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ORIGINAL RESEARCH

Temporal Perspective and Prosocial Behavior Under Mortality Salience: Evidence from Chinese University Students

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Purpose: Existing research on mortality salience (MS) and prosocial behavior demonstrates inconsistent findings, suggesting potential moderation by psychological variables. One such potential moderator is temporal perspective, which fundamentally shapes individuals' understanding of life course. This study examines how temporal perspective moderates the effect of MS on prosocial behavior.

Patients and Methods: A 3 (blank control vs linear temporal perspective vs cyclical temporal perspective) × 2 (MS vs dental pain) between-subjects design was implemented. Participants (N=212) were randomly assigned to different groups. Prosocial behavior was measured through self-reported helping intentions. Participants' prosocial behavior was compared across six experimental conditions defined by the combination of temporal perspective and MS manipulations.

Results: MS significantly increased prosocial behavior relative to control. Temporal perspective moderated this effect: Linear priming amplified MS-induced prosociality, whereas cyclical priming attenuated the effect to non-significance. Control group showed moderate MS effects. Critically, a significant interaction emerged between temporal perspective and MS in predicting prosocial behavior.

Conclusion: The findings reconcile previous inconsistencies by demonstrating temporal perspective's critical moderating role. Linear temporal perspective strengthens MS effects through enhanced existential threat awareness, while cyclical temporal perspective helps individuals avoid the awareness of mortality's inevitability via natural cycle conceptualizations. This suggests temporal cognition interventions could modulate prosocial outcomes in death-related contexts, with implications for terror management applications in social behavior modification.

Keywords: terror management theory, mortality salience, prosocial behavior, temporal perspective, linear temporal perspective, cyclical temporal perspective

Introduction

Death-related experiences, whether encountered directly (eg, personal loss, car accidents, public health crises)[1–4] or indirectly (eg, exposure to war-related media or reports of cluster suicides),[5,6] profoundly influence human cognition and behavior. According to terror management theory (TMT), the awareness of mortality conflicts with the innate survival instinct and triggers death anxiety.[7–10] Individuals cope with this anxiety through self-esteem maintenance and cultural worldview defense.[8–10] Mortality salience (MS), a core paradigm of TMT, arouses individuals' death awareness by activating their cognition of life's finiteness.[9] Death anxiety is the intense emotional panic experienced by individuals when they become aware of their inevitable mortality.[11] Empirical studies have shown that MS significantly motivates individuals to maintain self-esteem as a psychological defense mechanism against death anxiety.[12] MS also strengthens individuals' adherence to dominant cultural values, reinforcing their intrinsic motivation for prosocial behavior.[13,14] Prosocial behavior is a form of action that has positive

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effects on others or society.[15] Prosocial behaviors such as volunteering, charitable giving, and offering assistance are integral components of cultural and moral worldviews across societies, particularly in traditional Chinese culture where collective welfare and social harmony are highly valued.[16,17] Engaging in these culturally valued behaviors affirms one's alignment with shared norms and simultaneously enhances self-esteem by demonstrating personal value and social responsibility.[18,19] According to TMT, this combination of cultural worldview affirmation and self-esteem enhancement provides symbolic meaning that transcends individual mortality and helps buffer death anxiety.[8–10] In this study, although our measure of prosocial behavior (the amount of time voluntarily dedicated to completing an additional task) is a general indicator of helping intention, it can still be regarded as a socially endorsed behavior that strengthens one's sense of worth within the TMT framework.

However, the impact of MS on prosocial behavior is not always positive. In some cases, heightened death awareness reduces willingness to donate organs and discourages participation in volunteer activities.[20–22] These conflicting findings indicate that the impacts of MS on prosocial behavior depend on specific contextual and psychological factors. To better understand these conditions, it is necessary to introduce a new theoretical perspective.

Temporal perspective, a fundamental dimension of human existence, refers to one's overall perception of the passage of time and shapes how individuals interpret life's trajectory and the meaning they attribute to death.[23–25] Based on how individuals conceptualize time, two distinct temporal perspectives can be identified: the linear temporal perspective and the cyclical temporal perspective.[26,27] These contrasting frameworks influence how people understand the life course and cope with death-related cognitions.

The linear temporal perspective conceptualizes time as a finite, unidirectional continuum, emphasizing its irreversibility and future orientation—much like life itself, which moves forward without return.[19,27] This perception reinforces the sense of death as a definitive endpoint. According to TMT, this awareness may motivate individuals to transcend their finite existence by contributing to enduring social values, such as engaging in prosocial behaviors, thereby buffering death anxiety.[19,28,29]

In contrast, the cyclical temporal perspective understands time as a recurring loop, where life events repeat and the future closely resembles the present.[26,30] This temporal perspective may reduce the perceived threat of death, leading individuals to focus more on present-centered experiences. From the standpoint of TMT,[26] a cyclical time view may temporarily suppress death awareness, thereby reducing the activation of cultural worldview defenses and, consequently, diminishing prosocial motivation in response to MS.

In summary, we hypothesize that (1) MS will have a positive effect on prosocial behavior, and (2) this effect will be moderated by temporal perspective. Specifically, individuals with a linear temporal perspective are expected to exhibit a stronger positive association between MS and prosocial behavior, whereas those with a cyclical temporal perspective may show a reduced or null effect relative to the blank control condition.

Materials and Methods

Participants

The sample size was calculated using G*Power 3.1, based on a two-way between-subjects designed to examine the interaction between temporal perspective and MS. Assuming a medium effect size (*Cohen's f*=0.25), a significance level of α=0.05, statistical power (1 − β)=0.80, numerator degrees of freedom=2, and six experimental groups, the minimum required sample size was calculated to be 158 participants. Ultimately, 212 undergraduate students were recruited and randomly assigned to one of the six experimental conditions: blank control × MS (n=34), blank control × dental pain (n=32), linear temporal perspective × MS (n=41), linear temporal perspective × dental pain (n=33), cyclical temporal perspective × MS (n=36), and cyclical temporal perspective × dental pain (n=36). Participants ranged in age from 18 to 26 years (*M*=20.92, *SD*= 1.29), and the sample included 101 males and 111 females. All participants received monetary compensation and were fully informed of their right to withdraw from the study at any time.

Experimental Design and Procedure

A 3 (blank control vs linear temporal perspective vs cyclical temporal perspective) × 2 (MS vs dental pain) between-subjects experimental design was employed (see Figure 1).

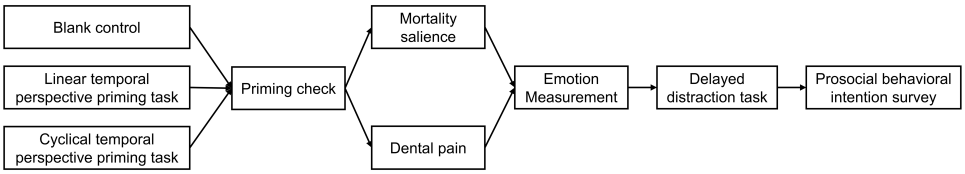

Figure 1 Experimental Procedure.

In the temporal perspective priming phase, participants assigned to the linear or cyclical conditions completed reading and writing tasks designed to prime the respective temporal orientation, followed by a manipulation check assessing the effectiveness of the priming. Participants in the blank control condition did not receive the temporal perspective priming and the manipulation check. All participants then underwent a standardized MS induction procedure intended to activate death-related awareness. After the manipulation, participants completed the positive and negative affect schedule (PANAS), engaged in a delayed distraction task, and subsequently completed a prosocial behavior assessment. They then provided demographic information, including age and gender. At the end of the experiment, all participants were fully debriefed about the true purpose of the study and invited to share feedback about their experience. Those who reported emotional discomfort were offered access to appropriate psychological support services.

Experimental Materials

Temporal Perspective Priming Materials

The temporal perspective priming materials used in this study were adapted from prior research, with modifications made to better align with Chinese participants' reading habits, which have been shown to enhance the effectiveness of priming.[31,32] Participants were instructed to carefully read a short passage that emphasized either a linear or cyclical view of time. After reading, they were asked to recall a personally meaningful life event that related to the short passage and describe it in writing. To ensure task engagement, participants were required to write at least three lines on the paper questionnaire. The full texts of the priming passages are presented below.

Linear Temporal Perspective Priming: Our lives consist of a series of independent and progressive time segments. We often hear expressions such as "time flies like an arrow", "the past cannot be retrieved", and "flowing water never returns", because since the Big Bang, time has been flowing forward linearly from zero. Just as we say farewell to childhood and enter adolescence, and then leave adolescence to enter adulthood, once an event has passed, it will not happen again. The future is like a road that extends forward from the present. Therefore, if you take action now (eg, developing a good habit), you will place yourself in a better position in the future. However, if you do not act now, your progress will slow down, and you will need to accelerate later to catch up.

Cyclical Temporal Perspective Priming: Our lives are composed of many large and small cycles. It is well known that a tree grows from sprouting to maturity and fruit-bearing, and when its fruit falls into the soil, it can sprout again, continuing this cycle of growth. Humans are like trees, continuously reproducing generation after generation and living within this cycle. The seasons—spring, summer, autumn, and winter—keep changing in a recurring pattern, and each week's seven days repeat endlessly. Every day, we engage in similar routines of work, study, eating, and resting. In other words, events in human life tend to repeat. The future is essentially the next cycle of the present. Therefore, if you perform an action now (eg, developing a good habit), you are more likely to repeat this action in the next cycle. However, if you do not execute it now, the likelihood of doing it in the next cycle will be lower.

Temporal Perspective Priming Check

The temporal perspective priming check used in this study was informed by established savings behavior research.[31] In their procedure, participants were asked to recall the temporal orientation implied by an expert-recommended saving strategy after completing a priming task. Responses were recorded using a 7-point Likert scale, where lower scores (closer to 1) indicated a stronger cyclical temporal perspective, and higher scores (closer to 7) reflected a stronger linear temporal perspective. In the present study, after completing the temporal perspective priming task and the main experimental procedures, participants were asked to indicate their perceived temporal orientation using the same

7-point scale as a manipulation check. Since the blank control group in this study was not exposed to any temporal perspective priming materials, this group was not included in the manipulation check procedure. Therefore, the manipulation check analysis focused solely on the two experimental groups (linear and circular temporal perspective), where actual priming was implemented and manipulation validity needed to be confirmed. The exact wording of the manipulation check item was:

> Please recall the content you just read during the reading and comprehension task. Based on that content, to what extent do you think life is cyclical or linear? Please select a number from 1 to 7, where 1 indicates strongly cyclical and 7 indicates strongly linear.

The MS Paradigm

We employed the well-established MS paradigm,[9] a method empirically validated through extensive prior research.[9,14,28] Participants in the MS condition were asked to respond to two open-ended questions: (1) "Please briefly describe the emotions you experience when you think about your own death", and (2) "Please describe, in as much detail as possible, what you believe will happen to your body physically when you die". In the control condition, participants answered parallel questions pertaining to the experience of dental pain (low MS). Because death-related topics can elicit emotional discomfort or heightened sensitivity, participants were informed in advance that the task was part of a personality and imagination assessment, which served to reduce hypothesis guessing and minimize emotional over-involvement. To ensure adequate cognitive engagement with the task, participants were required to write at least three lines in response to each question. This constraint was designed to strengthen the effectiveness of the MS induction by encouraging deeper reflection on the priming content.

Emotion

Participants' emotional states were assessed using the revised version of the PANAS, adapted by Chinese scholars to ensure cultural and linguistic relevance.[33,34] The scale comprises 18 adjectives, with 9 items assessing positive affect and 9 items assessing negative affect. Participants responded using a 5-point Likert scale ranging from 1 ("very slightly or not at all") to 5 ("extremely"). Mean scores were calculated separately for positive and negative affect. The revised scale exhibited strong internal consistency, with Cronbach's α coefficients of 0.89 (positive affect subscale) and 0.82 (negative affect subscale).

Delayed Distraction Task

Following the MS induction, a delayed distraction task was administered to allow death-related thoughts to temporarily recede from conscious awareness prior to measuring prosocial behavior.[21,28] Based on established procedures, the present study utilized the "digital triangle" task (see Figure 2).[35] In this task, participants were presented with two geometric triangles on a sheet of paper, each with three circles placed on its sides. They were instructed to fill each circle with a natural number such that the sum of the numbers on each side of the first triangle equaled 9 (see Figure 2a), and the

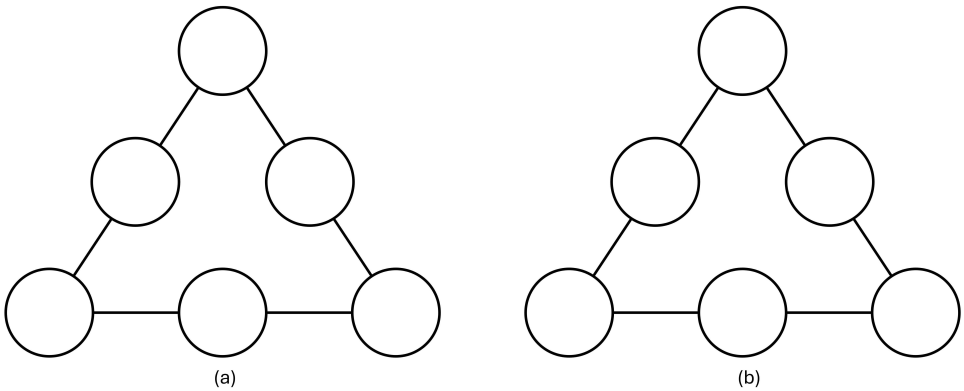

Figure 2 The "Digital Triangle" Task. (**a**) Sum of 9 for each side task. (**b**) Sum of 10 for each side task.

sum on each side of the second triangle equaled 10 (see Figure 2b), without repeating any numbers. Participants were given five minutes to complete the task, which served as a cognitive distraction to standardize the delay across conditions.

Prosocial Behavior

Prosocial behavior was was measured through self-reported helping intentions from prior research.[36] At the conclusion of the experiment, participants were informed that there was an opportunity to assist with an additional unrelated study. They were then asked to indicate how much time, ranging from 0 to 30 minutes, they would be willing to volunteer to help with the subsequent task. The self-reported amount of time was used as a indicator of prosocial behavior, with higher values reflecting stronger willingness to engage in prosocial behavior. The exact wording of the measure was:

> Apart from this task, we are conducting another task in a separate room. How many minutes (0–30) are you willing to volunteer to help us complete this additional task?

Participants responded by indicating a number between 0 and 30.

Results

Validity of Temporal Perspective Manipulation

To evaluate the effectiveness of the temporal perspective manipulation, an independent samples *t*-test was conducted using temporal perspective condition (linear vs cyclical) as the independent variable and participants' temporal perspective tendency score as the dependent variable. Results indicated that participants in the linear temporal perspective condition (M=5.45, SD=1.59) reported significantly higher scores than those in the cyclical condition (M=3.46, SD=1.68), $t(144)=7.35$, $p<0.001$. These results provide strong evidence for the validity of the temporal perspective priming manipulation.

Emotional Responses

To examine participants' emotional responses, a between-subjects analysis of variance (ANOVA) was conducted with positive affect and negative affect as dependent variables (see Table 1). For positive affect, results revealed a significant main effect of MS, $F(1, 206)=4.70$, $p=0.031$, $\eta_p^2=0.02$, indicating that participants in the MS condition (M=2.41, SD=0.78) reported significantly lower positive affect than those in the dental pain condition (M=2.65, SD=0.78). However, the main effect of temporal perspective was not significant, $F(2, 206)=1.02$, $p=0.364$, $\eta_p^2=0.01$, nor was the interaction between MS and temporal perspective, $F(2, 206)=0.32$, $p=0.730$, $\eta_p^2<0.01$. For negative affect, participants exposed to MS reported slightly higher levels (M=2.03, SD=0.68) than those in the dental pain condition (M=1.87, SD=0.63), but the difference did not reach statistical significance, $F(1, 206)=3.19$, $p=0.076$, $\eta_p^2=0.02$. Similarly, no

Table 1 Main and Interaction Effects of Temporal Perspective and Mortality Salience on Emotion and Prosocial Behaviors

	Source	df_1	df_2	F	p	η_p^2
Positive affect	Time perspective × MS	2	206	0.32	0.730	0.00
	Time perspective	2	206	1.02	0.364	0.01
	MS	1	206	4.70	0.031	0.02
Negative affect	Time perspective × MS	2	206	0.82	0.442	0.01
	Time perspective	2	206	0.61	0.545	0.01
	MS	1	206	3.19	0.076	0.02
Prosocial behaviors	Time perspective × MS	2	204	3.15	0.045	0.03
	Time perspective	2	204	0.80	0.450	0.01
	MS	1	204	15.93	< 0.001	0.07

Notes: df_1 represents the numerator degrees of freedom; df_2 represents the denominator degrees of freedom; η_p^2 serves as an estimate of effect size, representing the proportion of variance accounted for.
Abbreviations: *df*, degrees of freedom; *F*, F-statistic; *p*, p-value; η_p^2, partial eta-squared.

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significant main effect of temporal perspective, $F(2, 206)=0.61$, $p=0.545$, $\eta_p^2=0.01$, or interaction effect, $F(2, 206)=0.82$, $p=0.442$, $\eta_p^2=0.01$, was observed. These results suggest that while MS briefly reduced positive affect, the effect was small and consistent with prior findings that death-related thoughts elicit transient emotional responses.[37] Neither temporal perspective nor its interaction with MS significantly influenced emotional states. To rule out emotion as a confounding factor, mediation and moderation analyses were conducted.[37] Positive affect did not significantly mediate the relationship between MS and prosocial behavior (95% CI [−0.22, 0.47]), nor did it significantly moderate this relationship (95% CI [−3.01, 1.83]). Negative affect did not significantly mediate the relationship between MS and prosocial behavior (95% CI [−0.42, 0.20]), nor did it significantly moderate this relationship (95% CI [−3.55, 2.28]). Thus, emotional responses can be excluded as alternative explanations for differences in prosocial behavior. Nonetheless, positive and negative affect scores were included as covariates in subsequent analyses to control for potential residual emotional variance.

The Role of Temporal Perspective and MS in Prosocial Behavior

To examine the effect of MS on prosocial behavior in the absence of temporal perspective priming, an independent samples *t*-test was conducted within the blank control group. Results indicated that participants in the MS condition reported significantly higher levels of prosocial behavior ($M=16.07$) than those in the dental pain condition ($M=11.74$), $t(64)=2.83$, $p=0.006$, Cohen's $d=0.70$, reflecting a moderate effect size. To further assess the joint effects of temporal perspective and MS, a two-way ANCOVA was performed with prosocial behavior as the dependent variable, positive and negative affect as covariates, and temporal perspective and MS as independent variables (see Table 1). A significant main effect of MS emerged, $F(1, 204)=15.93$, $p<0.001$, $\eta_p^2=0.07$, replicating the earlier finding: participants primed with MS displayed higher levels of prosocial behavior than those in the dental pain condition. The main effect of temporal perspective was not significant, $F(2, 204)=0.80$, $p=0.450$, $\eta_p^2=0.01$. However, the interaction between temporal perspective and MS was statistically significant, $F(2, 204)=3.15$, $p=0.045$, $\eta_p^2=0.03$, suggesting that temporal perspective moderated the effect of MS on prosocial behavior.

To explore this interaction in greater detail, simple effects analyses were conducted (see Table 2), and an interaction plot was generated (see Figure 3). Post-hoc pairwise comparisons were conducted using Bonferroni corrections to control for the increased risk of Type I error associated with multiple comparisons. Within the blank control condition, participants in the MS group ($M=16.07$) again reported significantly higher prosocial behavior than those in the dental pain group ($M=11.74$), $F(1, 204)=6.44$, $p=0.012$, Cohen's d=0.70. In the linear temporal perspective condition, MS produced a stronger effect, with participants in the MS condition ($M=16.69$) demonstrating significantly higher prosocial behavior than those in the dental pain condition ($M=10.20$), $F(1, 204)=16.02$, $p<0.001$, Cohen's d=0.94. In contrast, no significant difference was observed in the cyclical temporal perspective condition, where participants in the MS group ($M=12.83$) and the dental pain group ($M=12.06$) showed comparable levels of prosocial behavior, $F(1, 204)=0.22$, $p=0.643$, Cohen's d=0.10. These findings indicate that the prosocial effect of MS was evident in both the blank control and linear temporal perspective conditions, but was absent in the cyclical condition. Moreover, comparisons of effect sizes showed that the linear temporal perspective condition produced a large effect size (Cohen's $d=0.94$), which

Table 2 Simple Effects Analysis of Prosocial Behavior by Experimental Conditions

Time Perspective	Condition	Mean (SE)	*F*	df_1	df_2	*p*	95% CI	Cohen's *d*	SIR
Blank control	MS	16.07 (1.19)	6.44	1	204	0.012	[0.96, 7.68]	0.70	
	Dental pain	11.74 (1.22)							
Linear	MS	16.69 (1.08)	16.02	1	204	<0.001	[3.29, 9.68]	0.94	+34.29%
	Dental pain	10.20 (1.21)							
Cyclical	MS	12.83 (1.16)	0.22	1	204	0.643	[−2.49, 4.03]	0.10	−85.71%
	Dental pain	12.06 (1.17)							

Notes: SIR represents the percentage change in Cohen's d between each temporal perspective group (linear or cyclical) and the blank control group.

Abbreviations: SE, Standard Error; CI, Confidence Interval; SIR, Standardized Improvement Ratio.

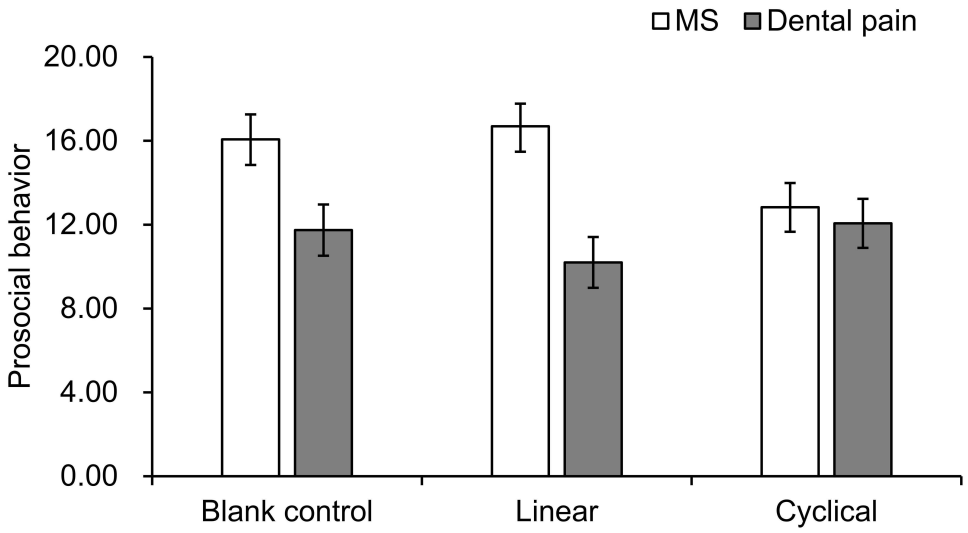

Figure 3 Interaction Effects.

represents a 34.29% increase over the moderate effect observed in the blank control group (Cohen's d=0.70). This pattern of results supports the hypothesis that a linear temporal perspective amplifies the effect of MS on prosocial behavior, whereas a cyclical temporal perspective appears to attenuate or neutralize this effect.

Discussion

This study introduced linear and cyclical conceptions of time—long of great significance in philosophical discourse—as psychological constructs, operationalized as temporal perspectives, to investigate their role in shaping individuals' behavioral responses to death. By integrating temporal perspective into the domain of death psychology, this study investigated whether and how different temporal perspectives moderate the effect of MS on prosocial behavior. Temporal perspective was experimentally manipulated through a reading and writing task, followed by a standard MS induction, an affect assessment, and a delayed distraction task. Prosocial behavior was then measured by participants' willingness to allocate time to assist with a subsequent task. The findings provide strong support for the hypothesis that MS significantly increases prosocial behavior, and critically, that this effect is moderated by temporal perspective. Specifically, participants primed with a linear temporal perspective exhibited significantly greater prosocial tendencies under MS than those in the dental pain condition, whereas participants primed with a cyclical temporal perspective did not show a comparable increase. These results suggest that individuals' temporal perspective functions as a key psychological moderator in the processing of existential threat, influencing whether death awareness translates into social engagement.

The analysis of emotional responses showed that MS significantly decreased positive affect and also increased negative affect, although the effect on negative affect did not reach statistical significance. Drawing on previous research, we conducted mediation and moderation analyses, which ruled out any significant role of either positive or negative affect in the relationship between MS and prosocial behavior.[37] This finding is in line with TMT and indicates that the effects we observed are not driven by transient emotional reactions.[7–10]

Analysis of the blank control group confirmed that MS facilitates prosocial behavior, aligning with prior research and providing empirical support for the theoretical predictions of TMT.[38–40] According to TMT, reminders of mortality trigger death anxiety, motivating individuals to seek symbolic immortality through actions that affirm culturally valued norms and beliefs.[9,10,41] Prosocial behavior represents one such pathway, allowing individuals to bolster self-worth and reinforce their alignment with shared cultural worldviews.[42,43] As self-esteem and cultural worldview adherence constitute the core psychological defenses posited by TMT, altruistic behavior in response to existential threat can serve as a mechanism to buffer morality-related distress.[44,45]

Prior research examining the relationship between MS and prosocial behavior has produced mixed findings.[13,14,20,46] Some studies have explored this issue from the perspective of prosocial behaviour types, proposing the self-protective altruism hypothesis. This hypothesis posits that helping others under the threat of death functions as a psychological self-protective mechanism; consequently, individuals exhibit reduced behavioral intentions when a prosocial act explicitly signals the vulnerability of life.[20,46,47] However, this theoretical perspective focuses on the static categorization of prosocial behavior types, thereby failing to explain motivational differences in the same behavior across different contexts.[48] Second, it does not identify the specific psychological mechanisms that dynamically regulate the relationship between MS and prosocial behavior.[47] To address these limitations, the current study introduces a temporal perspective by investigating how externally imposed temporal frameworks moderate prosocial behavior under MS. Compared to previous research, the intervenable features of the temporal perspective provide a more actionable theoretical basis for promoting prosocial behavior strategies in death-related crises. Results demonstrated that the facilitating effect of MS on prosocial behavior was significantly amplified under the linear temporal perspective condition compared to the blank control group. In contrast, no such effect was observed under the cyclical temporal perspective, where prosocial behavior did not differ significantly between MS and dental pain conditions.

According to TMT, MS activates a psychological defense mechanisms wherein individuals affirm cultural worldviews and enhance self-esteem through symbolic behaviors, including helping others.[9,10] Temporal perspective may influence the accessibility and strength of this defense mechanism. The linear temporal perspective, which highlights the irreversibility and forward trajectory of time, likely increases individuals' confrontation with the finality of death.[23,27] This heightened awareness intensifies the need to assert symbolic meaning and continuity, thereby reinforcing prosocial motivation as a defense against death anxiety.[7,42,45]

Empirical studies have shown that future-oriented individuals, particularly during the (coronavirus disease 2019) COVID-19 pandemic, were more likely to engage in meaning-making processes, which in turn promoted prosocial behaviors.[49] Our findings are consistent with this view: under MS, the linear temporal perspective directs attention toward the future, promotes existential reflection, and encourages socially constructive actions.[50] As previous research indicates, the linear temporal perspective fosters goal-directed thinking and positive expectations about the future,[31] and positive future thinking has been robustly associated with increased prosociality.[51,52]

In contrast, the cyclical temporal perspective downplays the future orientation of time, leading individuals to focus more on present-moment experiences.[27,53] This present-centered focus may diminish the salience of death-related thoughts, thereby weakening the activation of TMT defense systems. Consistent with this interpretation, prior research has demonstrated that individuals with a present-focused temporal orientation are more likely to be immersed in immediate emotional experiences and less attuned to the needs of others.[53]

Despite its theoretical and empirical contributions, this study has several limitations that warrant consideration. First, the sample was composed exclusively of college students, whose temporal perspective may be shaped by their developmental stage and educational background.[54] As such, the generalizability of the findings is limited. Future research should seek to replicate and extend these results in more diverse populations across a broader range of age groups, socioeconomic statuses, and cultural contexts. Second, the study employed a laboratory-based MS induction, which may not evoke the same intensity of emotional or cognitive reactions as actual experiences with death.[13,14,55] To enhance ecological validity, future studies could investigate the interactive effects of temporal perspective and MS in real-world contexts, such as during natural disasters, public health emergencies, or post-traumatic environments. Third, prosocial behavior was measured using a single-item indicator—participants' self-reported willingness to allocate time for a follow-up task. While this measure provides behavioral insight, it may not fully capture the multidimensional nature of prosociality and could be susceptible to social desirability bias.[48] These factors suggest that the observed effects may reflect not only prosocial motivation but also compliance or impression management tendencies. Future research should adopt more comprehensive and less reactive measures, such as anonymous donation tasks or objective behavioral observations, and should also examine whether different forms of helping (eg, low-cost versus risk-oriented behaviors) might be differentially influenced by MS and temporal perspective. In addition, considering the transient nature of priming effects, future studies should further explore strategies to promote sustained prosocial behavior over time, thereby extending the practical implications of temporal framing interventions. Fourth, the current study

operationalized temporal perspective using a binary classification (linear vs cyclical). While this dichotomy captures meaningful distinctions, more nuanced frameworks—such as Zimbardo and Boyd's five-factor temporal perspective model — could yield deeper insights by considering temporal dimensions such as past-positive, present-hedonistic, or future orientation.[56] Moreover, cultural and religious influences on temporal perception merit deeper discussion. Traditional Chinese worldviews, which emphasize cyclical patterns of life and death, may predispose individuals toward cyclical temporal orientations and could shape how participants respond to temporal priming.[26,27,57] Future research could examine cross-cultural differences in baseline temporal orientation and explore how these cultural factors interact with MS in shaping prosocial tendencies. Finally, although the linear temporal prime used in this study emphasizes the unidirectional and irreversible nature of time and does not contain any references to death, mortality, or existential threat, we cannot completely exclude the possibility that perceiving time as irreversible might indirectly activate death-related cognitions for some individuals.[31,32] Therefore, the findings should be interpreted with caution, and future studies could directly examine whether linear temporal framing elevates death-related anxiety to clarify this potential overlap.

Conclusion

This study provides experimental evidence that MS facilitates prosocial behavior, while also demonstrating that temporal perspective serves as a critical moderator in this relationship. The findings support a central proposition of TMT—that reminders of mortality activate psychological defense mechanisms, including worldview affirmation and self-esteem maintenance, which in turn promote prosocial behavior.[9,10,42,43] More importantly, the study extends the theoretical scope of TMT by elucidating the dual psychological functions of temporal perspective in death-related processing. Specifically, a linear temporal perspective intensifies awareness of life's finality, thereby amplifying death anxiety and motivating symbolic immortality-seeking behaviors such as prosocial action. In contrast, cyclical temporal cognition reinforces death avoidance by diminishing the salience of existential threats, thereby curtailing compensatory prosocial motivation. These findings offer a novel conceptual framework for understanding individual differences in prosocial responses to MS and underscore the importance of temporal orientation in shaping psychological reactions to existential threat. From an applied standpoint, the results suggest that future-oriented psychological interventions—such as emphasizing linear temporal perspective through goal-directed narratives—may strengthen individuals' motivation to engage in socially constructive behaviors and reduce the risk of social disengagement or apathy during crises.

Data Sharing Statement

The raw data that support the findings of this study are publicly available from the corresponding author.

Ethical Statement

The Ethics Committee of Wuhan Mental Health Center approved the study protocol, and all participants provided informed consent. The study protocol, along with the employed methods, followed the principles outlined in the Declaration of Helsinki and complied with the ethical guidelines and regulations applicable in China.

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Disclosure

The authors report no conflicts of interest in this work.

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