a neutral control, an abstract picture could have had the unintended effect of decreasing participants' sense of meaning (Landau, Greenberg, Solomon, Pyszczynski, & Martens, 2006), thereby increasing the accessibility of death thoughts. Moreover, the 50 PLN Polish banknote contains the image of the Polish King Casimir III the Great (1310–1370) on the obverse, and an image of regalia on the reverse, which could prime nationalistic feelings or a particular worldview. Using U.S. banknotes in the current study would lead to similar concerns, as American banknotes contain images emblematic of American history and heritage. To rule out these potential confounds, we employed a money manipulation and a control condition that were not based on images. Specifically, we used a word descrambling task that had been successfully employed in previous money priming studies (Boucher & Kofos, 2012; Caruso, Vohs, Baxter, & Waytz, 2013; Kouchaki, Smith-Crowe, Brief, & Sousa, 2013; Schuler & Wänke, 2016; Vohs et al., 2006). As in Experiment 2, we predicted that participants reminded of their mortality and then exposed to money cues would produce significantly less death-related thoughts than those reminded of their mortality but not exposed to money—as few as people not reminded of their mortality.

Another crucial aim of Experiment 3 was to test the focal psychological mechanism—self-worth, as we propose—that explains the existential anxiety buffering function of money. As we noted earlier, TMT argues that a critical ingredient of any effective existential anxiety buffering system is a sense of personal worth and value. We hypothesize that money buffers the accessibility of death thoughts prompted by mortality reminders, because even mere reminders of money are capable of triggering an increased sense of self-worth, thereby shielding

from death anxiety. We suspected that this effect would not be explained to the same degree by other psychological outcomes associated with money, such as a sense of control or competence (self-efficacy). Although these constructs are strongly related to self-esteem, we believe that they do not play as crucial a role in buffering existential threats as does a global sense of self-worth. This assumption is based on terror management theory, according to which self-esteem (and not a sense of control or self-efficacy) is the key ingredient of the existential anxiety buffer (Greenberg et al., 1992; Harmon-Jones et al., 1997; Pyszczynski et al., 2004).

In sum, we again predicted that participants reminded of their mortality and then exposed to money cues would produce significantly less death-related thoughts than those reminded of their mortality but not exposed to money. Furthermore, we expected that this effect would be mediated by self-esteem, such that participants primed with money would report higher self-worth than controls, which would predict their lower death thought accessibility of in the face of mortality reminders.

5.1. Method

5.1.1. Participants and design

We calculated the minimum acceptable sample size for this experiment. As the mortality salience × money priming interaction effect observed in Experiment 2 was weaker than those reported by Hayes et al. (2010), our a priori power analyses used that smaller effect size. Results of analyses conducted with G*Power (Faul et al., 2007) suggested that, given an alpha of 0.05 and a conventionally assumed power of 0.80, a sample of 135 total participants would be required to detect the interaction effect size of 0.056. We aimed to start with about double the size of the minimum acceptable sample size we calculated.

Three hundred and thirteen U.S. participants were recruited from Amazon's Mechanical Turk using the TurkPrime platform to complete a study in exchange for $1.00. Participants were randomly assigned to one of the four experimental conditions in a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) between-participants factorial design. We discarded data from ten participants who did not provide valid links in the money manipulation task. The final sample consisted of 303 participants (164 women, M_{age} = 37.73 years, SD = 11.344; 14.19% unemployed, 14.85% part-time employed and 70.96% full-time employed). Collection of data was not continued after data analysis.

5.1.2. Procedure

Participants were randomly assigned to either the mortality salience (n = 152) or the control (n = 151) condition. After giving an informed consent and providing demographic information, participants were asked to perform an online search task that served as a mortality manipulation (Kesebir, 2014). They were informed that they would be given a phrase and then asked to come up with three Internet links to pictures that depict the contents of this phrase, using any web search engine (e.g., Google, Yahoo, Bing) of their choice and choosing any picture, as long as it accurately depicted what was asked from them. Following the instructions, half of the participants were asked to provide three separate web addresses, at which one could see pictures of a death-related concept ("graveyard"). The other half, assigned to the neutral prime condition, was asked to provide links to pictures of a neutral concept ("mug"). Following this manipulation, participants were asked to perform a word-descrambling task, which served the dual purposes of pushing recently evoked death thoughts out of consciousness, and acting as an experimental manipulation. This task consisted of forming a grammatically correct four-word phrase out of five scrambled words. The money condition (n = 149) contained 15 money-related phrases (e.g., "one hundred dollar bill") and 15 neutral phrases, while the control condition (n = 150) contained 30 neutral phrases (Appendix A in Vohs et al., 2006). The order of the phrases was randomized for each participant.

Following the word-descrambling task, participants completed the word-stem task aimed at measuring death-thought accessibility and the questionnaire aimed at measuring potential mediators of the examined effects. The order of the two tasks was randomized. The word-stem completion task was one used in previous research as a measure of DTA (e.g., Arndt, Greenberg, Pyszczynski, & Solomon, 1997). It consisted of 25 word-fragments, six of which could be completed with either a death-related word or a neutral word. For example, the fragment COFF_ _ could be completed as COFFIN or COFFEE. The possible death related words were *buried*, *dead*, *grave*, *killed*, *skull*, and *coffin*. The remaining fragments could only be completed as neutral words.

The questionnaire that came after the word-stem completion task consisted of 15 items measuring sense of control, self-esteem and self-efficacy, presented in randomized order. Responses for each item were provided on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*), and participants were asked to indicate to what extent they agreed with the statements at that moment. Sense of control was measured using the established four-item Personal Mastery measure from Lachman and Weaver (1998). A sample item from the scale is "Whatever happens in the future mostly depends on me". The four items were averaged into a sense of control index (Cronbach's α = 0.834). Self-esteem was measured using the Single Item Self-Esteem Scale: "I have high self-esteem" (Robins, Hendin, & Trzesniewski, 2001). Finally, self-efficacy was measured with the General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995) consisting of 10 items. A sample item is "I can always manage to solve difficult problems if I try hard enough." The 10 items were averaged into an index of self-efficacy (Cronbach's α = 0.933).

5.2. Results and discussion

No significant differences were observed between the MS and control conditions in negative affect, $F(1, 301) = 0.798$, $p = .372$, $\eta^2 = 0.003$. For positive affect, the difference between the two conditions was significant, $F(1, 301) = 5.712$, $p = .017$, $\eta^2 = 0.019$, with participants reminded of their mortality declaring lower levels of positive affect (M = 27.164, SD = 8.836) than controls (M = 29.470, SD = 7.929). Participants produced a similar number of words in the word-stem task, independently of the mortality salience manipulation, $F(1, 299) = 3.050$, $p = .082$, partial $\eta^2 = 0.010$, the money manipulation, $F(1, 299) = 0.001$, $p = .973$, partial $\eta^2 < 0.001$, and their interaction, $F(1, 299) = 0.035$, $p = .852$, partial $\eta^2 < 0.001$. Self-esteem was unsurprisingly significantly correlated with self-efficacy, $r(303) = 0.579$, and with sense of control, $r(303) = 0.441$. Self-efficacy was also correlated with sense of control, $r(303) = 0.771$, (all $ps < .001$).

We had predicted that money reminders combined with mortality salience would alter the accessibility of death-related thoughts amongst participants. This hypothesis was supported by the results of a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) ANOVA. As expected, a mortality salience × money priming interaction was a significant predictor of the number of death-related words (Fig. 2), $F(1, 299) = 5.637$, $p = .018$, partial $\eta^2 = 0.019$. Both main effects were also significant, $F(1, 299) = 8.923$, $p = .003$, partial $\eta^2 = 0.029$ for money priming and $F(1, 299) = 19.110$, $p < .001$, partial $\eta^2 = 0.060$ for mortality salience.

Planned comparisons again supported our predictions. In the no money condition, participants reminded of their mortality filled more words in a death-related manner than participants not reminded of their mortality (M = 2.44, SD = 1.510 versus M = 1.59, SD = 0.867), $F(1, 299) = 23.142$, $p < .001$, partial $\eta^2 = 0.072$. As predicted, this effect of mortality salience disappeared when participants were primed with money. In the money priming condition, the number of death-related words did not significantly differ between participants who were reminded of their mortality and participants who were not (M = 1.77, SD = 1.216 versus M = 1.51, SD = 0.843), $F(1, 299) = 1.962$, $p = .162$, partial $\eta^2 = 0.007$. Furthermore, participants

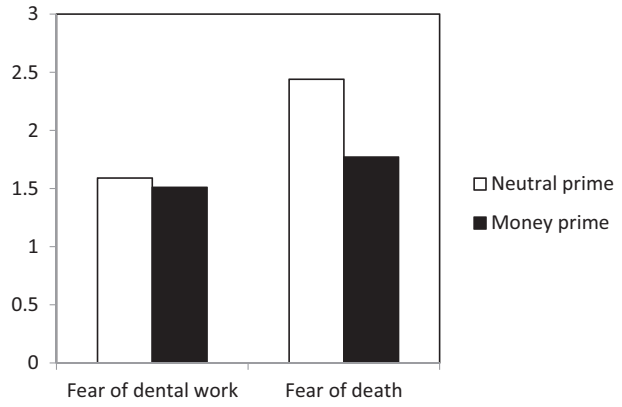

Fig. 2. The number of death-related words as a function of mortality salience and money priming (Experiment 3).

reminded of their mortality produced lower number of death-related words in a word-stem task if they had been exposed to money than if they had not (M = 1.77, SD = 1.216 versus M = 2.44, SD = 1.510), F (1, 299) = 14.440, p < .001, partial η^2 = 0.046.

In the next step, we conducted one-factor (money prime vs. neutral prime) ANOVA analyses for each of our three mechanism variables (self-esteem, self-efficacy, and sense of control). A significant effect of money priming emerged for all three scales: respectively, self-esteem: F (1, 301) = 5.455, p = .020, partial η^2 = 0.018, self-efficacy: F(1, 301) = 5.963, p = .015, partial η^2 = 0.019, and sense of control: F(1, 301) = 4.803, p = .029, partial η^2 = 0.016. After being reminded of money, participants declared higher self-esteem (M = 4.94, SD = 1.521), self-efficacy (M = 5.42, SD = 0.913) and sense of control (M = 5.47, SD = 0.867) than after a neutral condition (respectively, M = 4.54, SD = 1.465 for self-esteem, M = 5.17, SD = 0.827 for self-efficacy and M = 5.24, SD = 0.903 for sense of control).[3] Sense of control was not correlated with the number of death-related words produced by participants, r(303) = −0.088, p = .125. However, the correlations between the DTA measure and both self-esteem and self-efficacy were significant, suggesting potential mediation in case of these two psychological mechanisms, respectively, r(303) = −0.255, p < .001, and r(303) = −0.142, p = .013.

Taking into account that the three potential mediators were significantly correlated, and that the effects of money reminders on self-efficacy and sense of control might be by-products of its global effect on self-esteem, we conducted a serial moderated mediation analysis to investigate the unique indirect effect of each variable while controlling for the common variance of the three constructs and the relationships between them. We used Model 6 in Process 3.0 with 10,000 samples bootstrapping (Hayes, 2017) to test the model that the money prime interacts with mortality salience in predicting death-thought accessibility, while it also boosts self-esteem, and then self-efficacy and sense of control, which could in turn alleviate death thoughts (Fig. 3). We expected that the only significant indirect path would be the path through self-esteem. All variables were z-scored before the analysis in order to allow for standardized coefficients.

After controlling for the three potential mediators, the effect of the mortality salience by money priming interaction on DTA weakened but remained significant, suggesting partial mediation (total effect: β = −0.131, se = 0.055, t = −2.374, p = .018; direct effect: β = −0.121, se = 0.054, t = −2.235, p = .026). The only indirect effect that was significant was through self-esteem, indirect effect = −0.031, boot se = 0.019, 95% CI [−0.080, −0.005]. The indirect effects through self-efficacy and sense of control were not significant, respectively, indirect effect = −0.002, boot se = 0.008, 95% CI [−0.029, 0.007] for self-efficacy and indirect effect = 0.001, boot se = 0.005, 95% CI [−0.003, 0.019] for sense of control. None of the serial mediations was significant, respectively, indirect effect = −0.003, boot se = 0.008, 95% CI [−0.022, 0.011] for the mediation through self-esteem and self-efficacy; indirect effect = −0.0001, boot se = 0.001, 95% CI [−0.003, 0.001] for the mediation through self-esteem and sense of control; indirect effect = −0.003, boot se = 0.007, 95% CI [−0.004, 0.027] for the mediation through self-efficacy and self-control; and indirect effect = 0.004, boot se = 0.006, 95% CI [−0.005, 0.022] for the mediation through self-esteem, self-efficacy, and self-control.

To sum up, in Experiment 3 we replicated the existential anxiety buffering effect of money using a different method to prime money thoughts, a different method to prime mortality salience, and a different method to capture death thought accessibility. This conceptual replication reinforces our belief in the validity and robustness of the effect we are reporting. In the current study, we also explored some potential mediators of the relationship between money and reduced DTA and demonstrated that amongst them, self-esteem appears the most promising.

6. Experiment 4

To provide further support for the hypothesis that thinking about money shields against death thought accessibility, we conducted Experiment 4, in which we aimed to replicate the findings of Experiments 2 and 3 (in a U.S. sample) and to address some concerns about the possible role of emotional states in our results. Specifically, we wanted to rule out the alternative explanation that reminders of money might change people's emotional state, which could in turn drive the effect of money on death thought accessibility. Although in Experiments 2 and 3 we tested the impact of the MS manipulation on positive and negative affect, we could not test whether money priming had an effect on emotional states, as they were measured before the money priming manipulation. Moreover, broad positive and negative affect measures may not be granular enough to detect any effects MS could have on more specific emotions. Furthermore, the fact that they are administered right after the MS manipulation, and not after a delay, might explain the lack of MS effects on affective states (Jonas et al., 2014). To address these issues, in Experiment 4 we used an extended version of PANAS (Watson & Clark, 1994) after the second manipulation (i.e., money priming) and tested whether the scores on general dimension scales (positive and negative affect) as well as basic emotion scales mediated the relation between the mortality salience by money priming interaction and the accessibility of death-related thoughts.

6.1. Method

6.1.1. Participants and design

We aimed at collecting data from at least 300 people. Three hundred and thirty U.S. participants were recruited on Amazon's MTurk who completed the survey, and received $1.00 in return. As in Experiment 2, participants were randomly assigned to one of the four experimental conditions in a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) between-subject design. We discarded data from nine participants who did not provide valid links in the mortality salience manipulation task. The final sample consisted of 321 participants (148 women, M_{age} = 36.07 years, SD = 11.407; 14.95% unemployed, 16.20% part-time employed, and 68.85% full-time employed). Collection of data was not continued after data analysis.

[3] We also conducted 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) ANOVA analyses for each of our three mechanism variables (self-esteem, self-efficacy, and sense of control). In each case, the effect of mortality salience and the MS x money interaction was not significant, while the effect of money priming remained significant (see Supplementary materials).

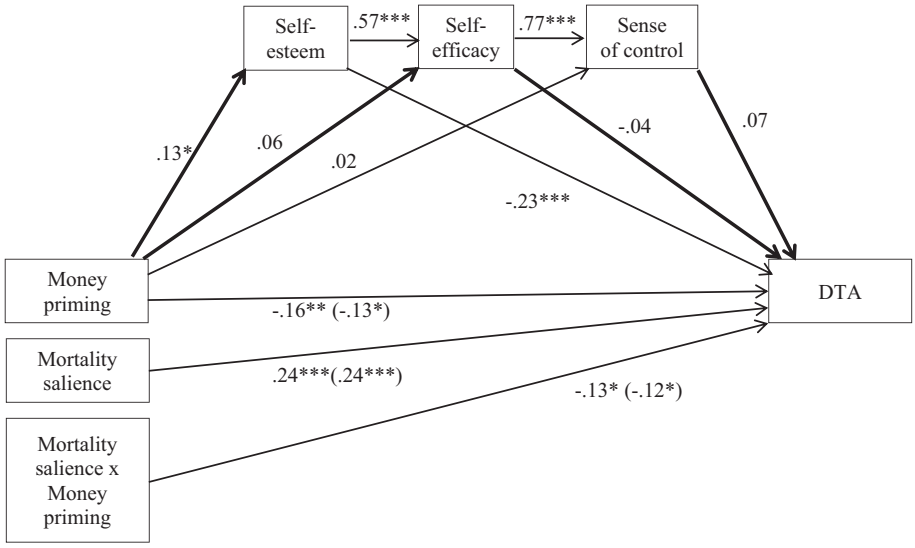

Fig. 3. Serial moderated mediation effect of mortality salience and money priming through self-esteem, self-efficacy and sense of control on DTA. Standardized regression coefficients, *$p < .05$, **$p < .01$, ***$p < .001$. Values in parentheses represent regression coefficient while controlling for three potential mediators.

6.1.2. Procedure

The procedure in Experiment 4 was similar to the one in Experiment 3, with the exceptions that we included PANAS-X after the second manipulation (i.e., money priming) instead of a brief form of PANAS after the mortality salience induction but before the money priming, in order to test for affect dimensions as potential mediators of the buffering effect of money. Participants were asked to perform a search task in which some of them were asked to provide three separate web addresses, at which one could see pictures of a death-related concept ("graveyard", $n = 157$), while the rest, assigned to the neutral prime condition, was asked to provide links to pictures of a neutral concept ("mug", $n = 164$). Next, they were asked to perform the same word-descrambling task as in Experiment 3, which again served the dual purposes of pushing recently evoked death thoughts out of consciousness, and acting as an experimental manipulation either to prime participants with money ($n = 156$) or with neutral concepts ($n = 165$).

Following the word-descrambling task, participants completed the PANAS-X scale (Watson & Clark, 1994). The expanded form of the Positive and Negative Affect Schedule PANAS-X consists of 60 items describing different feelings and emotions. Participants were asked to indicate to what extent they "felt like this right now" on a scale from 1 = *very slightly or not at all* to 5 = *extremely*. In addition to the two higher order scales, positive affect (Cronbach $\alpha = 0.915$) and negative affect ($\alpha = 0.935$), the PANAS-X allows to measure eleven specific affects: fear ($\alpha = 0.902$), sadness ($\alpha = 0.882$), guilt ($\alpha = 0.938$), hostility ($\alpha = 0.908$), shyness ($\alpha = 0.864$), fatigue ($\alpha = 0.898$), surprise ($\alpha = 0.829$), joviality ($\alpha = 0.941$), self-assurance ($\alpha = 0.873$), attentiveness ($\alpha = 0.829$), and serenity ($\alpha = 0.855$).

Finally, participants completed the word-stem task aimed at measuring the death-thought accessibility. The word-stem completion task was the same as the one we used in Experiment 3. It consisted of 25 word-fragments, six of which could be completed with a death-related word or with a neutral word. The number of words completed in a death-related manner served as the death thought accessibility measure.

6.2. Results and discussion

As the measurement of the affective states was conducted after the two manipulations, we conducted a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) ANOVA to verify their effects on participants' affective states. We did not detect any significant main effects, for both positive affect, mortality salience: $F(1, 317) = 0.015$, $p = .994$, partial $\eta^2 < 0.001$, money priming: $F(1, 317) = 0.332$, $p = .565$, partial $\eta^2 = 0.001$, and negative affect, mortality salience: $F(1, 317) = 0.086$, $p = .770$, partial $\eta^2 < 0.001$, money priming: $F(1, 317) < 0.001$, $p = .994$, partial $\eta^2 < 0.001$. The interactions between mortality salience and money priming were also not significant, for positive affect: $F(1, 317) = 0.272$, $p = .603$, partial $\eta^2 = 0.001$; for negative affect: $F(1, 317) = 1.181$, $p = .278$, partial $\eta^2 = 0.004$. As in Experiment 2, participants produced a similar total number of words in the word-stem task, independently of the mortality salience manipulation, $F(1, 317) = 1.114$, $p = .292$, partial $\eta^2 = 0.004$, the money priming manipulation, $F(1, 317) = 0.767$, $p = .382$, partial $\eta^2 = 0.002$, and their interaction, $F(1, 317) = 1.363$, $p = .244$, partial $\eta^2 = 0.004$.

Again, our central prediction was that money reminders combined with mortality salience would alter the accessibility of death-related thoughts amongst participants. This hypothesis was supported by the results of a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) ANOVA. As expected, the mortality salience × money priming interaction was a significant predictor of the number of death-related words (Fig. 4), $F(1, 317) = 6.814$, $p = .009$, partial $\eta^2 = 0.021$. Both main effects were significant, $F(1, 317) = 10.224$, $p = .002$, partial $\eta^2 = 0.031$ for money priming and $F(1, 317) = 4.998$, $p = .041$, $\eta^2 = 0.013$ for mortality salience.

Planned contrasts supported our predictions. In the no money

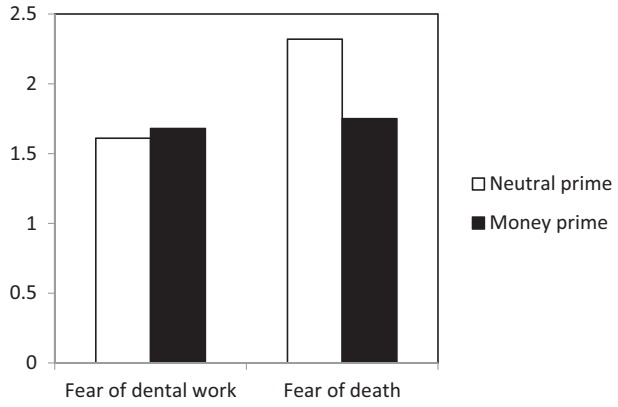

Fig. 4. The number of death-related words as a function of mortality salience and money priming (Experiment 4).

condition, participants reminded of their mortality filled out more words in a death-related manner than participants not reminded of their mortality ($M = 2.32$, $SD = 1.391$ versus $M = 1.75$, $SD = 0.935$), $F(1, 317) = 13.280$, $p = .001$, partial $\eta^2 = 0.034$. As predicted, this effect of mortality salience disappeared when participants were primed with money. In the money priming condition, the number of death-related words did not significantly differ between participants who were reminded of their mortality and participants who were not ($M = 1.61$, $SD = 1.029$ versus $M = 1.68$, $SD = 0.907$), $F(1, 317) = 0.149$, $p = .700$, partial $\eta^2 < 0.001$. Moreover, participants reminded of their mortality produced fewer death-related words in a word-stem task when they had been exposed to money than if they had not ($M = 1.61$, $SD = 1.029$ versus $M = 2.32$, $SD = 1.391$), $F(1, 317) = 16.456$, $p < .001$, partial $\eta^2 = 0.049$.

In the next step, we conducted a multivariate analysis of variance (MANOVA) to test whether money priming and mortality salience affected any of the specific effects on PANAS-X, namely fear, sadness, guilt, hostility, shyness, fatigue, surprise, joviality, self-assurance, attentiveness, and serenity. These dimensions were not affected significantly by money priming, $F(11, 307) = 1.566$, $p = .108$, partial $\eta^2 = 0.053$, Wilks' $\lambda = 0.975$, by mortality salience, $F(11, 307) = 0.725$, $p = .715$, partial $\eta^2 = 0.025$, Wilks' $\lambda = 0.947$, or by their interaction, $F(11, 307) = 0.854$, $p = .587$, partial $\eta^2 = 0.030$, Wilks' $\lambda = 0.970$. None of the specific affect dimensions were correlated with the DTA score, $-0.063 < r(321) < 0.081$, $ps > .148$ (detailed results of these analyses are provided in Supplementary materials). These results show that the relationship between the two experimental manipulations and DTA is not mediated by specific affects such as fear, attentiveness, or serenity.

To sum up, Experiment 4 replicated the results of the previous studies and systematically addressed the question of whether the DTA-buffering effect of money can be explained by any specific emotional state. Our results did not yield any support for this hypothesis.

7. Experiment 5

The objective of Experiment 5 was to test our main hypothesis using different manipulations of mortality salience and money priming, and a different measure of death thought accessibility, thereby investigating the robustness of our findings. A final way in which the present study differed from the previous ones was that we tested potential moderators of the anxiety buffering function of money. We hypothesized that if money buffers death-related cognition due to its ability to trigger self-esteem, this effect should be especially pronounced amongst people who base their self-esteem on financial success (Park, Ward, & Naragon-Gainey, 2017). As we have seen, a critical ingredient of an effective existential anxiety buffer is a sense of personal worth and value, and high self-esteem people are less affected by death reminders than those low in self-esteem (Greenberg et al., 1997). However, over a dozen studies have demonstrated that mortality salience induction only increases strivings for certain objects or behaviors when people perceive these objects or behaviors to be relevant to their self-esteem. For example, mortality salience increased intention to take driving risks and increase driving speed in a driving simulator (Jessop, Alebry, Rutter, & Garrod, 2008; Taubman Ben-Ari et al., 1999), increased fitness intentions (Arndt, Schimel, & Goldenberg, 2003), reduced the intention to buy high factor sunscreen products (Routledge, Arndt, & Goldenberg, 2004), increased strength display (Peters, Greenberg, Williams, & Schneider, 2005) and finally, increased importance ratings of extrinsic motives (Kosloff & Greenberg, 2009), but only for participants who saw driving, fitness, suntanning, strength training and extrinsic goals as being important to their self-esteem.

In a similar vein, we hypothesize that money reminders would not shield everyone equally from existential terror—it would shield only those who perceive money as relevant to their self-esteem. In other words, we expect that the more a person's self-worth is contingent on money, the more protection they should get from being primed with money, irrespective of their own financial situation. We predicted that participants reminded of their mortality and then exposed to money cues would produce significantly less death-related thoughts than those reminded of their mortality but not exposed to money. However, this effect should be moderated by the financial contingency of self-worth. Specifically, participants with a tendency to link their self-worth to their finances should get protection from money cues when reminded of their mortality, but this effect should be absent for participants with a low tendency to link their self-worth to finances. We did not expect the effect of money priming on DTA to be moderated by participants' socio-economic status, because our hypothesized moderator—the tendency to link one's self-worth to one's finances—is not limited to a single socioeconomic class.

7.1. Method

7.1.1. Participants and design

The present study was designed as a two-part study, in which participants would be contacted twice over a period of time. Factoring in potential attrition from the first to the second part of the study and our plans to conduct moderator analyses, we aimed to start with about triple the size of the minimum acceptable sample size calculated in an a priori power analysis in Experiment 3.

In the first part of Experiment 5, which was part of a larger study, 415 American participants were recruited from Amazon's Mechanical Turk using the TurkPrime platform, and completed a brief online survey in exchange for $0.40. Ten participants who failed to pass an attention check embedded in the survey were removed from the study. The remaining 405 participants were e-mailed ten days after the first survey and invited to participate in an ostensibly unrelated study in exchange for $0.40. Out of them, 266 took up the invitation and completed the survey in the next 48 h. This second part of the study had randomly assigned participants to one of four experimental conditions in a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) between-participants factorial design. Data from 4 participants was discarded: three did not provide valid links in the money manipulation task and one did not provide valid words for the death accessibility task. The final sample consisted of 262 participants (131 women, M age = 36.68 years, $SD = 11.480$; 16.8% unemployed, 17.6% part-time employed and 65.6% full-time employed). Collection of data was not continued after data analysis.

7.1.2. Procedure

In the first part of the study, participants filled out the Financial Contingency of Self-Worth Scale (Park et al., 2017) as part of a bigger correlational study on financial traits and personality. The financial CSW scale is a 5-item scale that measures the degree to which people tie their self-esteem to their finances. On a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*) participants thus indicated their agreement with statements such as “My self-esteem depends on having a lot of money” and “I feel bad about myself when I feel like I don't make enough money” (Cronbach's $\alpha = 0.643$). We also collected data on participants' subjective socio-economic status using three items (Griskevicius, Tybur, Delton, & Robertson, 2011): “I have enough money to buy things I want,” “I don't need to worry too much about paying my bills,” and “I feel relatively wealthy these days” (Cronbach's $\alpha = 0.724$).

The second, experimental part of the study took place ten days after this. The procedure used to prime mortality thoughts was different from the one used in Experiments 2–4, but it is commonly employed in TMT studies (e.g., Kesebir, 2014; Zaleskiewicz, Gasiorowska, & Kesebir, 2013, 2015). Participants were randomly assigned to either the mortality salience ($n = 134$) or the control ($n = 128$) condition. In the mortality salience condition, they were asked to write three sentences about what they feel when they think about the fact that they will die

one day. In the control condition, on the other hand, they were asked to write three sentences about what they feel when they think about experiencing intense pain during a visit to the dentist. Following the manipulation, all participants completed the brief version of the Positive and Negative Affect Schedule (PANAS; Cronbach's α's = 0.891 for positive affect and 0.934 for negative affect).

Next, participants were asked to perform a search task, which served the dual purposes of pushing recently evoked death thoughts out of consciousness, and acting as a mortality salience manipulation. All participants were informed that they would be given a phrase and then asked to come up with three Internet links to pictures that depict the contents of this phrase. They were instructed that they could use any web search engine (e.g., Google, Yahoo, Bing) of their choice and choose any picture, as long as it accurately depicted what was asked from them. Subsequent to the instructions, half of the participants were asked to provide three separate web addresses, at which one could see pictures of "a pile of money" (n = 126). The other half, assigned to the neutral prime condition, was asked to provide links to pictures of "a pile of papers" (n = 136).

In the final part of the study, participants were shown the picture of a drawing that could be interpreted as depicting either a woman sitting in front of a mirror admiring herself, or a skull. This drawing by American illustrator Charles Allan Gilbert (1873–1929), titled "All Is Vanity," has been used in previous TMT research to assess death thought accessibility (Gailliot, Schmeichel, & Baumeister, 2006). Participants were instructed to write down the first 10 words that came to their mind as they viewed the image. Two judges blind to the experimental condition determined which words that the participants listed were related to death (e.g., *dead*, *skull* or *skeleton*; ICC = 1; the complete list of words classified as death-related is provided in Supplementary materials), and then one of the judges coded the data (i.e., counted the number of death-related words) using the above-mentioned list of words. The number of words related to death constituted the measure of explicit death thought accessibility.

7.2. Results and discussion

No differences were observed between the MS and control conditions in either positive affect, $F(1, 260) = 0.135$, $p = .714$, $\eta^2 = 0.001$ or negative affect, $F(1, 260) = 0.025$, $p = .874$, $\eta^2 < 0.001$. All participants provided exactly 10 words/phrases in the DTA task, so there were no differences between conditions concerning the overall numbers of words. Financial contingency of self-worth (CWS) and assessment of current socio-economic status were negatively correlated, $r(262) = -0.141$, $p = .022$.

Our central prediction that money reminders combined with mortality salience would alter the accessibility of death-related thoughts was supported by the results of a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) ANOVA. As expected, the mortality salience × money priming interaction was a significant predictor of the number of death-related words (Fig. 5), $F(1, 258) = 4.660$, $p = .032$, $\eta^2 = 0.018$. The main effect of the money priming condition was marginally significant, $F(1, 258) = 3.017$, $p = .084$, $\eta^2 = 0.012$, whereas the main effect of the mortality salience condition was not significant, $F(1, 258) = 2.221$, $p = .137$, $\eta^2 = 0.009$.

Planned comparisons again supported our predictions. In the no money condition, participants reminded of their mortality wrote down more death-related words in response to the drawing than participants not reminded of their mortality ($M = 2.13$, $SD = 1.305$ versus $M = 1.60$, $SD = 0.889$), $F(1, 258) = 7.893$, $p = .005$, $\eta^2 = 0.030$. As predicted, this effect of mortality salience disappeared when participants were primed with money. In the money priming condition, the number of death-related words did not significantly differ between participants who were reminded of their mortality and participants who were not ($M = 1.63$, $SD = 0.911$ versus $M = 1.69$, $SD = 1.259$), $F(1, 258) = 0.086$, $p = .770$, $\eta^2 < 0.001$. Furthermore, participants reminded of their mortality were less likely to list death-related words if they had been exposed to money than if they had not ($M = 1.631$, $SD = 0.911$ versus $M = 2.130$, $SD = 1.305$), $F(1, 258) = 6.819$, $p = .010$, $\eta^2 = 0.026$.

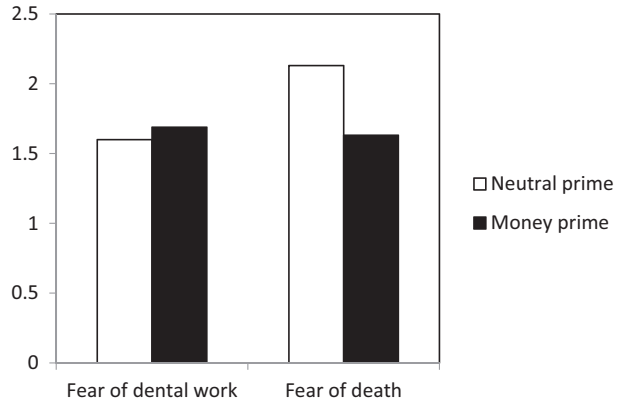

Fig. 5. The number of death-related words as a function of mortality salience and money priming (Experiment 5).

Finally, we conducted two regression analyses to test whether the mortality salience × money prime interaction effect was moderated by either financial contingency of self-worth (CWS) or socio-economic status. All variables were z-scored prior to the analyses, to allow for standardized regression coefficients in the output. The regression model with mortality salience manipulation, money priming manipulation, socio-economic status and all their interactions was not significant, $F(7, 254) = 1.578$, $p = .142$, $R^2 = 0.042$. However, the two-way interaction between money priming and mortality salience was significant, $\beta = -0.127$, $se = 0.062$, $t = -2.083$, $p = .038$, 95%CI [−0.215, −0.007], and the three-way interaction between both manipulations and SES was not significant, $\beta = 0.007$, $se = 0.062$, $t = 0.119$, $p = .906$, 95%CI [−0.114, 0.129]. The lack of the three-way interaction suggests that the significance of the two-way interaction effect (mortality salience × money) on death thought accessibility was not a function of participants' subjective feelings of having enough money.

The regression model with mortality salience manipulation, money priming manipulation, financial contingency of self-worth and all their interactions, on the other hand, was significant, $F(7, 254) = 2.493$, $p = .017$, $R^2 = 0.064$. The two-way interaction between money priming and mortality salience was significant, $\beta = -0.122$, $se = 0.061$, $t = -2.005$, $p = .046$, 95%CI [−0.243, −0.002], and the three-way interaction between both manipulations and financial CSW was marginally significant, $\beta = -0.121$, $se = 0.062$, $t = -1.962$, $p = .051$, 95%CI [−0.243, 0.0004]. This three-way interaction indicates that the significance of the two-way interaction effect (mortality salience × money) on death thought accessibility was a function of whether participants based their self-esteem on financial success.

To decompose this moderation effect, we examined how money priming buffered the effect of mortality salience on death thought accessibility at three levels of the moderator (financial CSW): mean, 1 *SD* below the mean and 1 *SD* above the mean (respectively, at the raw scores of 3.132, 4.281, and 5.429 on the 7-point scale). The interaction between money priming and mortality salience was not significant at the lowest level of financial CSW ($\beta = -0.001$, $se = 0.087$, $t = -0.011$, $p = .991$), whereas at the intermediate and high levels it was ($\beta = -0.122$, $se = 0.061$, $t = -2.005$, $p = .046$ and $\beta = -0.244$, $se = 0.087$, $t = -2.805$, $p = .005$, respectively; see Fig. 6).

Investigation of the interaction using the Johnson-Neyman regions of significance (Hayes, 2013) revealed that the buffering effect of money priming on the relation between mortality salience and death thought accessibility was significant when the participant's financial CSW score was at least 4.260 out of 7 (0.018 *SD* below the mean score

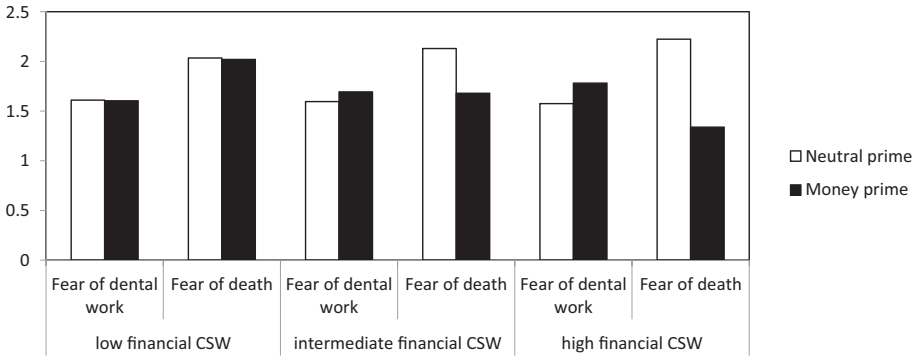

Fig. 6. The number of death-related words as a function of mortality salience, money priming and financial contingency of self-worth (Experiment 5).

on the scale). The higher a participant's score was above this threshold, the stronger was the buffering effect of money reminders on death-related cognition induced by mortality salience.

In sum, the present study demonstrated that when mortality thoughts were made salient, money cues reduced the accessibility of death-related thoughts, but only for people who had an average or above-average tendency to base their self-esteem on their finances, irrespective of their subjective socio-economic status. This result is consistent with TMT research showing that in order for an entity to buffer existential anxiety, it has to have important self-esteem implications for the person. It is also important to recognize that the relatively small effect sizes observed in the previous experiments reflect a mixed group of people, with some caring less about money than others.

8. Experiment 6

In Experiment 6, we intended to replicate and extend the results of the previous experiments in both Polish and U.S. samples. In light of the previous experiments, we expected that money priming would hamper death thought accessibility triggered by mortality salience. However, there was an additional question we wanted to answer: In the previous experiments, we have shown that money acts as a "suppressant," restraining the availability of death thoughts aroused by a previous mortality salience manipulation. As money cues followed mortality thoughts within a reasonable time window, the psychological ingredients inherent to money responsible for the soothing effects on the participants were activated and effectively neutralized death related-thoughts. These results are also consistent with research demonstrating that the self-esteem boost provided after the mortality salience induction reduces MS-produced worldview defense (e.g. Schmeichel et al., 2009; Taubman Ben-Ari et al., 1999).

While we demonstrated the "suppressant" effect of money on DTA, we were wondering if money could also serve as a "vaccination," inoculating participants against the anxiety to be aroused by future mortality thoughts. It stands to reason that a self-esteem boost through money cues would fortify one's defenses against an existential threat. Indeed, studies show that enhancing self-esteem prior to a mortality salience induction can reduce worldview defense (Harmon-Jones et al., 1997). Zhou et al. (2009) have also found that people primed with money suffered less than controls in response to interpersonal rejection and even physical pain. In these studies, money priming had occurred at the beginning of the experiment, which suggests that once thoughts about money are activated, they can act as a resource to draw from to cope with forthcoming problems such as social rejection and painful experience. Their function can almost be likened to a vaccination that inoculates people against potential future pain.

In line with this, we hypothesized that reminders of money would act as a vaccination and soften the blow from not only social and physical but also existential pain. To test this out, Experiment 6 alternated the order of manipulations: Some participants were primed with money before the mortality salience manipulation, and others—as in the previous studies—after it. We expected that money priming would not only suppress the accessibility of death thoughts triggered by a past mortality salience manipulation, but also inoculate participants against the effects of a future mortality salience. In particular, we hypothesized that: (1) participants reminded of death and then exposed to money cues would produce significantly fewer death-related thoughts than those reminded of death and not exposed to money; (2) participants exposed to money cues and then reminded of death would also produce significantly fewer death-related thoughts than those not exposed to money and then reminded of death; (3) these effects would hold in both the Polish and U.S. samples.

8.1. Method

8.1.1. Participants and design

In this study, we aimed to at least double the size of the minimum acceptable sample size calculated in Experiment 3 in both the U.S. and Polish samples. In the U.S., 299 American participants were recruited from Amazon's Mechanical Turk using the TurkPrime platform, to complete a study in exchange for $0.40. We discarded data from five participants who did not provide valid links in the money manipulation task. The final U.S. sample consisted of 294 participants (161 women, M_{age} = 36.02 years, SD = 11.262; 17.69% unemployed, 17.69% part-time employed and 64.62% full-time employed). In Poland, 402 participants were recruited from an online panel to complete a study in exchange of points, which they could later redeem for rewards (e.g., cosmetics, electronics). We discarded data from 34 participants who did not provide valid links in the money priming task and data from one participant who filled the dependent measure using the same word ten times. The final Polish sample consisted of 367 participants (199 women, M_{age} = 44.35 years, SD = 14.10; 26.43% unemployed, 10.08% part-time employed and 63.49% full-time employed). Participants were randomly assigned to one of the eight experimental conditions in a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) × 2 (money prime first vs. mortality salience first) between-participants factorial design. Collection of data was not continued after data analysis.

8.1.2. Procedure

The procedure was identical to the one used in the experimental (second) part of Experiment 5, with one exception: some participants underwent the money priming task before the mortality salience manipulation and PANAS (n = 333), while others did it after the mortality salience manipulation and PANAS, as in Experiment 5 (n = 328). Similar to Experiment 5, the mortality salience manipulation involved asking participants to write three sentences about what they feel when they think about the fact that they will die one day (n = 327). The control group was again asked to write about experiencing intense pain during a visit to the dentist (n = 334). Immediately after this

manipulation, all participants completed the brief version of the Positive and Negative Affect Schedule (PANAS; Cronbach's α's = 0.848 for positive affect and 0.907 for negative affect). As in Experiment 5, to prime participants with money, we asked them to provide three separate web addresses with images depicting "a pile of money" (n = 332). The other half was asked to provide links to images depicting "a pile of papers" (n = 329). Death-thought accessibility was again operationalized as the number of death-related words listed in response to the "All Is Vanity" picture from Experiment 5. In the U.S. sample, one judge blind to the experimental condition coded which words were related to death using the list developed previously. In the Polish sample, two judges blind to the experimental condition determined which words that the participants listed were related to death (e.g., *śmierć* [dead], *skull* [czaszka] or kościotrup [*skeleton*], ICC = 1; the complete list of words classified as death-related is provided in Supplementary materials), and then one of these judges coded the data (counted the number of death-related words) using the above-mentioned list of words.

8.2. Results and discussion

No significant differences were observed between the MS and control conditions in negative affect, $F(1, 659) = 0.004$, $p = .952$, $\eta^2 < 0.001$. For positive affect, the difference between these two conditions was significant, $F(1, 659) = 4.049$, $p = .045$, $\eta^2 = 0.006$, with participants reminded of their mortality declaring higher levels of positive affect ($M = 29.960$, $SD = 7.732$) than controls ($M = 28.766$, $SD = 7.520$).

Our prediction was that money reminders combined with mortality salience would hinder the accessibility of death-related thoughts amongst participants, irrespective of whether thoughts about money or mortality were activated first, and irrespective of participants' country of origin. This hypothesis was supported by the results of a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) × 2 (money prime first vs. mortality salience first) × 2 (U.S. vs Poland) ANOVA. As predicted, the three-way interaction between mortality salience, money priming and order of manipulations was not significant, $F(1, 645) = 0.447$, $p = .504$, $\eta^2 = 0.001$. The three-way interaction between mortality salience, money priming and country was also not significant, $F(1, 645) = 0.018$, $p = .894$, $\eta^2 < 0.001$. As in the previous studies, however, the mortality salience by money priming interaction was a significant predictor of the number of death-related words, $F(1, 645) = 13.119$, $p < .001$, $\eta^2 = 0.020$ (see Fig. 7). The main effect of the money priming condition was significant, $F(1, 645) = 11.334$, $p = .001$, $\eta^2 = 0.017$; the main effect of the mortality salience condition was also significant, $F(1, 645) = 7.443$, $p = .007$, $\eta^2 = 0.011$; but the main effect of manipulation order was not significant, $F(1, 645) = 0.007$, $p = .931$, $\eta^2 < 0.001$. None of the two-way interactions between manipulations and manipulation order was significant either, $F(1, 645) = 0.504$, $p = .478$, $\eta^2 = 0.001$ for mortality salience by order interaction, and $F(1, 645) = 0.795$, $p = .373$, $\eta^2 = 0.001$ for money priming by order interaction (see Supplementary materials for other results).

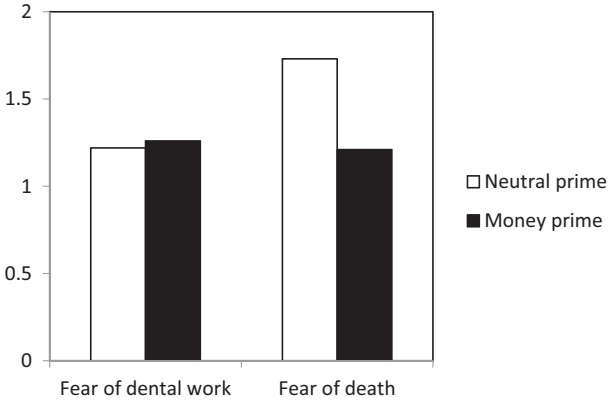

Fig. 7. The number of death-related words as a function of mortality salience and money priming (Experiment 6).

Planned comparisons again revealed the predicted effects. In the no-money condition, participants reminded of their mortality generated more death-related words than participants not reminded of their mortality ($M = 1.73$, $SD = 1.211$ versus $M = 1.22$, $SD = 0.978$), $F(1, 657) = 20.420$, $p < .001$, $\eta^2 = 0.030$. In line with our predictions and findings from previous experiments, the effect of mortality salience disappeared when participants were exposed to money cues. In the money priming condition, no significant difference in the number of death-related words was found between participants reminded of their mortality and participants who were not ($M = 1.21$, $SD = 0.934$ versus $M = 1.26$, $SD = 0.926$), $F(1, 657) = 0.250$, $p = .617$, $\eta^2 < 0.001$. Furthermore, participants reminded of their mortality were less likely to generate death-related words if they had been exposed to money than if they had not ($M = 1.21$, $SD = 0.934$ versus $M = 1.73$, $SD = 1.211$), $F(1, 657) = 21.539$, $p < .001$, $\eta^2 = 0.032$.

These findings add to the accumulating evidence for our hypothesis that money thoughts stand in the way of mortality thoughts and prevent them from entering deeper into consciousness. From Experiment 6, we have further learnt that money cues reduce the accessibility of death-related thoughts in the face of mortality salience, regardless of whether they are presented before or after the mortality salience. These results show that when money inhibits death thoughts accessibility in the face of mortality reminders, it does it in both a vaccine-like way, inoculating against the anxiety-inducing potential of mortality thoughts, and a suppressant-like way, restraining any anxiety that may have arisen once these thoughts have been activated. This finding attests to the robustness and effectiveness of money as a defense against death anxiety.

9. Meta-analysis

In order to strengthen our claim that money primes nullify the effect of mortality salience on death-related cognition, we performed a meta-analysis on Experiments 1–6. To account for the variance caused by different study designs and participant populations, we performed random-effects meta-analyses using the Multicondition Meta-Analysis software (MCDM) dedicated to single-paper meta-analyses (McShane & Böckenholt, 2017). The advantage of using Multicondition Meta-Analysis instead of the classic approach and the Comprehensive Meta-Analysis software (Borenstein, Hedges, Higgins, & Rothstein, 2009) is that the MCDM methodology allows to meta-analyze interactions in addition to simple or main effects for each study. Given our main hypothesis that exposure to money prevents mortality salience from leading to increased death thought accessibility, we were primarily interested in the money prime × mortality salience interaction effects in our meta-analysis. We also wanted to investigate the main effects of both manipulations, as well as the simple effect of mortality salience when participants were primed with money and when they were not.

For Experiment 1, we defined and coded two subgroups, depending on whether participants were primed with money or not, assuming that mortality was not salient. For Experiments 2–5, we defined and coded four subgroups in a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) design. As Experiment 6 included alternate order of the manipulations and participants from two different countries, we decided to code it as four different studies in a 2 (mortality salience vs. control) × 2 (money prime vs. neutral prime) design, controlling for the order of manipulations and country as study-level moderators.

The results of the analysis revealed a reliable general main effect of mortality salience, effect = 0.560, se = 0.099, $Z = 5.640$, $p < .001$, a general main effect of money priming, effect = -0.678, se = 0.097, $Z = -6.951$, $p < .001$, and a mortality

salience × money prime interaction effect on the accessibility of death thoughts, effect = 0.560, se = 0.097, $Z = 5.745$, $p < .001$. Further analyses confirmed the effect of mortality salience in the absence of money cues, effect = 0.560, se = 0.069, $Z = 8.069$, $p < .001$, but a lack of such effect in the presence of money reminders, effect = 0.0003, se = 0.070, $Z = 0.004$, $p = .997$. In sum, the meta-analysis strongly supported our hypothesis that money cues inhibit death-related cognition.

Furthermore, we analyzed I^2, a statistical measure that describes the percentage of variation in the observations (beyond that attributable to the experimental manipulations) that is due to heterogeneity (McShane & Böckenholt, 2017). In our case, I^2 is estimated at 23.558%, $Q(22) = 28.780$, $p = .151$, suggesting that method factors account for about one-fourth of the variation in the observations beyond that attributable to experimental manipulations. According to guidelines on the typical I^2 size in behavioral research provided by Pigott (2012), I^2 around 25% indicates low heterogeneity. However, the uncertainty interval for our I^2 is 95% CI [0%, 54.165%], suggesting the data are consistent with there being anywhere from zero to medium heterogeneity, and the estimate of heterogeneity is imprecise. For that reason, we also tested whether other factors varying in our experiments (e.g., participants' nationality, the order of manipulations, methods of priming money and mortality thoughts, the measurement of DTA) impacted the effect of mortality salience by money priming interaction on death thought accessibility. A series of tests yielded no effect for country, effect = −0.117, se = 0.277, Z = −0.424, $p = .672$, order of manipulations, effect = −0.231, se = 0.283, Z = −0.818, $p = .413$, methods of manipulations, effect = −0.568, se = 0.495, Z = −1.148, $p = .251$, and the method of DTA measurement, effect = 0.610, se = 0.636, Z = 0.959, $p = .337$. After controlling for these study-level moderators, the general interaction effect remained significant, effect = 1.249, se = 0.378, Z = 3.308, $p < .001$. Moreover, the estimate of heterogeneity was much lower than when not controlling for moderators, $I^2 = 0\%$, 95% CI [0%, 4.531%], $Q(10) = 4.166$, $p = .940$, suggesting that the majority of unexplained variance was due to various factors that served as study-level moderators.

10. General discussion

The main objective of the current set of experiments was to show that exposure to money weakens the accessibility of death-related thoughts, even when mortality thoughts have been intentionally activated. Results from six experiments lent substantial support to this hypothesis. We have showed repeatedly that when mortality was made salient, participants who were exposed to money displayed lower death-related cognition than participants who were exposed to non-monetary stimuli. Similarly, over several studies with different samples, methods of manipulation, and DTA measurements, once money cues were activated, participants who have been reminded of their mortality did not differ in their death thought accessibility from those who have not been reminded of their mortality. Yet when money cues were absent, the two groups differed in their death thought accessibility in the direction that would be expected.

While demonstrating that money cues neutralize the anxiety-inducing effects of mortality reminders, we have also investigated the psychological mechanism behind this effect. We hypothesized that money cues inhibit death-related thoughts in the face of mortality, because—at least for some people—mere reminders of money have the capacity to trigger feelings of self-worth. Experiment 3 revealed that self-esteem mediated the relationship between money cues and death-related cognition in response to mortality salience. No such mediation effects were observed for self-efficacy or sense of control. Experiment 4 has failed to find support for the alternative explanation that thinking about money prevents the generation of death-related thoughts through increasing positive affect or decreasing negative affect.

Finally, Experiment 5 revealed that money cues inhibited death-related thoughts in the face of mortality salience, but only for participants who linked their self-worth to their finances, independent of their socio-economic status. These findings provide further evidence for the presumed psychological mechanism underlying the existentially protective effects of thinking about money. According to TMT, an existential anxiety buffer has to fulfill certain psychological functions, such as providing the person with a sense of self-esteem and security. The more people tie their self-worth to their financial situation, the more existential protection they should derive from thinking about money, and this is exactly what our findings showed.

Another contribution of our paper has been to demonstrate (in Experiment 6) that as long as money and mortality thoughts follow each other closely in time, it does not matter which one comes first: Money is effective in neutralizing death thoughts both prospectively and retrospectively. Although this finding may not necessarily be surprising from a theoretical point of view, it still testifies to the power of money reminders as a defense against death anxiety and is coherent with prior experiments, in which self-esteem enhanced either before or after mortality salience had a buffering effect (Harmon-Jones et al., 1997; Schmeichel et al., 2009; Taubman Ben-Ari et al., 1999).

10.1. Why does money buffer death-related cognition?

We have shown that thinking about money triggers self-esteem and thereby prevents death-related thoughts from becoming accessible after mortality has been made salient. A question that arises in this context is which features of money allow it to fulfill such a psychological function. We proposed in the introduction that even mere reminders of money initiate feelings of strength, self-efficacy, persistence and agency that are closely related to self-esteem, and this is why money is associated in people's minds with self-esteem. Basing our research project on terror management theory, we assumed that people achieve self-esteem by living in ways consistent with the values and standards prescribed by their cultural worldview. We use money—earn and spend it, save and donate it—because doing so is approved by close others and endorsed by the society we live in. Through the self-esteem afforded by money, we might achieve the sense of symbolic immortality, based on our participation in the greater (materialistic) culture.

The results of this project can be interpreted not only in the narrower context of terror management theory but also in the broader context of the recently developed process-related work on threat and defense (e.g., Jonas et al., 2014). According to the model of threat and defense, following various kinds of threats (including existential threats) people often turn to abstract conceptions of reality: They invest more heavily in their belief systems, worldviews, social identities, goals, and ideas. This happens because exposure to threats confronts people with discrepancies that immediately activate basic neural processes related to anxiety (Jonas et al., 2014; Proulx, Inzlicht, & Harmon-Jones, 2012). Some defenses against such threats are proximal and symptom-focused, resulting directly from anxious arousal and hypervigilance, while other types of defenses operate more distally and diminish anxiety by activating approach-oriented states.

Money is an approach-motivation activating reward (e.g. Simon et al., 2010; Simon et al., 2015), especially when people think about potential earnings or gains. As we noted earlier, mere reminders of money make people feel stronger (Zhou et al., 2009) and enhance persistence in even unsolvable tasks (Gasiorowska et al., 2016; Vohs et al., 2006), again pointing to approach motivation. Taking this into account, we might expect that participants in the mortality salience condition, for whom existential threat was made salient, would be looking for behaviors, objects, norms, or values to relieve themselves from anxious distress. Money cues could help them in mobilizing approach-motivated states to thereby mute anxiety-related processes.[4]

[4] We would like to thank the Reviewers for offering this interpretation of the

Using the language of the threat and defense process model (Jonas et al., 2014), we can say that approach-oriented reactions related to money can be activated as a way to cope with existential anxiety produced by mortality thoughts. Research has shown that people experiencing fear of death turn to concrete personal and money-oriented defenses, such as increased commitment to tangible material rewards (Arndt et al., 2004; Kasser & Sheldon, 2000; Kosloff & Greenberg, 2009). Our research shows, however, that money might also act as an abstract personal defense, because thinking about money boosts self-esteem, possibly offering feelings of power or status.

What else, other than self-esteem, could explain that exposure to money hinders death-related cognition? One conceivable, but in our view unlikely, explanation is that money cues act as a distractor and the cognitive load they engender keep death-related constructs from being accessible. Empirical evidence from the existing literature, as well as our own research fails to support this argument. It has been shown that cognitive load leads to increased rather than decreased death thought accessibility following mortality salience induction (Arndt, Greenberg, Pyszczynski, Solomon, & Simon, 1997). Moreover, if money priming attracted or disturbed attention, it should have caused people to be less, rather than more, productive in the word-stem completion task. Our results clearly show that this is not the case, as the two manipulations (money priming and mortality salience) did not have a significant effect on the overall number of fragments filled out in the word-stem task. What we found was specific to the mortality salience condition: Participants reminded of their mortality and exposed to money were not less likely to create words on the whole, but were only less likely to produce death-related words. Because of these reasons, we deem it unlikely that the existential anxiety buffering effect of money is due to its capacity to distract.

Another alternative interpretation of our results can come from self-affirmation theory. Money can act as an important existential resource not only because it furnishes people with self-esteem, as we demonstrated, but also because it gives the hope of enduring significance within a cultural worldview (Zaleskiewicz, Gasiorowska, Kesebir, Luszczynska, & Pyszczynski, 2013). Undoubtedly, money possesses a special meaning within people's worldview systems, especially in contemporary Western societies that promote consumption and materialism (Sandel, 2012). Indeed, as demonstrated by Schmeichel and Martens (2005), bolstering one's worldview through a self-affirmation manipulation prior to mortality salience reduced defensive reactions and accessibility of death-related words. Reminding people of money might also be regarded as a form of self-affirmation manipulation, in that money is a value important in many people's cultural worldview. However, the effect demonstrated by Schmeichel and Martens (2005) was independent of participants' self-esteem, whereas in our experiments, money cues bolstered self-worth. Although we grant that some of the effects we demonstrated might be due to self-affirmation mechanisms, we do not believe that they could be exclusively due to value/worldview oriented self-affirmation. It is also worth mentioning here that in a set of recent studies Park, Gasiorowska and Vohs (in prep) demonstrated that value-based self-affirmations had the power to offset both positive and negative effects of money reminders. For participants who received self-affirmation manipulation, money priming did not harm their prosociality, but it also did not boost their persistence. Future studies could investigate the effects of combining mortality salience with both money priming and a value-based self-affirmation manipulation to see whether the interaction between the two buffering manipulations would annul their soothing effect.

10.2. Is money good or bad?

Our findings contribute not only to the discussion of how people react to and defend themselves against existential threats, but they also enrich our insight into the psychological meaning of money. In particular, they bring us closer to the understanding of the dual (good vs. bad) nature of money.

We showed that even thinking about money has the capacity to buffer existential anxiety. This effect, replicated in different samples and with the use of various methods, seems to disclose a positive psychological, emotional or symbolic function of money. If exposure to money boosts self-esteem and thereby helps people cope with the awareness of life's finiteness and death's inevitability, we might conclude that thinking about money is fully benign and potentially helpful. However, this conclusion stands at odds with substantial evidence showing that valuing money and possessions is associated with a host of negative long-term well-being consequences (Dittmar et al., 2014; Kasser, 2016). For example, people high in materialism who are strongly attached to money report higher levels of loneliness, more anxious attachment styles and lower-quality social relationships (see Kasser, 2014 for a review). A wide array of research also indicates that being part of a high-income group (Bianchi & Vohs, 2016) or even being subtly reminded of money (Vohs, 2015; Zaleskiewicz et al., 2018) produces negative consequences for interpersonal connections that are crucial for well-being (Diener, Oishi, & Tay, 2018; Diener & Seligman, 2002). In this context, a particularly intriguing question concerns why people base their death anxiety buffering system on money, even though a materialistic orientation yields little long-term life satisfaction?[5] One answer emerging from our research is that although valuing money reinforces maladaptive patterns that have negative consequences for long-term well-being, money offers the chance to self-soothe in the short run through its immediate anxiety-buffering function. From this perspective, money resembles some natural or cognitive incentives (e.g., drugs, alcohol, pornography) that offer immediate rewards but have destructive long-term consequences because of their addictive nature (Lea & Webley, 2006).

10.3. Limitations

Our findings should be interpreted with certain limitations and future research directions in mind. Firstly, although we used indirect measures of death anxiety, namely death-thought accessibility, as our dependent variable, all assessments in the current project were self-reports, and we used Amazon Mechanical Turk and an online Polish platform to recruit the participants in four out of six experiments. Although the quality of data obtained from online labor markets has been questioned, research suggests that in terms of internal consistency and test-retest reliability, data collected on MTurk is comparable to data collected via traditional methods (Buhrmester, Kwang, & Gosling, 2011). The finding that MTurk is a valid means of collecting data seems to be robust (Mason & Suri, 2012).

A second limitation of our work is that, in all our studies we concentrated on death-related cognition as the dependent variable, and did not assess worldview defense at the end of the procedure. While prior research has shown that implicit self-worth and value-affirmations eliminate both DTA and worldview defense effects (e.g., Schmeichel et al., 2009; Schmeichel & Martens, 2005), we cannot conclude from our research whether money exposure affects only DTA, or also the proneness to defend one's worldview. Following Harmon-Jones et al. (1997) and Schmeichel and Martens (2005), we reason that the DTA measure itself may activate death thoughts, thereby influencing subsequent reactions to a worldview violator. It is thus possible that

(*footnote continued*)
results.

[5] We would like to thank Tim Kasser who inspired us to interpret our results from this perspective.

whereas self-worth and value-affirmations are able to diminish death-related cognition and alleviate defensiveness in the face of mortality salience (e.g., Schmeichel et al., 2009; Schmeichel & Martens, 2005), money reminders are able just to relieve death-thought accessibility, but do not affect worldview defense. However, this hypothesis needs to be examined in the future studies.

10.4. Final remarks

Even if money has various symbolic meanings (Belk & Wallendorf, 1990; Zelizer, 1994) and produces different psychological consequences (Zaleskiewicz et al., 2018), it is, above all, the medium of exchange that people use to acquire goods and services (Mansfield, 1992). In this sense, our results do not exclude the possibility that money serves as a proximal (conscious and direct) defense against existential anxiety. After all, the more money people accumulate, the greater possibilities they will have to protect their health and security, and as a consequence suffer less from death fear. Our analysis, however, emphasizes the symbolic power of money and its distal existential buffering function. We propose that money is a source of self-esteem that exists within the cultural worldview, and thus has the capacity to soothe existential anxiety. Money holds extraordinary appeal for people, not simply because it is an effective facilitator of exchange, but because it has come to be viewed as a reward in and of itself due to the needs it fulfills or promises to fulfill, psychological or otherwise (Lea & Webley, 2006). We do not deny that money might have a pragmatic utility for coping with the fear of death, but we demonstrate that it goes beyond that and acts as a lot more than just a medium of exchange.

The results of the present research program, combined with the effects documented by Zaleskiewicz, Gasiorowska, Kesebir, Luszczynska, and Pyszczynski (2013), make a strong case that money is a potent existential anxiety buffer. This means that the ubiquitous desire for money is at least partially driven by existential motives: People want to possess money, because, at least to some extent, it has the power to buffer them against death-related thoughts and the accompanying death anxiety. When money does this, it is not only because of its obvious instrumental functions that can help postpone the moment of death (e.g., better quality of life, better access to healthcare), but also because even the thought of money can give people the illusion of feeling valuable in a fragile and finite world.

Acknowledgements

The research project presented in this paper has been financed by the National Science Centre grants DEC-2012/07/B/HS6/02580 and DEC-2013/11/B/HS6/01316.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jesp.2018.09.004.

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