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Social connectedness mediates the effect of awe in reducing dishonest behavior

Li Luo[1] & Jiajin Yuan[2]✉

Dishonest behavior is immoral and can cause harm to relationships and social development. To investigate whether awe can mitigate dishonest behavior from the perspective of self-transcendent emotion, we conducted three studies. In Study 1, 347 college students completed the dispositional awe scale and questions related to dishonest tendencies. The results showed that dispositional awe was negatively related to dishonest tendencies. In Study 2, an experimental approach was taken with 157 participants randomly assigned to awe, amusement, and neutral conditions. The analysis revealed that participants in the awe group exhibited lower levels of dishonest behavior compared to those in the amusement and neutral groups. In Study 3, we further examined the mechanisms underlying this relationship with 210 participants. The results demonstrated that social connectedness, but not the universe connectedness, small self, or authenticity, mediated the effect of awe on reducing dishonest behavior. The findings of the present study suggest that both trait-like and state-like experiences of awe can decrease dishonest behavior, primarily through enhancing social connectedness. Therefore, cultivating the experience of awe is an effective way to improve individuals' ethical decision-making.

Keywords Awe, Self-transcendent emotion, Dishonest behavior, Social connectedness

Dishonesty permeates all levels of human interaction, manifesting in behaviors ranging from mundane daily deceptions to severe corporate fraud and political malfeasance[1]. Dishonest behavior typically involves individuals disregarding rules or sacrificing the interests of others for their own gain, which can harm relationships and hinder social development[1-3]. Given these detrimental consequences, identifying effective interventions to mitigate dishonesty remains a critical challenge for psychological science. The current study examines whether awe, a prototypical self-transcendent emotion, can serve as a psychological deterrent against dishonest acts.

Self-transcendent emotions represent a distinct class of affective experiences that facilitate the transcendence of ego-centric perspectives and promote a shift from self-interest to collective concerns[4]. Awe is a typical self-transcendent emotion[4-7], characterized by its unique capacity to induce feelings of wonder and reverence in response to perceptually or conceptually vast stimuli that challenge one's existing cognitive frameworks[8]. Keltner and Haidt[8] point out that the perception of the vastness of physical stimuli and the need for cognitive adjustment are two major characteristics of awe. In daily life, people often experience awe when witnessing beautiful sunrises and sunsets, admiring magnificent landscapes, encountering influential figures, and visiting extraordinary works of art[9,10].

In recent years, researchers in the field of positive psychology have extensively explored the influence of awe on individual moral behaviors[11-15]. Keltner and Haidt[8] point out that awe is a self-transcendent moral emotion that could encourage individuals to act according to social norms and can inhibit immoral behavior[16]. Empirical studies have found that awe prompts individuals to engage in more moral behaviors, such as sustainable consumer behavior[17], sharing[18,19], and helping others[10,12,13,14,15,20]. Piff, Dietze[14] induced a state of awe and tested participants' moral levels through nine hypothetical scenarios, revealing that the induction of awe significantly enhanced participants' morality. Luo and her colleagues[20] found that both socially elicited awe and naturally elicited awe could increase the real monetary donation. Scenic spots that evoke awe (e.g., Daocheng Yading) lead individuals to adopt stricter moral judgment standards and demonstrate a stronger willingness to practice moral behaviors compared to spots that elicit neutral emotions (e.g., Sanshengxiang in Chengdu)[21]. Furthermore, awe can also reduce behaviors that are immoral or prohibited by laws, such as aggression[22] and corruption[11]. Notably, these effects emerge for both natural and social elicitors of awe, suggesting a robust phenomenon independent of stimulus type.

[1]The Department of Education Science, Neijiang Normal University, Neijiang 641112, China. [2]Sichuan Key Laboratory of Psychology and Behavior of Discipline Inspection and Supervision, Institute of Brain and Psychological Sciences, Sichuan Normal University, Chengdu 610066, China. ✉email: yuanjiajin168@126.com

However, despite this extensive literature on awe's moral influence, its specific impact on dishonest behavior remains an unanswered question. This gap is particularly critical given the unique nature of dishonest behavior. Unlike prosocial acts (e.g., helping, sharing) that actively benefit others or overt aggressive behaviors that directly cause harm, dishonest behaviors (e.g., lies, tax evasion) are characterized by two defining features: (1) their covert nature, relying on deception rather than overt action, and (2) their self-interested motivation, prioritizing personal gain over others' welfare[23]. Whereas prosocial behaviors (e.g., helping) typically occur in observable social contexts and involve other-focused concerns[24], dishonest acts often emerge in situations with limited social monitoring[25] and entail complex trade-offs between moral standards and self-interest[26]. Therefore, these distinctive characteristics highlight the need for specific investigation of awe's relationship with dishonest behavior. In addition, despite the prevalence of dishonest behaviors in daily life and their significant social impacts[1,25], the relationship between awe and dishonesty remains surprisingly understudied. This investigation represents an important theoretical extension of the awe literature into nuanced moral contexts where behavior is driven by concealed motives rather than visible social outcomes.

The moral foundation theory argues that moral emotions, particularly self-transcendent moral emotions, are crucial in shaping moral behavior as they can inspire individuals to prioritize the welfare of others over their own self-interest (Haidt, 2007; Jacobs & McConnell, 2022). When people are confronted with awe-inspiring objects, the powerful experience of awe may foster a sense of connection to a larger collective group [12,27,28] and activate moral intuitions and consciousness[21,29,30], reinforcing a sense of right and wrong. Therefore, based on previous research and theories, we hypothesized that awe would significantly decrease individual engagement in dishonest behaviors (H1).

Prior research has examined potential mechanisms underlying awe's effects on moral behavior, focusing primarily on three pathways: small self, connectedness, and authenticity. The small self refers to the diminished perception of oneself when confronted with something vast and transcendent[14]. According to the small self theory, awe arises when individuals encounter stimuli that transcend their existing mental frameworks, leading them to perceive themselves as part of a larger collectiveness[8]. This perspective shift has been shown to promote moral and prosocial outcomes, including more equitable resource distribution in economic games[14], increased helping and collective behavior[10,14,20,22]. However, the evidence for the mediation of small self remains inconsistent. While some studies support its mediating role, others have failed to replicate these findings[12,20,22]. This inconsistency suggests that the small self may not reliably explain awe's effects on dishonest behavior. We therefore hypothesize that the mediating effect of the small self in the relationship between awe and dishonest behavior may be uncertain (H2).

Connectedness refers to the sense of unity with broader entities, including society, nature, humanity, and the universe[31]. Self-transcendence theory proposes that emotions such as awe and gratitude fundamentally strengthen social bonds, connecting oneself with others and expanding one's boundaries beyond the self[4]. Social control theory posits that strong social bonds inhibit deviant behavior and reinforce moral obligations[32,33]. A number of studies suggest that individuals might experience the sense of connectedness when they are in a state of awe[12,28,31,34]. How individuals perceive their connectedness with others, the world, and nature can have an impact on their behaviors[11]. For instance, a wealth of converging evidence has revealed that perceiving a sense of connectedness with nature can boost pro-environmental behaviors[35,36]. When people perceive a sense of connection with society, it can facilitate prosocial behaviors like donating, cooperating, and sharing, while also reducing immoral behaviors and crime[11,12,37,38,39]. Based on the evidence, we put forward the hypothesis that the sense of connectedness, particularly social connectedness, mediates the relationship between awe and dishonest behavior (H3).

Recent research has expanded the investigation of awe's moral effects by incorporating the concept of authenticity—the psychological state of aligning one's actions with their true self[40,41]. Authenticity involves both self-awareness ("being aware of one's experiences, thoughts, and emotions") and self-congruent behavior ("acting in accordance with deeply held values"). Studies have found that induced awe can significantly enhance individuals' authentic pursuit[7,42], which in turn improve cognitive empathy , increase helping willingness and inhibit immoral behaviors like dishonesty[40] or rule-breaking assitance[7]. Therefore, we hypothesized that awe could enhance authenticity and then inhibit dishonest behavior (H4).

To test these hypotheses, three studies were conducted. Study 1 adopted a questionnaire-based method to explore whether there is a negative correlation between dispositional awe and the willingness to sell masks at high prices during the epidemic. Such a behavior was regarded as dishonest[43]. Study 2 employed an experimental approach to figure out whether state-like awe could prevent individuals from seeking financial gains through dishonest ways. Study 3 delved deeper into the mechanisms through which awe alleviated dishonest behavior from the perspectives of small self, connectedness, and authenticity. This study was conducted in accordance with the Declaration of Helsinki, and ethical approval was obtained from Neijiang Normal University Institutional Review Board (Protocol number: 20230001). In Studies 2 and 3, the emotion of amusement was selected as a comparison. This is because amusement is a positive emotion which, similar to awe, can be elicited by incongruity and has the effect of diverting attention away from the self[12,14,29]. Following the framework proposed by Simmons et al.[44], we report the rationale and procedure for determining sample size, all criteria and instances of data exclusion, all experimental manipulations, and all measures (including assessment tools and scoring methods) used in all studies.

Study 1

Methods

Participants

We used the correlation tool in G*Power to determine the required number of participants, with a moderate effect size of 0.3 and power of 0.8, indicating a minimum of 64 participants was required. A total of 347 college

students (N_{female} =195, N_{male} = 152) from Neijiang Normal University participated in this survey online. Their age ranged from 18 to 24 (M = 20.39, SD = 1.14). Prior to beginning the online questionnaire, participants provided informed consent and were informed that they would receive ¥5 upon completion of the survey.

Materials

Dispositional awe The awe sub-scale in the Dispositional Positive Emotion Scale (DPES-awe) was utilized to evaluate participants' trait awe (Shiota et al., 2006). The DPES is designed to assess dispositional tendencies to experience specific positive emotions, such as love, compassion, joy, and awe. According to the purpose of this study, only awe was measured. The DPES-awe comprises 6 items, such as "I often feel awe". Participants were required to rate each item on a 7-point scale (1 - strongly disagree; 7 - strongly agree). A higher score indicates a greater tendency towards dispositional awe. The Cronbach's alpha for the scale in the current study was 0.91.

Dishonesty There was one item assessing dishonesty, that is, "During the epidemic, masks are urgently needed as a medical supply and are in short supply. If you were a boss, to what extent would you sell them to consumers at a high price?" Participants answered this question on a scale from 1 (not at all) to 7 (very much). A higher score indicated a higher level of dishonesty. Price gouging was considered as dishonesty due to its implicit violation of market fairness norms, which may mislead consumers about the reasonable price range during a crisis, aligning with definitions of the dishonesty as covert norm violations[23,45].

Data analysis

We conducted descriptive and regression analysis in SPSS 26.0 (SPSS Inc, Chicago, IL, USA).

Ethical approval

All aspects of the study design and procedures were approved by the Neijiang Normal University Institutional Review Board (Protocol number: 20230001).

Informed consent

All participants provided informed consent.

Results

The mean for the willingness to sell masks at inflated prices was 2.23, with a standard deviation (SD) of 1.54. Meanwhile, the mean value of the dispositional awe was 5.38, and its standard deviation was 1.07. We utilized linear regression to examine the prediction of dispositional awe on the willingness to sell masks at inflated prices. The findings indicated that individuals with lower dispositional awe were more likely to sell masks at inflated prices, β = -0.24, t (344) = -4.65, $p < 0.001$. Even when controlling for age, area (coding as: 1-rural, 2-urban), and gender (coding as: 1-male, 2-female), the effect was also significant, β = -0.19, t (344) = -3.67, $p < 0.001$. These results suggest that higher dispositional awe is associated with reduced willingness to engage in dishonest price gouging.

In this study, we conducted a cross-sectional survey to explore the relationship between dispositional awe and dishonesty and found that dispositional awe negatively predicted dishonest tendencies. However, this study has several limitations. First, as a correlational design, it cannot establish a causal relationship between dispositional awe and dishonest behavior. Second, the use of a single-item measure to assess price gouging represents a context-specific operationalization of dishonesty, which may limit the generalizability and reliability of the findings. Therefore, in Study 2, we adopted an experimental approach to further examine the effect of state awe on dishonest behavior.

Study 2

Methods

Participants

The repeated measures ANOVA in G*power[46] was used to calculate the required sample size, with a moderate effect size (f) set at 0.25, power (1 - β) set at 0.8, and α set at 0.05 (two-tailed). It was indicated that a minimum of 42 participants was required. A total of 160 participants took part in the study, with 3 participants excluded due to unsuccessful data recording. Therefore, valid data for analysis included 157 participants (N_{awe} = 53; $N_{amusement}$ = 52; $N_{neutral}$ = 52). There were 128 females (N_{awe} = 49; $N_{amusement}$ = 38; $N_{neutral}$ = 41). There was no significant difference in gender distribution across the three conditions, χ^2 (22) = 3.26, p = 0.07. The mean age of participants was 19.97 years (SD = 1.24), with the range from 18 to 23. All participants were given written informed consent.

Research design

We used a 3 × 2 mixed design, including emotional conditions (awe, amusement, neutrality) as the between-subject factor and consistent conditions (consistency, inconsistency) as the within-subject factor. The dependent variable measured was accuracy in a visual-perception task[47], which served as an indicator of dishonest behavior. The lower the accuracy rate, the less honest the individual.

Materials and procedure

After obtaining written consent, participants were randomly assigned to one of the three emotional groups: awe, amusement, or neutrality. First, participants reported their current emotional experience regarding 'pride', 'fear', 'happiness', 'disgust', 'awe', and 'amusement' on a 7-point scale (1 = not at all, 7 = very strong) as the emotional baseline[14,20]. They were then randomly assigned to one of the emotional groups to watch a video. Participants in the awe condition viewed a video showcasing magnificent nature scenes such as waterfalls, oceans, and

mountains, as well as the relationship between humans and nature, with a duration of 1'59". Those in the amusement condition watched a segment from the comedy film Flirting Scholar lasting 4'23". Participants in the neutral condition watched a 4'23" traffic recording video. Although the durations of the videos vary, we found the manipulation check was effective that videos can induce the target emotions. Furthermore, these videos have been proven to effectively evoke the intended emotions[20]. After viewing videos, participants reevaluated their current emotions as a manipulation check.

Next, participants completed a visual-perception task to assess their dishonest behavior[47]. In this task, participants were shown an image of a square bisected into two rectangles by a line. Each rectangle contained 20 dots scattered unevenly on either side of the line. On each trial, participants had to press a button to indicate whether there were more dots on the left or right side of the rectangle. They received 20 points for each response that identified more dots on the right side and 1 point for each response that identified more on the left side. In the consistent condition, there were more dots on the right side of the rectangle, whereas in the inconsistent condition, there were more dots on the left side. Participants were informed before the formal experiment that their payment would be based on the number of points earned rather than the correctness of their responses. Therefore, participants had the opportunity to lie on the inconsistent condition trials to increase their payment[47].

For each trial (see Fig. 1), a 300 ms "+" fixation point was first presented in the center of the screen. The target stimuli were then displayed, and participants were required to respond quickly. If they perceived more dots on the left side, they should press "F"; if they thought more dots on the right side, they should press "J". Following their response, feedback was shown for 1000ms indicating the number of points earned in that trial. The experiment consisted of 10 practice trials, followed by 200 formal experiment trials, which were divided into two groups of 100 trials each. There were 100 contained more dots on the right side (consistent condition). Participants who correctly identified this were deemed honest. In the remaining 100 trials, there were more dots on the left side. Participants who claimed there were more dots on the right side in these trials were considered to have cheated. The lower the accuracy rate, the less honest the participant is. Upon completion of the DPES-awe (Cronbach's alpha = 0.87)[48] and providing demographic information, participants were compensated based on their performance. No participants expressed any suspicion regarding the purpose of the experiment.

Data analysis

We conducted analysis of descriptive statistics and repeated ANOVA in SPSS 26.0 (SPSS Inc, Chicago, IL, USA).

Ethical approval

All aspects of the study design and procedures were approved by the Neijiang Normal University Institutional Review Board (Protocol number: 20230001).

Informed consent

All participants provided informed consent.

Results

Manipulation checks

We employed MANOVA and Bonferroni for post-hoc tests to analyze the effectiveness of our manipulations [12]. The pre-test revealed no differences among the three conditions in terms of self-reported emotions: 'pride', 'fear', 'happiness', 'disgust', 'awe', and 'amusement', with $ps \geq 0.056$.

The post-test results indicated that participants in the awe condition experienced a significantly stronger feeling of awe ($M = 5.38$, $SD = 1.43$) compared to those in the amusement condition ($M = 1.89$, $SD = 1.43$; 95% confidence interval [2.72, 4.27]) and the neutral condition ($M = 3.50$, $SD = 2.15$; 95% confidence interval [1.10, 2.66]), F (2, 154) = 59.30, $p < 0.001$, $\eta^2 = 0.44$. Conversely, participants in the amusement condition reported a higher level of amusement ($M = 4.87$, $SD = 1.46$) than those in the awe condition ($M = 1.21$, $SD = 0.69$; 95%

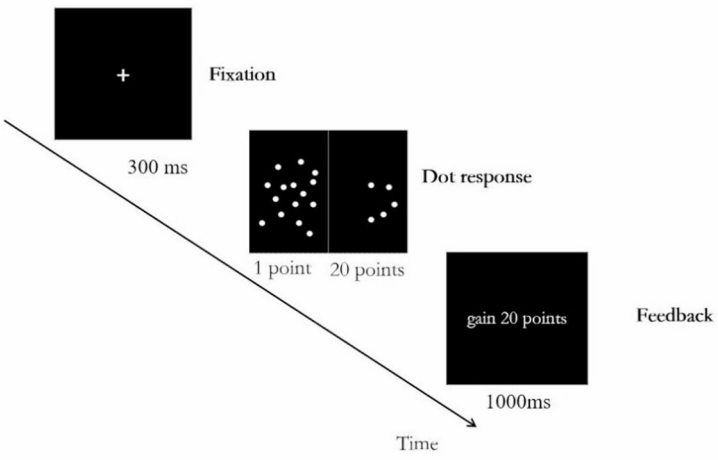

Fig. 1. One trial of the visual-perception task.

confidence interval [3.14, 4.14]) and the neutral condition ($M = 1.33$, $SD = 0.88$; 95% confidence interval [3.02, 4.02]), F (2, 154) = 198.57, $p < 0.001$, $\eta^2 = 0.71$. Furthermore, participants in the awe condition experienced a stronger feeling of awe compared to other five emotions, $ps < 0.001$, and participants in the amusement condition felt a greater experience of amusement than others, $ps < 0.001$. In all, these results suggest that emotional manipulation was effective across all conditions.

We also used MANOVA and Bonferroni to compare other post-test emotions among three conditions, and the results found that pride, fear, happiness, and disgust in the awe condition were all higher than in the amusement condition ($ps < 0.009$), happiness in amusement condition was higher than that in neutral condition ($p < 0.001$), and pride in neutral condition was higher than that in amusement condition ($p = 0.003$). Other comparisons were non-significant, $ps > 0.053$. The details were shown in the supplementary material of Table S1.

The effect of awe on dishonest behavior

We performed a 2 × 3 repeated measures ANOVA to investigate the impact of emotion and consistency on dishonesty. The main effect of emotion was found to be significant, F (2,154) = 4.08, $p = 0.019$, $\eta^2 = 0.05$. We performed post-hoc pairwise comparisons using the Bonferroni method[49]. Results showed that accuracy was higher in the awe condition ($M = 95.66$, $SD = 1.24$) compared to the amusement condition ($M = 91.07$, $SD = 1.25$; $p = 0.03$; 95% confidence interval of the difference [0.33, 8.85]) and there was no difference on other comparisons ($ps > 0.07$). The main effect of consistency was significant, F (1,154) = 14.09, $p < 0.001$, $\eta^2 = 0.09$. The accuracy rate was higher in the consistent condition ($M = 95.15$, $SD = 0.66$) as opposed to the inconsistent condition ($M = 90.41$, $SD = 1.18$; $p < 0.001$; 95% confidence interval of the difference [2.25, 7.24]).

The interaction between emotion and consistency was also significant, F (2,153) = 4.55, $p = 0.012$, $\eta^2 = 0.06$. Simple effect analysis indicated that there were no differences among the three emotional groups under the consistent condition, $ps > 0.76$. However, under the inconsistent condition, accuracy in the awe group ($M = 95.91$, $SD = 2.03$) was significantly higher than in the amusement ($M = 86.87$, $SD = 2.05$; $p = 0.002$; 95% confidence interval of the difference [3.34, 14.74]) and neutral groups ($M = 88.46$, $SD = 2.05$; $p = 0.011$; 95% confidence interval of the difference [1.74, 13.15]). The accuracy was not different between amusement and neutral groups ($p = 0.583$; 95% confidence interval of the difference [-4.13, 7.32]). Moreover, there was no significant disparity in accuracy rates between the consistent and inconsistent conditions in the awe group, $p = 0.822$; 95% confidence interval of the difference [-4.78, 3.80]; but significant differences were observed between these conditions in the amusement ($p < 0.001$; 95% confidence interval of the difference [4.07, 12.74]) and neutral groups ($p = 0.005$; 95% confidence interval of the difference [1.97, 10.64]). These findings suggest that awe can deter individuals from engaging in dishonest behavior. The results are shown in Fig. 2.

Even after controlling for the influence of gender, age, and area, the impacts of emotion ($F(1,143) = 4.98$, $p = 0.008$, $\eta^2 = 0.07$) and the interaction of emotion and consistency ($F(2,143) = 5.92$, $p = 0.003$, $\eta^2 = 0.08$) on dishonest behavior remained significant.

In all, Study 2 examines the mitigating effect of awe on dishonest behavior by inducing state experience of awe. The results show that awe can inhibit dishonest behavior even when there is an opportunity to strive for more self-interests. A limitation of Study 2 is that while videos were used to induce target emotions, the equivalence of video duration was not controlled. To address this, Study 3 utilized videos of identical length for all conditions. Additionally, Study 3 advanced the investigation by examining the mediating mechanisms of awe's effect on dishonest behavior, including social connectedness, universe connectedness, small self, and authenticity.

Study 3

Methods

Participants

We conducted a priori power analysis using G*Power to calculate the required sample size[46], with a moderate effect size (f) set at 0.25, power (1 - β) set at 0.8, and α set at 0.05 (two-tailed). It is indicated that a minimum of 126 participants was needed. A total of 210 participants from the Credemo website took part in the study, divided evenly and randomly into three groups with 70. There were 99 females ($N_{awe} = 35$, $N_{amusement} = 32$, $N_{neutral} = 32$) and there was no significant difference in gender composition across the three groups, χ^2 (2) = 0.34, $p = 0.843$. The mean age was 31.13 years ($SD = 10.67$; range = 18–59). All participants were provided with detailed information and gave their informed consent before joining the study.

Materials and procedure

We adopted a single factor experimental between-subject design where the independent variable was emotion with three levels, namely awe, amusement, and neutrality. Participants completed the experiment through the Credemo online platform. After reading and agreeing to the informed consent, they were randomly assigned to different emotional conditions. Then, they completed the same procedures as in Experiment 2 including the pretest of emotion self-rating, video viewing, and post-test of emotion self-rating. In the self-reported emotions, we replaced "pride" with "boredom". The duration of each video was 4'23".

Then, participants completed the measures related to connectedness[12], small self[14], and authenticity[50]. The connectedness scale was used to measure the sense of contact with the outside world, which has 10 items, including the two dimensions of social connectedness (e.g., "Right now, I felt closely connected to humanity") and universe connectedness (e.g., "Right now, I had the sense of being connected to everything"). The Cronbach's alpha for this scale in the current study was 0.80. The measure of small self has two items (e.g., "Right now, I feel insignificant") and the Cronbach's alpha is 0.90. The state Southampton Authenticity Scale was adopted to measure self-authenticity (e.g., "Right now, I feel true to myself") and the Cronbach's alpha is 0.74. All three scales adopted a 7-point scale from 1 (strongly disagree) to 7 (strongly agree).

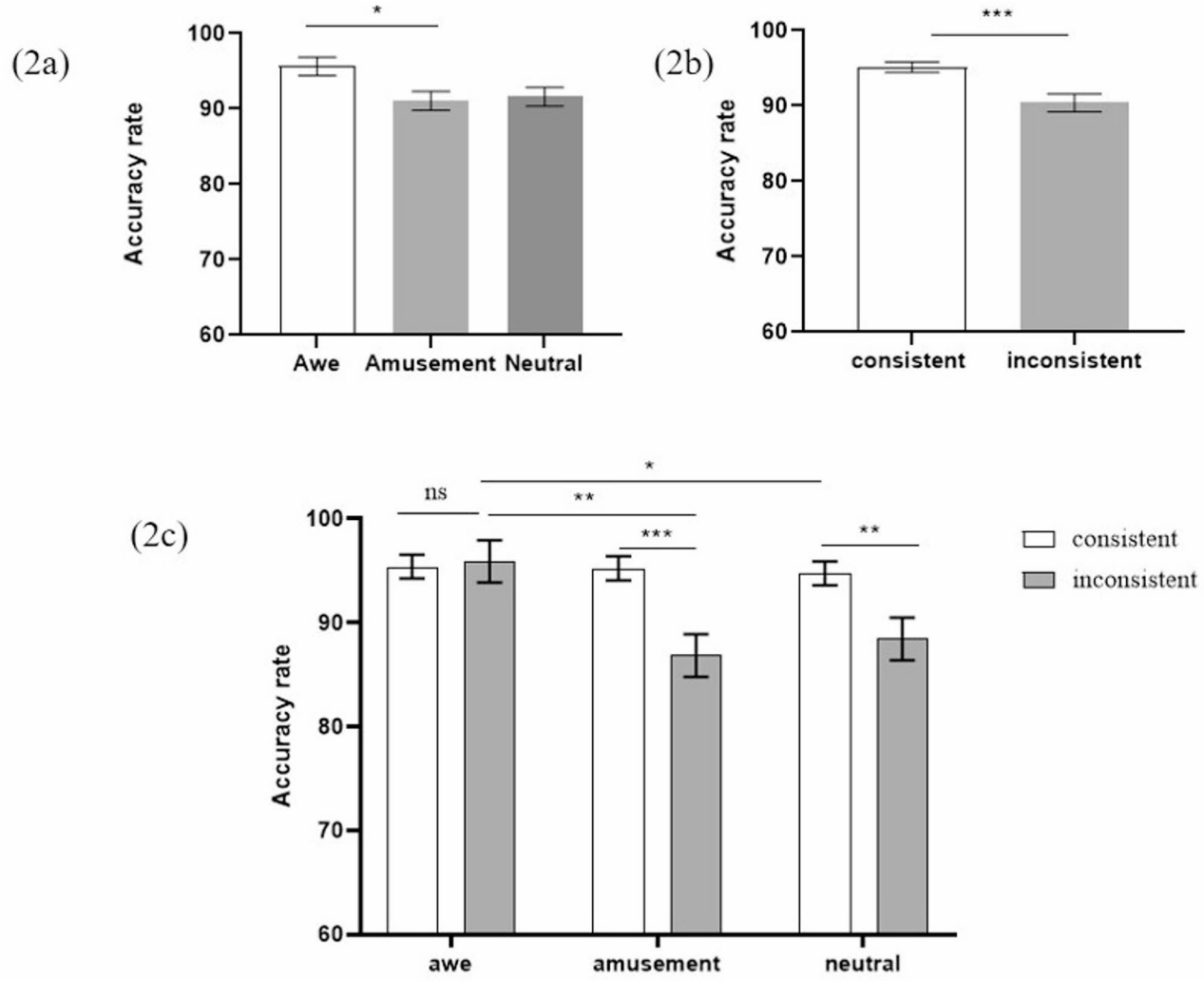

Fig. 2. The main and interaction effects of emotion and consistency on dishonest behavior. Figure 2a shows the means and comparisons of dishonest behavior among different emotional conditions. Figure 2b shows the means and comparisons of dishonest behavior between consistent and inconsistent conditions. Figure 2c indicates the interaction effect of emotion and consistency on dishonest behavior. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

After that, participants were instructed to complete a 20-question psychological knowledge test and were told that scoring in the top 10% would give them a chance to earn an extra ¥5, though in fact each received ¥8[40]. Before starting to answer, they were asked to prepare pen and paper. While answering on the computer, they had to write answers on paper for verification. After they finished answering the questions, we informed the participants that due to the large number of participants taking part in the study, we couldn't check their answers one by one, so they can check their answers according to the key and fill in the correct number on the online platform, creating a chance to cheat. The dishonesty index was calculated as the difference between their self-reported correct counts and actual accuracy, with a larger discrepancy indicating higher levels of dishonesty.

Last, participants completed the DPES-awe (Cronbach's alpha = 0.63)[48] and provided demographic information. One-way ANOVA showed that there was no significant difference in dispositional awe among the three groups, $F(2, 207) = 1.25$, $p = 0.29$. In addition, to improve the data reliability, we set lie detection items, and all the participants passed them.

Data analysis

We performed descriptive statistics and ANOVA analyses using SPSS 26.0. For mediation analysis, we adopted a dual analytical approach: (1) traditional structural equation modeling (SEM) with maximum likelihood estimation in AMOS, and (2) Bayesian mediation analysis in JASP[51]. Traditional SEM provided point estimates with p-values for null hypothesis testing, while Bayesian methods—offering distinct advantages for evaluating null effects[48]—yielded posterior distributions to quantify evidence for effects. In the SEM framework, we assessed indirect effects using a parametric bootstrap procedure with 5,000 replications, reporting 95% bias-corrected confidence intervals (CIs); effects were considered significant if CIs excluded zero. For Bayesian

analysis, parameters were estimated via Markov chain Monte Carlo (MCMC) sampling with 20,000 iterations per chain (first 50% discarded as burn-in). Convergence was ensured (all R-hat values < 1.05), and posterior distributions were examined for 95% credible intervals. This dual methodology allowed robust evaluation of all hypothesized pathways through both frequentist and Bayesian paradigms.

Ethical approval
All aspects of the study design and procedures were approved by the Neijiang Normal University Institutional Review Board (Protocol number: 20230001).

Informed consent
All participants provided informed consent.

Results

Manipulation checks
We performed a MANOVA to assess the manipulation effectiveness just like in study 2. For the pre-test emotion, no differences were found among the three conditions in terms of self-reported emotions: 'boredom', 'fear', 'happiness', 'disgust', 'awe', and 'amusement', with $ps \geq 0.134$. The post-test results showed that participants in the awe condition ($M = 6.34$, $SD = 0.88$) felt a significantly stronger sense of awe compared to those in the amusement ($M = 2.79$, $SD = 1.75$; 95% confidence interval [2.72, 4.27]) and the neutral condition ($M = 3.21$, $SD = 1.63$; 95% confidence interval [1.10, 2.66]), F (2, 207) = 121.60, $p < 0.001$, $\eta^2 = 0.54$. Conversely, participants in the amusement condition reported a higher level of amusement ($M = 5.89$, $SD = 0.54$) than those in the awe condition ($M = 1.51$, $SD = 1.41$; 95% confidence interval [3.14, 4.14]) and the neutral condition ($M = 1.97$, $SD = 1.39$; 95% confidence interval [3.02, 4.02]), F (2, 207) = 261.00, $p < 0.001$, $\eta^2 = 0.72$. Furthermore, participants in the awe condition experienced a stronger feeling of awe compared to amusement, F (1, 68) = 1005.98, $p < 0.001$, $\eta^2 = 0.94$, 95% confidence interval [4.53, 5.13], while participants in the amusement condition felt a greater experience of amusement than awe, F (1, 68) = 1378.61, $p < 0.001$, $\eta^2 = 0.95$, 95% confidence interval [2.50, 3.70]. These results suggest that emotional manipulation was effective across all conditions.

The results of other post-test emotions among three conditions mainly showed that fear in the awe condition was higher than it in amusement and neutral conditions ($ps < 0.001$); happiness in the amusement condition was higher than it in awe and neutral conditions ($ps < 0.001$). Descriptive statistics of emotional ratings can be found in Table S2 of the Supplementary Materials.

The effect of awe on dishonest behavior
One-way ANOVA and Bonferroni for Post-hoc pairwise comparisons were used to investigate the impact of emotion on dishonesty. While there was no difference in the actual correct number (F (2, 207) = 0.39, $p = 0.676$, $\eta^2 = 0.01$) and reported correct number (F (2, 207) = 1.31, $p = 0.271$, $\eta^2 = 0.01$) among the three emotional conditions, the effect of emotion was found to be significant on the overreporting correct count, F (2, 207) = 3.53, $p = 0.031$, $\eta^2 = 0.03$. Specifically, the overreporting correct count was lower in the awe condition ($M = 0.03$, $SD = 2.29$) than in the amusement condition ($M = 1.13$, $SD = 3.01$; $p = 0.026$; 95% confidence interval of the difference [0.10, 2.10]). Other comparisons was not significant, $ps > 0.477$. These results showed that awe can mitigate dishonest behaviors. These effects of emotion on dishonest behavior remained significant when controlling for gender, age, and area, F (2, 204) = 3.38, $p = 0.036$, $\eta^2 = 0.03$). The results are shown in Fig. 3.

The effect of awe on small self, connectedness, and authenticity
Using MANCOVA, it was found that emotion could influence the sense of universe connectedness (F (2, 207) = 7.32, $p < 0.001$, $\eta^2 = 0.07$), social connectedness (F (2, 207) = 5.06, $p < 0.001$, $\eta^2 = 0.06$), small self (F (2, 207) = 24.48, $p < 0.001$, $\eta^2 = 0.19$), and authenticity (F (2, 207) = 3.24, $p < 0.001$, $\eta^2 = 0.03$). The results of post-

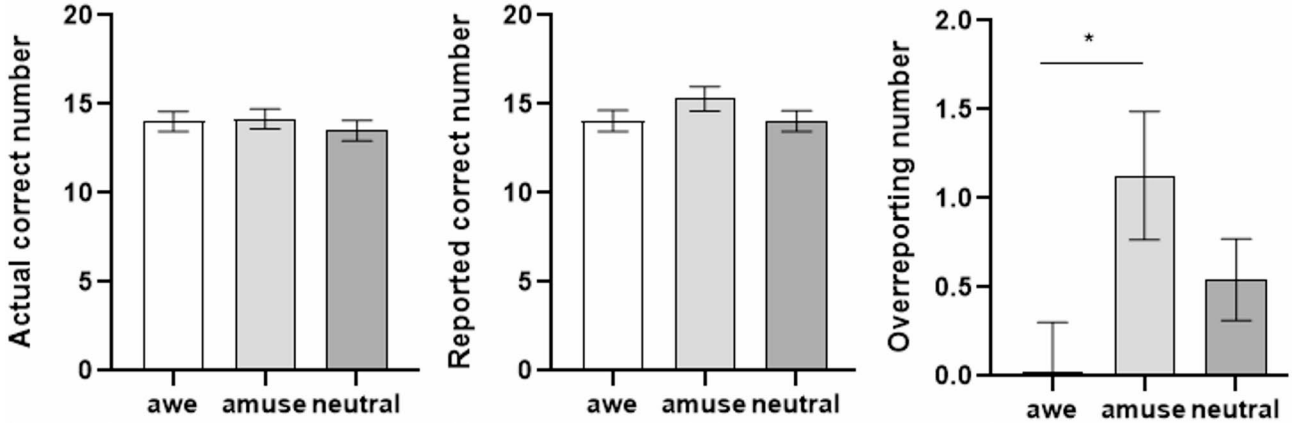

Fig. 3. The effects of emotions on actual correct number, reported correct number, and overreporting number. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

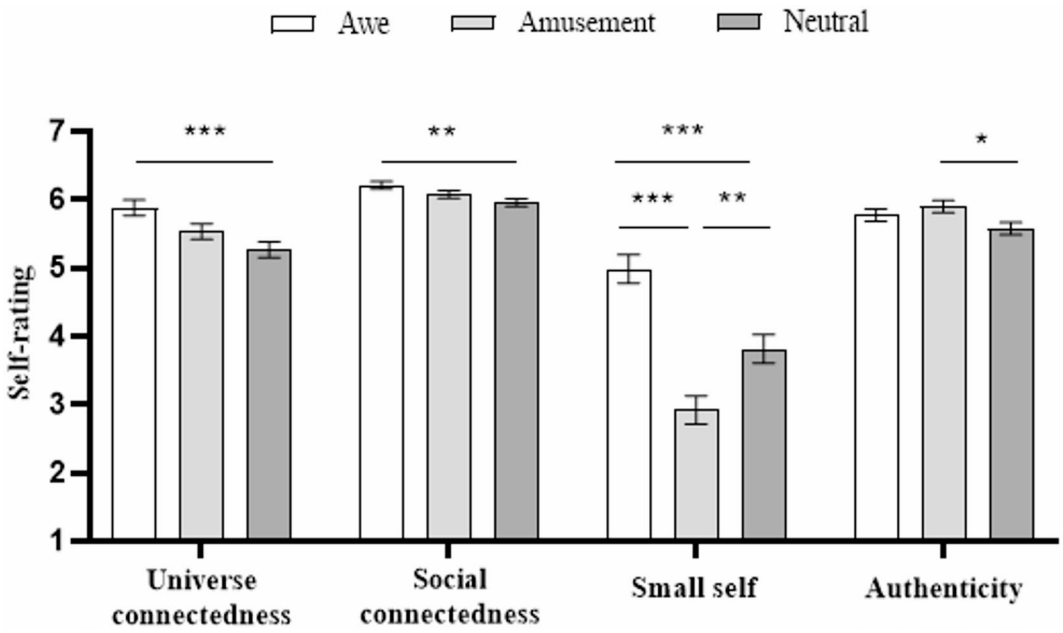

Fig. 4. The effects of emotions on connectedness, small self, and authenticity.

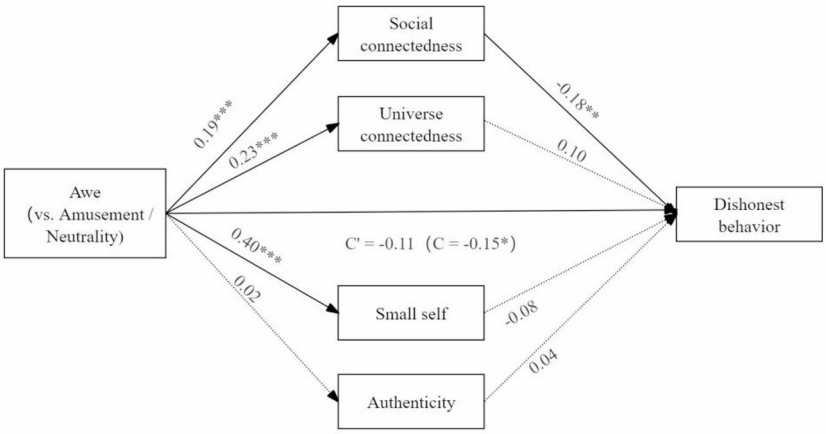

Fig. 5. The mediation effects analysis between awe and dishonest behavior. All path coefficients were standardized, and dashed lines denoted insignificant paths. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

hoc comparation revealed that awe improved small self, social connectedness, and universe connectedness compared to both amusement and neutral groups, $ps < 0.001$. Additionally, the amusement group exhibited greater authenticity than the neutral group, $p = 0.037$. These findings are presented in Fig. 4.

The mediation analysis

We performed a traditional mediation analysis with group (dummy-coded: awe = 1, amusement/neutral = 0) as the independent variable, social connectedness, universal connectedness, small self, and authenticity as parallel mediators, and overreporting correct count (dishonest behavior) as the dependent variable. The model demonstrated acceptable fit indices, χ^2 (3) = 4.01, $p = 0.26$, *CFI* = 0.99, *NFI* = 0.98, *TLI* = 0.98, *GFI* = 0.99, *RMSEA* = 0.04, see Fig. 5. Results revealed a significant total effect of awe on reducing dishonest behavior (β = -0.15, 95% CI [-0.25, -0.04], $p = 0.014$), and the direct effect was not significant (β = -0.11, 95% CI [-0.25, 0.03], $p = 0.128$). For the indirect effects, only social connectedness emerged as a significant mediator (mediation effect = -0.03, 95% CI [-0.07, -0.01], $p = 0.002$, Proportion Mediated = 20%), suggesting awe influences honesty primarily through enhanced social bonds. By contrast, Mediation via universal connectedness (indirect effect = 0.02, 95% CI [-0.01, 0.08], $p = 0.109$), small self (indirect effect = -0.03, 95% CI [-0.09, 0.04], $p = 0.345$), and authenticity (indirect effect = 0.001, 95% CI [-0.01, 0.02], $p = 0.63$) were not significant. These findings indicate that awe's dampening effect on dishonesty can be explained by increased social connectedness. After controlling for dispositional awe and demographic variables including gender, age, educational level, and rural-urban area, the

result of total effect (β = -0.16, 95% CI [-0.26, -0.04], $p = 0.011$) and mediation effect of social connectedness (β = -0.03, 95% CI [-0.07, -0.01], $p = 0.006$) remained significant. This indicates that the inhibitory effect of awe on dishonest behavior and the mediating role of social connectedness is stable.

The Bayesian mediation analysis yielded consistent findings, revealing a significant total effect of awe on dishonest behavior (posterior mean = -0.33, 95% credible interval [-0.63, -0.03]). However, the direct effect was non-significant (posterior mean = -0.24, 95% credible interval [-0.56, 0.08]). Regarding indirect effects, only social connectedness demonstrated a significant mediation effect (posterior mean = -0.07, 95% credible interval [-0.17, -0.004]). In contrast, the mediation effects through other pathways were non-significant: universal connectedness (posterior mean = 0.05, 95% credible interval [-0.04, 0.16]), small self (posterior mean = -0.06, 95% credible interval [-0.20, 0.06]), and authenticity (posterior mean = 0.002, 95% credible interval [-0.03, 0.04]).

Study 3 replicated the finding that awe mitigated dishonest behavior and further revealed that only social connectedness emerged as a significant mediator, while universe connectedness, small self, and authenticity did not.

Discussion

The current study explored the relationship between awe and dishonest behavior and examined the mediation effects of small self, connectedness, and authenticity through a combination of questionnaire surveys and experimental research approaches. The findings suggest that both trait-like and state-like awe negatively predict dishonest behavior. Moreover, it is social connectedness, rather than universal connectedness, small self, or authenticity, that plays a mediating role in this relationship.

Those with higher levels of awe are less likely to inflate prices for personal profits and state-like awe also mitigates dishonest behavior for improper benefits, as participants in the awe condition are less likely to lie for higher experimental rewards compared to those in neutral and amusement groups. These findings are consistent with previous research, which shows that awe leads to stricter moral judgments, closer adherence to ethical standards, and more ethical behaviors[14,16,21]. As a moral emotion, awe promotes self-transcendence, broadens attentional resources and shifts focus from self to the external world, reducing egocentrism and concerns for personal gain[4,12]. Existing literature indicates that individuals in awe prioritize public interests and often exhibit self-sacrifice and prosocial behaviors[13], even considering others' needs when self-interest conflicts[12,20]. All these collectively demonstrate that those in a state of awe tend to adopt higher moral standards, enhance moral behaviors and reduce unethical conduct, thus supporting the present research.

Despite awe and amusement sharing similar characteristics, such as a positive valence[12,14,52] and the attention shift from the self to external stimuli[29], our research found that the experience of amusement did not mitigate dishonest behavior. Previous studies also discovered that participants in the amusement group behaved less prosocially, e.g., donating less money than those in the awe group[12,20] and sharing fewer raffle tickets with others[14]. Amusement is not a moral emotion; instead, it may notably increase irreverence and narcissism[53] and, in turn, enhance tolerance and capacity for unethical behavior[54]. Furthermore, according to the appraisal tendency framework of emotion[55], each specific emotion possesses distinct core appraisal tendencies, which ultimately influence moral evaluations and behaviors[56]. Awe tends to make individuals feel insignificant and humble, integrating the self into a larger entity and enhancing social connections[12,28,57]. This can encourage individuals to engage in more moral and collective behaviors and reduces self-serving actions[10,13]. On the contrary, amusement lacks these characteristics and appraisal tendencies, instead being associated with individual pleasure and satisfaction[5,56], which can increase immoral conduct.

While previous studies have explored the mechanisms between awe and prosocial or moral behavior from aspects like connectedness, small self, or authenticity, both the results of traditional and Bayesian mediation analysis reveal that awe curbs dishonest behavior specifically by strengthening social connectedness. This aligns with prior literature showing awe's role in evoking collective consciousness and promoting prosocial behavior[12,28,37,38,58,59]. On the one hand, awe, triggered by vast and transcendent entities, encourages individuals to transcend personal boundaries and build broader social connections[4,28,60]. For instance, astronauts experience an overview effect looking at Earth from space, transcending identity boundaries[28]. On the other hand, social control theory supports that stronger social bonds lead to conformity with moral norms and inhibition of immoral behavior[32]. Stuart and Taylor[39] explored how social connectedness in U.S. cities from 1960 to 2009 affected crime, finding it significantly reduced various crimes, especially murders among youths in gangs and drug activities. Collectively, these evidences back up the present findings.

Notably, alternative pathways such as the small self, universal connectedness, and authenticity did not emerge as significant mediators, suggesting that awe's moral effects in this context are specifically tied to social cohesion. This pattern can be explained by two key factors. First, methodological considerations may account for prior inconsistencies. While earlier studies often examined these mediators in isolation, potentially inflating individual effects due to omitted variable bias and Type I error inflation[61,62]. Comprehensive multi-pathway analyses show different results, like the small self's inconsistent mediation effect[12,37]. On the other hand, cultural context seems to play a pivotal role. In Chinese collectivist culture—where interpersonal bonds and social harmony are paramount[63]—awe appears to prioritize relational integration over individual self-representation or abstract universal connections. This cultural orientation aligns with evidence that collectivist societies regulate moral behavior primarily through reinforced interpersonal obligations[64,65,66]. Consequently, social connectedness emerges as a culturally resonant mechanism through which awe curbs dishonest behavior—a finding that underscores the theoretical and cultural specificity of this pathway in relational societies.

This research yields significant theoretical advances and practical applications. Theoretically, by identifying social connectedness - rather than the small self or authenticity - as the key mechanism underlying awe's moral effects, our findings not only enrich understanding of awe as a multifaceted emotion with profound moral implications, but also highlight how awe operates through binding foundations in collectivist cultures. From

an applied perspective, these findings suggest several actionable interventions across multiple domains. For example, in educational contexts, educators could expose students to inspiring stimuli to foster the experience of awe, which can serve as an effective strategy to promote students' honesty and integrity; Organizations might incorporate awe-inspiring experiences into training programs to enhance ethical decision-making among employees; Public policy initiatives could employ awe-inducing narratives emphasizing community resilience to promote civic honesty. Previous studies have found that other people's virtue and magnificent natural scenery can elicit the experience of awe[8,10,67].

There are some limitations in this study that require further research. First, while the present work established a robust link between awe and reduced dishonesty, the ecological validity of these findings requires verification through naturalistic observations in daily life settings. Secondly, although video-based awe induction proved effective in our studies, future research should employ alternative methods, such as narrative recall tasks[10,12,14,68], musical induction[69,70], or immersive field experiences[14], to assess the generalizability of these effects across induction paradigms. Thirdly, because these findings are grounded in collectivist culture, the uniqueness of social connectedness as the mediating mechanism may not extend to individualistic cultures, where pathways like authenticity may be more salient in individualistic culture. Therefore, cross-cultural replications are needed to test this boundary condition. Finally, while this work confirmed social connectedness as the mediator, future neuroimaging research could reveal the neural mechanisms (e.g., reduced activity in self-referential networks or enhanced social cognition processing)[71], thereby providing objective evidence to more comprehensively understand how awe influences dishonest behavior.

Conclusion

This research provides evidence that both trait and state awe are associated with reduced dishonest behavior, and social connectedness mediates this effect in collectivism culture. The findings suggest that enhancing social bonds is the unique mechanism through which awe influences moral conduct. While this study highlights the role of social connectedness, other potential pathways (e.g., small self, universe connectedness, authenticity) were not supported as significant mediators in Study 3. The results contribute to our understanding how self-transcendent emotions relate to reducing immoral behaviors like dishonesty. Future research may further explore its applicability across diverse cultural settings and the neurological basis of this relationship.

Data availability

All data and analysis code have been made publicly available via The Open Science Framework repository, named data and script about "data and SM for awe and dishonest behavior", and can be accessed at https://osf.io/nvqyd.

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Author contributions

Li Luo: Funding acquisition, Methodology, Data collection, Data formal analysis, Paper writing; Jiajin Yuan: Funding acquisition, Methodology, Data formal analysis, Paper revising.

Declarations

Competing interests

The authors declare no competing interests.

Additional information

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Correspondence and requests for materials should be addressed to J.Y.

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