

Natural awe but not other types promotes altruistic behavior by increasing sense of the small self

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ARTICLE INFO

Received: 3 March 2023

Revised: 22 September 2023

Accepted: 8 October 2023

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KEYWORDS

awe, altruistic behavior, monetary donation, small self, mediation effect

ABSTRACT

Background: Awe promotes altruistic behavior by enhancing the sense of the small self. However, this mediation mechanism has not been consistently replicated, possibly due to variations in the types of awe. No studies have directly examined whether the mediation of the sense of the small self between awe and altruistic behavior holds true in general, or is specific to a certain type of awe induction. Here, we describe an experiment aimed to address this issue.

Methods: Two hundred and thirty-five participants were randomly assigned to different emotion groups, including natural awe, social awe, spiritual awe, amusement, and neutrality. After emotional manipulation, the participants were informed of a student's misfortune and asked to decide how much of their experimental compensation money (RMB 50) they would donate.

Results: We observed a promoting effect of awe induction on monetary donation in general, and this effect was similar across the three types of awe. Further mediation analysis indicated that natural awe, uniquely promoted altruistic behavior via the mediation role of the small self.

Conclusion: The current study demonstrates the novel insight that, although the different types of awe induction similarly promote altruistic behavior, only natural awe promotes altruistic behavior through increasing sense of the small self.

1 Introduction

Awe refers to the emotional responses to something having a vast physical or social size, transcending the individual's current frame

of reference and requiring new schemes to accommodate what is being perceived [1]. It plays an important role in promoting the individuals' happiness and psychological health. Research has shown that awe increases individuals' smile

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intensity [2], inner peace [3], happiness [4], and life satisfaction [5] while decreasing negative emotions and daily stress [6].

As a self-transcendent emotion that encourages people to go beyond their own momentary desires and enhance the welfare of others [7, 8], awe promotes altruistic behavior [5, 9–11]. Altruistic behavior refers to voluntary action undertaken with the primary intention of benefiting others and without the expectation of receiving rewards from external sources [12, 13]. A large number of studies have shown that, compared with the neutral condition, awe increases motivation and behavior [5, 9, 11, 14]. Participants who experience awe are more likely to volunteer time to help others [5]. Awe also encourages individuals to allocate more raffle tickets or money to the partner in the dictator game, a widely used economic game that assesses prosocial sharing [11].

Keltner and Haidt [1] propose that awe-inspiring events are diverse, including physical (e.g., nature, enormous buildings), social (e.g., powerful leader, God), and cognitive elicitors (e.g., grand theories). Previous studies have mainly used physical elicitors, such as majestic beauty in nature, to induce awe [9–11]. However, few direct comparisons have been made on the influence of the different awe types on altruistic behavior. Therefore, the current study mainly sought to explore the influence of diverse awe-inspiring elicitors on altruistic behavior. Since awe is a self-transcendent emotion, we assume that awe can increase altruistic behavior irrespective of awe types.

Previous studies indicate that promoting altruistic behavior by awe is due to an increased sense of the small self, which refers to the perception of oneself that is comparatively diminished when compared with something considered larger [11]. That is, individuals in a

state of awe are more likely to view themselves as insignificant and less important, which assists in reducing their self-centeredness and redirecting their attention from themselves toward the external world and others [11]. Consequently, the likelihood for individuals to help others in need increases. Piff et al. [11] found that the mediating role of the small self between awe and altruistic behavior was independent of the ways of eliciting awe and the measures of prosocial behavior. They asked participants to recall natural landscapes to induce awe and found that compared with the control condition, awe increased ethical decision-making capabilities through sense of the small self. However, this result was not replicated when the method of recalling experiences of awe was not restricted to natural stimuli [9]. The inconsistent results may be due to the variations among the different types of awe. However, no studies to test this proposal are present. Therefore, another purpose of this study is to clarify this inconsistent result by manipulating different types of awe.

Overall, the present work aims to explore the influence of diverse awe-inspiring events on altruistic behavior and the role of the small self as the mediator between them. The findings would help clarify the inconsistencies in previous studies and offer a deeper understanding of awe. We evaluated three types of awe elicitors: natural, social, and spiritual awe; which can effectively induce the feeling of awe and have cross-cultural consistency [15]. A monetary donation was considered as index of altruistic behavior because it is an important manifestation of altruism [16]. We hypothesized that: (1) experiencing a feeling of awe would encourage individuals to donate more money and (2) the mediating effects of the small self on the relationship between awe and altruism differ with awe types.

2 Methods

2.1 Participants

To calculate the required sample size, we conducted a priori power analyses using G*Power 3.1 (Kiel, Germany)[17] with the effect size set at 0.28, power ($1 - \beta$) set at 0.80, and $\alpha = 0.05$ (two-tailed) [18]. This analysis also included a 5-level between-subject factor. The necessary sample size was 160 individuals. In total, 243 non-psychology undergraduate students (114 women) completed the experiment. They were randomly assigned to five groups: natural awe ($n = 49$, 19 women; age: 20.16 ± 1.34 years), social awe ($n = 49$, 25 women; age: 20.08 ± 1.35 years), spiritual awe ($n = 50$, 25 women; age: 20.08 ± 1.10 years), amusement ($n = 50$, 23 women; age: 20.04 ± 1.11 years), and neutral ($n = 45$, 22 women; age: 19.84 ± 1.06 years). All participants enrolled online at Neijiang Normal University.

2.2 Research design

We employed a between-participant design. Participants were randomly assigned to five groups. Amusement was chosen for comparison because it is a positive emotion that can also be induced by an incongruity between one's expectations and experiences, such as awe [19]. By comparing the effects of awe and amusement on altruistic behavior, we can better understand whether awe is superior to other positive emotions in enhancing altruistic behavior.

2.3 Materials and procedure

The experiment was performed in a separate room following the double-blind principle. Participants were asked to read the informed consent statement, which specified they would perform three tasks, namely, answering a questionnaire, watching a video and rating their reactions, and reading. Informed consent was

obtained from all participants before the formal study.

First, participants completed two questionnaires, the Dispositional Positive Emotion Scale (DPES); [20] and Prosocial Tendencies Measure (PTM); [21]. These questionnaires were used to control the differences in emotional and prosocial traits between groups. The DPES-awe was used to measure dispositional awe, while the DPES-amusement was used to measure dispositional amusement. Participants responded to each item on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). A higher score indicated a higher frequency of experiencing the emotion. On PTM, participants were asked to rate the extent to which each statement described themselves on a 5-point scale, ranging from 0 (*does not describe me at all*) to 4 (*describes me greatly*). A higher mean score indicates a higher prosocial tendency. Statistical analyses showed no differences among the five groups in terms of dispositional awe, dispositional amusement, and prosocial tendency ($p \geq 0.792$).

After completing these questionnaires, participants reported the degree to which they were currently experiencing each of six emotions on a 7-point scale (disgust, awe, sadness, fear, happiness, and amusement; 1 = *not at all*, 7 = *very much*). Then, participants were randomly assigned to one of the five groups to watch a video. Natural awe was elicited using a video describing the relationship between human beings and nature (1'59"). Social awe was elicited using a video of an interview with a veteran (4'27"). Spiritual awe was elicited with a video depicting the prayers of pilgrims to the Potala Palace (4'27"). Amusement was elicited using a clip from the film *Flirting Scholar* (4'27"). Neutrality was elicited using a clip of a traffic recording (4'27"). After watching the video compilation, participants rated their emotions again for the manipulation check, and rated two survey items measuring the sense of

the small self ('*Right now, I feel relatively small*' and '*Right now, I feel insignificant*'); Piff et al. [11] using a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). In addition, we also measured the participants' sense of the small self with three pictorial measures that were reverse-scored [22]. Each measure included seven circles, a selection of full-body drawings, and a display of signatures. Participants were asked to select the option that best represented their perceived self-size. The size of the circles, full-body images, and signatures increased linearly and were each assessed using a 7-point interval scale. The mean of the five items served as the index of the small self. A higher score indicated a greater sense of the small self.

Lastly, participants were presented with a paper that contained the details of a fundraising:

Dear students, this is to inform you of a senior student at our university. Her name is Jiajia. Jiajia's mother died of a serious illness when Jiajia was young. Her father raised her by himself. Jiajia has twin brothers who are still in primary school. Several days ago, her father was seriously injured in a work accident, and he was admitted to the hospital. The family suddenly lost the most important source of income. Facing such a difficult and tough situation, Jiajia is in great pain; however, she is still trying to finish her studies to put her family in a better position and take care of her father after graduation.

After reading the material, participants reported their willingness to donate money on a 7-point scale (1 = *not at all*, 7 = *very much*). The question was, "*To what extent are you willing to donate money to the charity activity?*": Then, participants were told that the experiment was over, and they were paid RMB 50 for participation. Meanwhile, they received an empty envelope and a note with the following written on it: "*Considering the misfortune of Jiajia's family, the school is fundraising for her. If you want to donate money for Jiajia, please*

put money into the envelope and drop it into the donation box in the next room. Please note that the donation is anonymous and voluntary." The compensation of RMB 50 was broken down into four RMB 10, one RMB 5, and five RMB 1 notes to ensure that participants could donate any amount of money from RMB 0 to RMB 50. Participants were left in the room alone to decide how much money to put into the envelope for donation. After making their decision, the participants dropped the envelope into the donation box. The subject number was written in a secret place in the envelope so that the participants would not find it, which allowed the proponent to determine how much money these participants donated.

2.4 Data analysis

Data analyses were conducted using SPSS 23.0 (SPSS Inc, Chicago, IL, USA).

3 Results

Before the formal analysis, we tested whether the data met the assumptions required for conducting the one-way analysis of variance (ANOVA) or multivariate ANOVA (MANOVA). The assumptions required for conducting ANOVA include: (1) normal distribution; (2) homogeneity of covariance; and (3) random assignment. Those for MANOVA include: (1) independence, (2) random sampling, (3) multivariate normality; and (4) homogeneity of covariance matrices [23]. Therefore, the Brown-Forsythe method was to calculate the F-ratio and Tamhane T2 for post hoc pairwise comparisons [23], although the analyzed results were the same as those using uncorrected F and Bonferroni test (Table S1).

3.1 Manipulation checks

We evaluated the effectiveness of emotional manipulation. The independent variable was

emotion group, while the dependent variable was emotion rating. We did not include time (pre-test, post-test) as an independent variable. That is, we conducted analysis for the pre- and post-tests separately. The pretest showed no differences among the five groups in terms of their self-reported emotions ($p \geq 0.098$). The post-test confirmed that participants in the three awe groups experienced a stronger feeling of awe than did participants in the amusement and neutral groups ($F_{BF} [4.00, 229.83] = 64.78; p < 0.001; \eta^2 = 0.52$). In turn, participants in the amusement group experienced a stronger feeling of amusement than did participants in the awe and neutral groups ($F_{BF} [4.00, 146.19] = 163.18; p < 0.001; \eta^2 = 0.73$). Moreover, participants in the three awe groups experienced a stronger feeling of awe than that of amusement ($p < 0.001$), whereas participants in the amusement group experienced a stronger feeling of amusement than that of awe ($t [1, 49] = 9.68; p < 0.001$). No differences were found in the experience of awe among the three awe groups. All findings supported the success of our manipulation in eliciting the target emotion (Fig. 1 and Table S2).

3.2 Does awe increase sense of the small self?

We used the Brown–Forsythe method to test the

effect of emotion on the small self, with emotion as independent and small self as dependent variables. The results (Fig. 2A and Table S2) showed that the effects of emotion on small self were significant ($F_{BF} [4.00, 229.83] = 6.03; p < 0.001; \eta^2 = 0.09$). Post hoc analysis using Tamhane T2 method revealed that participants in the natural awe group had a higher sense of the small self than did those in amusement ($p < .001$; 95% confidence interval [CI] mean difference [0.15, 1.38]) and neutral groups ($p = 0.022$; 95% CI mean difference [0.05, 1.58]). Other pairwise comparisons were not significant ($p < 0.052$). These results showed that natural awe elicited the highest sense of the small self.

3.3 Does awe promote a willingness to donate?

FBF was applied to evaluate the effects of emotion on willingness to donate, with emotion as independent and willingness to donate as dependent variables. Results showed that the influence of emotion on willingness to donate money was not significant ($F_{BF} [4.00, 203.03] = 1.82; p = 0.167; \eta^2 = 0.03$) (Fig. 2A and Table S2).

3.4 Does awe affect the amount of monetary donation?

The FBF F-ratio was used to examine the effect

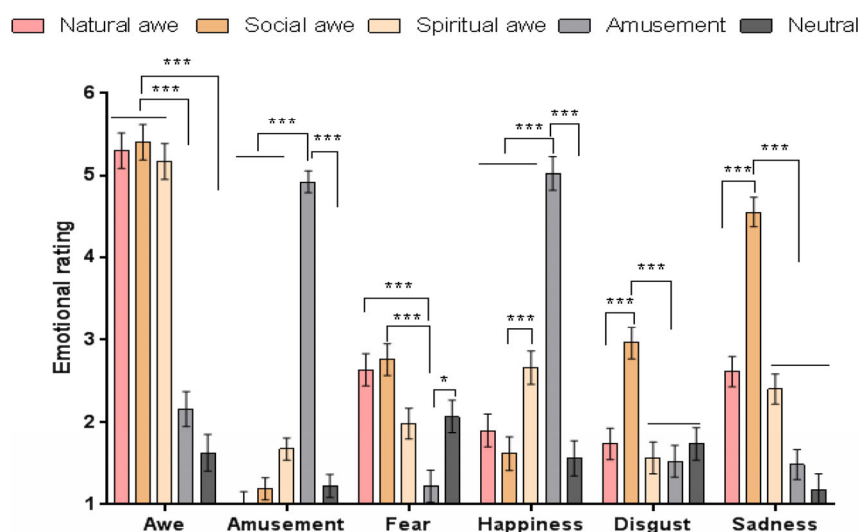


Figure 1 Manipulation checks of emotional elicitation in the post-test. * $p < 0.05$, and *** $p < 0.001$.

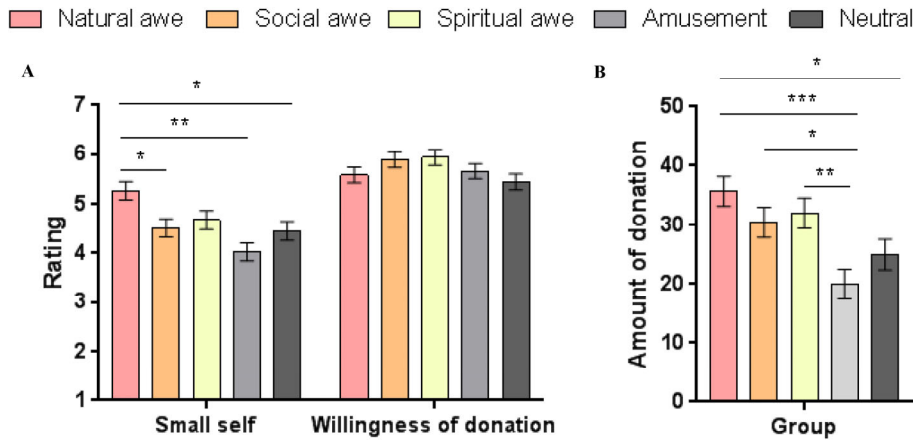


Figure 2 Effects of emotion on sense of the small self, willingness of donation (A), and amount of donation (B) Error bars represent standard errors. * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

of emotion on the amount of donation, with emotion as the independent variable and the amount of donation as the dependent variable. Results showed that the effect of emotion on the amount of donation was significant ($F_{BF} [4.00, 236.05] = 5.75; p < 0.001; \eta^2 = 0.09$) (Fig. 2B and Table S2). The post hoc analysis revealed that participants in each of the three awe groups donated more money than did those in the amusement group ($p < 0.028$). Participants in the natural awe group donated more money than those in the neutral group ($p = 0.043$). The results for other pairwise comparisons were insignificant ($p > 0.908$).

3.5 Mediation analysis

As the effect of awe on willingness to donate was not significant, we did not perform this mediation analysis. To assess whether sense of the small self had a significant mediation effect on the relationship between the different types of awe and amount of donation, in contrast to those for the amusement and neutral groups, we created three models using a bootstrapping procedure on PROCESS 3.1 (Calgary, Canada) [24], with 5000 replications and 95% bias-corrected CI to calculate the indirect effects. Each mediation model included awe as the predictor variable (coded as natural awe = social awe = spiritual

awe = 2; neutrality = -1; amusement = -1), small self as the mediator, and amount of donation as the outcome.

Compared with amusement and neutral groups, natural awe could affect sense of the small self ($\beta = 0.35; 95\% \text{ CI } [0.21, 0.49]; p < .001$), whereas social awe ($\beta = 0.13; 95\% \text{ CI } [-0.03, 0.28]; p = 0.093$) and spiritual awe ($\beta = 0.14; 95\% \text{ CI } [-0.02, 0.30]; p = 0.084$) could not (Fig. 3). For indirect effects, natural awe triggered more monetary donation through sense of the small self (mediation effect = 0.10; 95% CI [0.04, 0.19]; $p = 0.001$), but the mediation effect was insignificant on social awe (mediation effect = 0.03; 95% CI [-0.003, 0.100]; $p = 0.07$) and spiritual awe (mediation effect = 0.04; 95% CI [-0.002, 0.100]; $p = 0.057$). These results

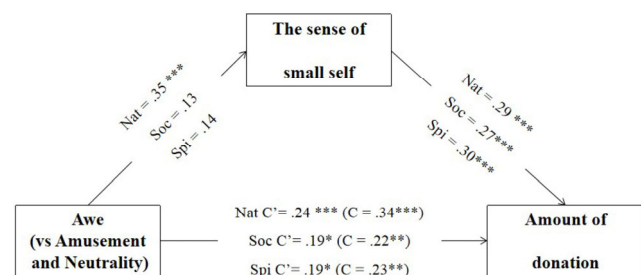


Figure 3 Mediating effect of sense of the small self on the relationship between awe and amount of donation. Note: The predictor variable compares each awe group against the amusement and neutral groups (coding: natural awe = social awe = spiritual awe = 2; amusement = -1; neutrality = -1). Standardized coefficients are displayed. Nat = Natural awe group; Soc = Social awe group; Spi = Spiritual awe group. * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

suggest that only natural awe can influence altruistic behavior through sense of the small self.

4 Discussion

We explored the association between the different types of awe and altruistic behavior, as well as the mediation effect of sense of the small self on the association. Compared with the amusement and neutral groups, awe contributed to a larger monetary donation, but not to willingness to donate money. Furthermore, sense of the small self mediated the relationship between natural awe and altruistic behavior, but it did not explain the link between social or spiritual awe and altruistic behavior.

Previous studies have explored the effect of experiencing awe on prosocial intention and behavior [10, 11, 14]. Piff et al. [11] used perceptually vast stimuli (e.g., towering trees) to induce awe to comprehensively explore its effect on generosity and helping behavior and found that awe strengthened prosocial behavior. Similarly, we observed that awe increased the amount of momentary donation, compared with amusement and neutral elicitors. Particularly, participants donated real money voluntarily and anonymously, which eliminated the possibility that they acted with the expectation of a reward, such as enhancing their reputation in the eyes of the experimenters or other people [12].

As a self-transcendent emotion [8, 19], awe is associated with moments of deep and personal change [25]. When experiencing awe, an individual's attention would shift from the self to the external world and larger entities, which may promote a feeling of concern and a willingness to help others in need [22]. Although we did not observe the promoting effect of awe on the willingness to donate money as Rudd et al., [5] did, participants in the awe groups donated

more money than did those in the amusement and neutral groups. Interestingly, participants in the amusement group donated the least amount of money, which confirms that awe is a distinct positive emotion [15]. The Appraisal–Tendency Framework posits that distinct emotion gives rise to specific cognitive and motivational processes, which account for the effects of each emotion on judgment and decision-making [26]. Amusement and awe share a similar feature that focuses attention away from the self [27]; however, awe has the element of “breaking set” in terms of beliefs about what is possible [19]. Awe pushes individuals to go beyond their existing boundaries and open up their minds. Contrarily, amusement increases irreverence and narcissism [28] and even pushes people to increase their capacity for accepting moral violations [29].

Meanwhile, awe is closely related with mindfulness. An existing study showed that mindfulness training can induce self-transcendence states and a state of awe [30, 31] by relaxing the boundaries of the self and extending the spatial frame of reference further beyond the physical [32]. Mindfulness also improves prosocial behavior [33, 34] and reduces reward salience [35]. One investigation reported that the experience of awe decreased desire for money [18]. Herein, we used monetary donation as the index of prosocial behavior. Therefore, awe may decrease the perceived importance of money and instead increase the tendency of a person to share it with others in need.

Sense of the small self significantly mediated the association between natural awe and altruistic behavior. Prior studies have consistently observed that the small self was the mechanism through which awe improved prosocial behavior when awe was triggered by perceptually vast, overwhelming scenes, such as beautiful natural landscapes, sunsets, or towering trees [9, 11]. Perception of something greater than the self

may imply a diminishment of the concepts and concerns attached to the individual self, thus leading to feelings that the being, concerns, and interests of the individual self are relatively insignificant [36]. Drawing attention to vast natural elicitors is an effective way of diminishing self-importance, which can decrease one's self-focus and serve as an important factor for collective engagement and the collaboration required in social groups [8, 22]. Such a great sense of the small self also allows people to transcend their self-interest and egoism to adjust their conduct according to social norms or their moral values [37]. Thus, changes in altruistic decision-making concerning monetary donation are partially due to the ability of natural awe to increase individuals' sense of the small self.

Notably, we did not observe the mediation effect of sense of the small self on the relationship between social awe or spiritual awe and altruistic behavior. This is consistent with the findings of a previous study by Yang et al. [9], who found that, when the recalling content was not restricted, sense of the small self did not have a mediating effect in interpreting the impact of awe experience on aggressive and prosocial behavior. Social awe (e.g., veterans, moral models) or spiritual awe may elicit awe in a way distinct from that elicited by the perception of greater stimuli than oneself. For one, compared with social or spiritual awe, natural environments, with fearful beauty and sublime magic may be more likely to inspire individuals, thereby promoting their small self [38]. For another, the vastness of natural as awe stimuli can be felt intuitively, whereas the psychological vastness of social or spiritual awe stimuli is more abstract. Researchers have found that emotions induced by social stimuli require an extended representation of oneself as situated within a society [39]. Social awe stimuli may involve higher levels of cognition, such as admiration, inspiration, optimism, and

encouragement [40]. Therefore, non-physical awe would be more likely to trigger more cognitive mechanisms to further influence subsequent behavior, with other mediators, (e.g., connectedness) to interpret the link between them. In addition, Chinese college students may be less sensitive to religion because the number of believers is relatively small [41], which may also be one of the possible reasons for the absence of differences in sense of the small self between the spiritual awe and amusement or neutral groups.

This work expands the current knowledge on awe and provides theoretical and practical implications for increasing altruistic behavior. On the one hand, it offers an insight into awe and its effects on human behavior. Awe is a complex emotion. Different types of awe stimuli have divergent effects on sense of the small self. Sense of the small self may be the major theme of natural awe [1, 11]; however, it may be not indispensable to all types of awe experiences, such as social awe and spiritual awe [42]. Furthermore, this study inspires us to rethink the definition of awe. Schneider [43] defines awe as a co-mingling of "thrill and anxiety," "humility and wonder of living" that invokes the perception of the intricacy and subtleties of life. He also points out that awe cannot be accommodated. Similarly, whether vastness is the core theme to awe also requires further research to validate. On the other hand, this study clarifies the inconsistent mediating effects reported in previous studies on the perspective of the small self. We should recognize that the mechanism of awe on altruistic behavior is complex. Further studies on the association between awe and altruistic behavior should be conducted from other perspectives to obtain a relatively refined and accurate picture of the pathways. Furthermore, the findings of this study suggest that all types of awe have the potential to enhance altruistic

behavior. Therefore, we need to pay attention to cultivating and arousing individuals' feeling of awe. Our study showed that nature, religion, and noble morality can effectively evoke awe, which is consistent with the results of previous studies [11, 42, 44].

The current study has certain limitations that should be noted. First, we elicited awe only by watching curated videos. Whether the results can be replicated through other methods (e.g., recalling and writing) requires further investigation. Second, we only compared the effects of awe and amusement. Differences between awe and other positive emotions, such as pride and gratitude, in terms of their effects and mechanisms on altruistic behavior were not evaluated. Third, all of the participants are Chinese college students, which would also limit the generalization of the results. The findings should be verified in countries with strong religious customs. Lastly, since the direct effect of awe on prosocial behavior remains significant, other possible mediators that were not examined in the present study may exist. As mentioned earlier, awe may lead to the reduction of reward salience, such as money [18]. Therefore, whether desire for money mediates the link between awe and prosocial behavior needs future study.

The present study demonstrated that sense of the small self is a core theme to natural awe. It mediates the link between natural awe and altruistic behavior; however, it could not substantiate the impact of social or spiritual awe on altruistic behavior. This work deepens current understanding of the effects of different awe types. Future studies should be conducted to replicate our findings in other cultures, especially those with strong religious customs, and employ other prosocial indicators. Moreover, the nuances of different awe stimuli when investigating the effects of awe should also be evaluated in future research.

Declaration of conflicting interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author Contribution

LL and YJ: conceived and designed the study; performed the experiments. LL: analyzed the data. LL, YJ and YX: wrote the manuscript. LL and YJ: funding acquisition. All authors contributed to the interpretation of the data and approved the final version of the manuscript.

Acknowledgments

Not applicable.

Funding information

This work was supported by the National Natural Science Foundation of China (grant number NSFC31971018; JiaJin Yuan); Natural Science Foundation-Outstanding Young Scholar Fund of Sichuan Province (grant number 2023NSFSC1938; JiaJin Yuan).

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Ethics approval

Not applicable.

Consent to participate

All patients provided written informed consent

at the time of entering this study.

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