Self-Transcendent Experiences Early in Life:

Children Appreciate Diverse Effects of Awe-Inspiring Experiences

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Abstract

Humans may have evolved to appreciate awe-inspiring experiences. To shed light on its origin, four studies (three preregistered) examined 4-9-year-old children's (N = 301) perceptions of awe-inspiring experiences. Children recognized vast nature as an elicitor of awe facial expression and reported mixed emotions in response to awe experiences (Study 1). Both positive (Study 2) and threatening (Study 3) awe experiences were more likely than neutral experiences to promote perceived vastness, motivation to explore, and awareness of unknown things. Compared to crowd experiences, awe experiences elicited more of these effects and positively affected children's sense of self (Study 4). These findings suggest that awe experiences are appreciated early in life, shedding light on the origin and nature of this important self-transcendent experience.

Keywords: awe, experiential appreciation, emotion development, motivation, sense-of-self, self-transcendence

Self-Transcendent Experiences Early in Life:

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Life is full of big and small experiences, and our capacity to appreciate them makes our existence feel more meaningful (Kim et al., 2022). Among various experiences we may have in life, some experiences are able to profoundly move us beyond our usual concerns and the boundary of the self. Awe-inspiring experiences — experiences that induce the feeling of perceiving something vast that transcends one's current understanding — is one such self-transcendent experience (Keltner, 2023). Awe has been central in spiritual and peak experiences (e.g., Burke, 1757/1990; James, 1902/1987; Maslow, 1964) and has been theorized to help our ancestors survive during evolutionary times (e.g., Chirico & Yaden, 2018; Keltner & Haidt, 2003). The hypothesized evolutionary functions predicted that an appreciation for awe-inspiring experiences should be early-emerging. But little research has examined how awe-inspiring experiences are perceived early in life (Prade, 2022), despite abundant research showing that adults appreciate and react positively to awe-inspiring experiences (e.g., Bai et al., 2017; Gottlieb et al., 2018; Griskevicius et al., 2010; Guan et al., 2019; Koh et al., 2019; McPhetres, 2019; Piff et al., 2015; Rivera et al., 2020; Rudd et al., 2012; Stellar et al., 2017; Valdesolo & Graham, 2014; Valdesolo et al., 2017). From a developmental perspective, our work adopts a social cognitive approach and systematically investigates how children perceive awe-inspiring experiences.

Existing research on children's emotional experiences has mainly focused on children's appreciation and understanding of experiences involving *basic emotions* (e.g., happiness, sadness, anger, fear; e.g., Harris, 2008; Harris et al., 2016; Rosnay & Harris, 2002; Wellman & Banerjee, 1991; Widen & Russell, 2008) and *self-conscious emotions* that center around the self (e.g., pride, shame, guilt; Baker et al., 2012; Kochanska et al., 2002; Lewis & Sullivan, 2005; Thompson & Hoffman, 1980). Evidence shows that even infants can

distinguish basic positive emotional facial expressions from negative ones (Barrera & Maurer, 1981; Bornstein & Arterberry, 2003; Farroni et al., 2007). By age two or three, children are able to use and understand languages for basic emotions such as happiness and sadness (e.g., Bartsch & Wellman, 1995; Wellman et al., 1995; Widen & Russell, 2003, 2008), as well as to reason about the basic emotional states of individuals (e.g., Ruba & Pollak, 2020; Wellman et al., 2000; Wellman & Banerjee, 1991). Research also shows that children start to understand and experience self-conscious emotions, such as guilt, shame, and embarrassment in preschool years (e.g., Bafunno & Camodeca, 2013; Kochanska et al., 2002; Lewis et al., 1991; Lewis & Sullivan, 2005; Thompson & Hoffman, 1980). Therefore, the past several decades of psychological research on emotional development have produced substantial evidence that children begin to appreciate and understand a variety of emotional experiences quite young. The empirical illustrations of young children's capacity to feel and understand complex, self-related emotions especially motivate questions about how the understanding and appreciation of self-transcendent experiences, specifically awe-inspiring experiences, fit into the developmental picture.

On the one hand, the lack of developmental research on awe is largely due to the assumption that such complex emotional experiences may only be present later in life (Stamkou et al., 2023). Awe has been viewed as a complex subjective experience involving multiple social, cognitive, and self-related facets (Yaden et al., 2019) and even a profound ineffable experience associated with religion and spirituality (Van Cappellen & Saroglou, 2012). This suggests the possibility that an appreciation for awe experiences may be relatively late-emerging. Perhaps awe-inspiring experiences are only appreciated once individuals gain relevant cognitive abilities (e.g., metacognitive awareness of one's own mental and emotional states; representations of the self in relation to entities larger than the self) and substantial life experiences (e.g., sufficient exposure with awe inspiring scenes and

experiences). Children's more limited metacognitive awareness and skills compared to adults may prevent them from understanding their own complex mental and emotional states (e.g., Kuhn, 2000). Therefore, it is possible that awe experiences could be too challenging for young children to perceive and appreciate, given their developing social cognitive skills.

On the other hand, self-transcendent experiences, such as compassion, gratitude, and awe, have been theorized to have important evolutionarily adaptive functions (Stellar et al., 2017; Yaden et al., 2017). In particular, awe has been theorized and found to be a "*collective emotion*" that facilitates prosociality and helps people bond in social groups (e.g., Bai et al., 2017; Goldy et al., 2022; Keltner & Haidt, 2003; Stellar et al., 2017; Piff et al., 2015; Prade & Saroglou, 2016). Awe is also a "*feel good*" emotion and promotes positive affect (e.g., Rivera et al., 2019; Rudd et al., 2012; Sturm et al., 2022), as well as an "*epistemic emotion*" that motivates people to explore their environment and inspire scientific thinking (e.g., Gottlieb et al., 2018; McPhetres, 2019; Stellar et al., 2018; Valdesolo et al., 2017). All of these functions may have contributed to individuals' survival and aided the formation of social bonds throughout evolution. If awe has evolved to serve these functions, we should be able to observe capacities for perceiving awe-inspiring experiences and its positive effects relatively early in life.

Supporting this possibility, research has shown that by preschool years, children can experience and understand other evolutionarily important self-conscious emotions (e.g., guilt, shame), which requires some level of engagement with awareness of the self in relation to others (e.g., Bafunno & Camodeca, 2013; Kochanska et al., 2002; Lewis et al., 1991; Thompson & Hoffman, 1980). Preschoolers also show prosocial emotions toward other individuals such as empathy and sympathy (e.g., Decety et al., 2018; Eisenberg et al., 2006; Kim & Kochanska, 2017; Michalson & Lewis, 1985). Given that awe is hypothesized to serve similar prosocial functions, it is possible that even young children might be able to

perceive and distinguish awe from other emotional experiences. Moreover, the perception of vastness and the need for accommodation have been theorized as two key components of awe experiences (Keltner & Haidt, 2003). Children's literal small size and newness in the world means that they may need to accommodate more experiences in life compared to adults and, thus, may have awe experiences quite often. Awe has been assumed to be a common experience in childhood (Kelter, 2023; Stamkou et al., 2023), but there is little direct evidence regarding this claim. To date, it has been found that brief exposures to awe-inspiring experiences make children more likely to explore novel toys (Colantonio & Bonawitz, 2018) and motivate 8-13-year-olds to help members of a national minority (Stamkou et al., 2023). What remains unknown is if children consciously appreciate and enjoy awe-inspiring experiences. Motivated by this question, our studies adopt a social cognitive approach to systematically examine how children perceive and understand diverse aspects of awe experiences from their own perspectives.

Based on the findings that awe-inspiring experiences have social, cognitive, and motivational effects among adults (Bai et al., 2017; Chirico & Yaden, 2018; Gottlieb et al., 2018; Jiang & Sedikides, 2022; McPhetres, 2019; Piff et al., 2015; Stellar et al., 2018; Valdesolo et al., 2017), our work examines how children perceive awe experiences in terms of these dimensions. Beyond these effects, we also pay special attention to awe experiences' effects on the sense of self. Awe-inspiring experiences elicit a sense of "small self" among adults (Piff et al., 2015), which mediates multiple benefits of awe, such as the effects on collective engagement and prosocial behaviors (Bai et al., 2017; Piff et al., 2015; Preston & Shin, 2017). One important open question is whether all experiences that comprise perceptual vastness and potentially make one feel small will be appreciated as similarly awe-inspiring. For example, unlike awe experiences, experiences like being in a large crowd often make people feel trivialized and deindividualized (Crossey et al., 2021; Neal, 1993). We are

interested in how potentially self-trivializing *crowd* experiences are perceived in contrast to awe experiences, in terms of diverse aspects of the self (such as self-transcendence, self-efficacy, sense of one's own uniqueness, and aspirations regarding oneself).

In summary, our work focuses on 4-9-year-old children's appreciation and perceptions of awe-inspiring experiences. We first explored if children could recognize the facial expression of awe and its elicitor, as well as their feelings before and after an awe-inspiring experience (Study 1). Then, across three preregistered studies, we investigated children's perceptions of positive (Study 2) and negative, threat-based awe experiences (Study 3) in comparison to neutral experiences. Finally, we examined if children distinguished awe experiences involving vast scenes of nature from crowd experiences involving large scenes of people, especially if the two experiences were perceived differently in relation to children's sense of self (Study 4). We included a sample of adults in all of our studies (total $N = 399$) to examine the developmental continuity across life span. We report all questions and analyses conducted in all studies. Stimuli, supplemental materials, and all data and analyses are shared on OSF (https://osf.io/wzsny/?view_only=e82db9c5bb494b66951be524530c87ab).

Study 1

Study 1 examined whether children recognize the elicitor of awe and how children emotionally react to awe-inspiring experiences. Much of the existing conceptualizations and findings on adults suggest that awe-inspiring experiences lead to perceivable shifts in one's emotional state, often leading to enhanced or intensified positive emotions (Bonner & Friedman, 2011; Chirico & Yaden, 2018; Darbor et al., 2016) and sometimes leading to fearful feelings and chills (Gordon et al., 2017; Keltner & Haidt; 2003; Yaden et al., 2018). In this study, we took an exploratory look at changes in children's basic emotions after they watched a video that has been used to elicit awe in adult studies.

Methods

Participants

We recruited 68 4-to-9-year-old children from a midwestern city and surrounding areas, who were told to participate in a short online activity involving videos and questions about emotions. Twelve participants were excluded due to inattention and distractions in the environment, leaving a final sample of 56 child participants (*M* age = 7.24 years, *SD* = 1.61 years, *range* = 4.04 to 9.92, male = 27, female = 29). According to G*Power (Faul et al., 2007), this sample size has at least 80% power to detect a moderate effect size of 0.36 for paired-sample Wilcoxon test. The majority of children in this study and in the following studies were from middle class families with diverse racial backgrounds, recruited from a database in the University of [masked for review]. Among all the participants in this work, 54.49% were White American, 14.95% were Black or African American, 9.63% were Asian or Asian American, 10.96% were Hispanic, and 9.97% identified as Other.

We also recruited an adult sample of 101 participants (*M* age = 40.71 years, *SD* = 13.83 years, *range* = 18 to 75, male = 65, female = 34, other = 2) on Amazon Mechanical Turk (MTurk; Litman et al., 2017), who completed the study in exchange for a small participation fee. We tested adult participants in this and subsequent studies to get a general sense of the developmental endpoints, not for direct statistical comparisons to children's data. We recruited more adults than children in all studies, in case some adults do not provide valid data in online studies (Chmielewski & Kucker, 2020). All adult participants in this and subsequent studies were located in the US and had a higher than 97% approval rate with at least 100 completed tasks on the platform. Among all the adult participants in this work, 71.43% were White American, 9.77% were Black or African American, 9.77% were Asian or Asian American, 5.01% were Hispanic, and 4.02% were Other. All studies reported in this paper were approved by the Institutional Review Board of [masked for review], protocol IRB

[masked for review]. Written parental consent and adult participant consent were obtained in advance of all testing; children also provided verbal assent prior to testing.

Procedure

For all of our child studies, each child was tested individually in a quiet space at their home in a five to ten minute session over Zoom. All testing stimuli and questions were presented using a Qualtrics survey through Zoom. Before beginning the testing session, we asked the parents to check that the technical devices were working, minimize the background noise, and remove other distractions. Parents were allowed to remain in the same room as the child but were instructed not to talk to the child or comment on the study during the testing session. We also had practice trials to make sure children understood the online testing platform and how they would be directed (e.g., verbally respond to which of two stimuli the mouse was pointing at). Testing began once the child's comprehension was confirmed.

Each child first provided a baseline emotion rating by selecting the word-picture pairs from a collection of basic emotion choices that described how they currently felt (*Happy*; *Sad*; *Mad*; *Surprised*; *Disgusted*; *Scared*; *None*). Children could select any one or multiple answers. A recent study showed that art stimuli could induce awe-inspired responses in children (Stamkou et al., 2023). We instead wanted to adopt the strongest and most reliable awe-inducing stimuli—vast scenes involving nature. Each child watched an awe-inspiring video montage from the BBC's *Planet Earth* of sweeping, panoramic, natural landscape footage, which was previously validated in reliably eliciting awe experience among adults (e.g., Piff et al., 2015; Rivera et al., 2020; Valdesolo & Graham, 2014). The video excerpt we presented to children was approximately 1 minute in length.

After watching the video, to understand how children's emotions were moved by the awe-inspiring video, children were first asked to freely respond with a description in their own words of how watching the video made them feel. Next, children were asked to indicate

their emotions by selecting from the same word-image pairs of basic emotions as we did for baseline. Finally, to see if children could recognize the facial expression of awe and its elicitors, children were presented with two child photos in a random order: one with a facial expression typical of a person in awe (with raised head, widened eyes and open mouth; Shiota et al., 2003; *Awe* emotion recognition) and the other with a happy facial expression (*Happy* emotion recognition). For each facial expression, children were asked to identify whether the experience depicted in each of three images (i.e., *vast nature, playground, jack-in-the-box*) could make the child in the photo feel the way they looked. We hypothesized that the three images may be perceived as most likely to elicit facial expressions of awe, happiness, and surprise respectively (see supplemental materials for testing stimuli in this study).

Adult participants watched the same awe-inspiring video and responded to the same questions through a Qualtrics survey on MTurk. To ensure data quality and check for attention in this and subsequent studies, after watching the video, adults were asked to identify from a list of items (i.e., a waterfall, the desert, a cat, outerspace) the particular item that was not in the video (i.e., a cat).

Results and Discussion

Open-Ended Response

Participants provided free responses about how the awe-inspiring experience made them feel. We were especially interested in if the participant mentioned any positive and non-positive emotions. The first author and a research assistant coded adult responses in terms of four non-exclusive thematic categories: *positive affect; non-positive affect*; *small self or insignificance*; *other*. Each response was coded in terms of whether it mentioned each category (coded as 1) or not (coded as 0). Any disagreement was resolved through discussions together with a third researcher. *Positive affect* responses included reports of

positively-valenced states such as awe, inspiration and calmness, whereas responses that communicated neutral or negative emotional states like surprise and fear were coded as *non-positive affect* responses. Responses that included notions of expressing perceptions of small self size were coded as *small self or insignificance*. All responses that did not fall into one of these three categories were coded as *other*. Child responses were coded in the same way, except that the *small-self or insignificance* category was omitted due to no expressions of perceived small self size or relative insignificance among children.

For adult open-ended responses, a generalized linear mixed effect model indicated that there was a significant difference between the frequency of the four categories, $\chi^2(3, N = 101) = 111.1$, $p < .001$. Of the 101 adult responses provided, 69% mentioned *positive affect* (e.g., "The natural beauty of our planet is awe inspiring."), 9% were categorized as *non-positive affect* (e.g., "Apart from the field of flowers, it somewhat scared me."), 19% were categorized as *small self or insignificance* (e.g., "It makes me feel small and insignificant."), and 15% of all responses were coded as *other.* The intercoder agreement was 96% for the *positive affect* category (*Cohen's K* = 0.91, $z = 9.09$, $p < .001$) ; 87% for *non-positive affect* (*Cohen's K* = 0.17, $z = 1.65$, $p = .099$); 100% for *small-self or insignificance* (*Cohen's K* = 1, $z = 10.0$, $p < .001$), and 90% for *other* (*Cohen's K* = 0.66, $z = 6.7$, $p < .001$) .

For children's open-ended responses, a generalized linear mixed effect model indicated that there was also a significant difference between the frequency of the three categories, $\chi^2(2, N = 55) = 45.16$, $p < .001$. Of the 55 child responses (one child did not provide an response), 68% were coded as *positive affect* (e.g., "It made me feel excited."), 38% were categorized as *non-positive affect* (e.g., "It makes me feel scared and surprised and worried."), and the remaining 9% were categorized as *other.* The intercoder agreement was 100% for *positive affect* (*Cohen's K* = 1, $z = 7.42$, $p < .001$); 93% for *non-positive affect* (*Cohen's K* = 0.85, $z = 6.31$, $p < .001$), and 93% for *other* (*Cohen's K* = 0.74, $z = 5.5$, p

< .001). These provide initial evidence that children, similar to adults, experience awe as positive, with some emotions like surprise and fear.

Self-Reported Emotion Ratings

We compared adult ratings for basic emotions before and after watching the awe-inspiring video by conducting a generalized linear mixed effects model with the lme4 package (Bates et al., 2015) using emotion type, testing question (pretest vs. posttest), and their interaction to predict adult responses, with a random intercept for each participant. According to the "drop1" function in R (likelihood ratio test comparing the full model to a model without the interaction), we found a significant interaction between emotion and question in improving the model fit, $\chi^2(6, N = 101) = 19.67$, $p = .003$. We then looked at pretest and posttest differences for each individual emotion (*Happiness, Sadess, Anger, Surprise, Disgust,* and *Fear*) using paired-samples Wilcoxon test. We found a significantly higher level of surprise for posttest ($M = 0.22$) than for pretest ($M = 0.03$) ($z = -3.78$, $p < .001$), but not for other emotions (ps > .24 for all other comparisons).

We conducted a similar model with children's data, and found that the interaction between emotion and question also significantly improved the model fit, $\chi^2(6, N = 56) = 36.00$, $p < .001$. We also included age as a moderator in the model and did not find that age moderated the interaction effects, $\chi^2(6, N = 56) = 8.84$, $p = .18$. Paired-samples Wilcoxon tests indicated a significant difference between pretest and posttest emotions for *happiness* (pretest $M = 0.95$, posttest $M = 0.73$, $z = -2.97$, $p = .003$), *surprise* (pretest $M = 0.14$, posttest $M = 0.45$, $z = -3.26$, $p = .001$), *fear* (pretest $M = 0.07$, posttest $M = 0.25$, $z = -2.33$, $p = .02$), and *sadness* (pretest $M = 0.04$, posttest $M = 0.18$, $z = -2.47$, $p = .013$), but not for *anger* (pretest $M = 0.05$, posttest $M = 0.05$, $z = -0.8$, $p = 0.423$) or *disgust* (pretest $M = 0.02$, posttest $M = 0.00$, $z = 0$, $p = 1$). These results show that adults and children both report an increase in

feelings of surprise after the awe experience, relative to the neutral experience, and that children also feel greater sadness and fear after the awe experience.

Emotion Recognition

We conducted a chi-square test of independence to examine adult responses to each emotion recognition question. For *Awe* recognition, the difference between people's choices for the three elicitors was significant, $\chi^2(2, N = 101) = 39.98$, $p < .001$. We then performed a binomial test to compare their choice for each option to chance level (0.33). We found that adults chose the *vast nature* image most often and at a significantly higher rate than chance level ($M = 0.63$, $p < .001$, $d = 0.63$), and they chose the *playground* ($M = 0.16$, $p < .001$, $d = 0.47$) and *jack-in-the-box* images ($M = 0.21$, $p = .008$, $d = 0.30$) significantly lower than chance level. For *Happy* recognition, adults also significantly distinguished the three possible options, $\chi^2(2, N = 101) = 42.14$, $p < .001$. Only a very small percentage of adults chose the *vast nature* image as eliciting the happy expression ($M = 0.03$, $p < .001$, $d = 1.76$), and they selected the *jack-in-the-box* image ($M = 0.52$, $p < .001$, $d = 0.39$) and the *playground* image ($M = 0.45$, $p = .020$, $d = 0.23$) significantly higher than chance. The findings suggest that adults expect the vast nature experience to elicit awe expressions but not happiness expressions.

We also conducted a similar chi-square test of independence to analyze children's responses to each emotion recognition question. Similar to adults, children also distinguished the three elicitors for the *Awe* emotion recognition question, $\chi^2(2, N = 56) = 39.98$, $p < .001$. A subsequent binomial test showed that children chose the *vast nature* image most often and significantly higher than chance level (0.33; $M = 0.64$, $p < .001$, $d = 0.65$), and they chose the *playground* ($M = 0.14$, $p = .002$, $d = 0.53$) and *jack-in-the-box* images ($M = 0.21$, $p = .065$, $d = 0.28$) lower than chance level, suggesting that children perceive the typical awe expression as a response to awe-inspiring scenes. For *Happy* emotion recognition, children's

selections of the three possible options were significantly different, $\chi^2(2, N = 56) = 32.40$, $p < .001$. Binomial tests indicated that children chose the *playground* image ($M = 0.59$, $p < .001$, $d = 0.52$), but not the *vast nature* ($M = 0.13$, $p < .001$, $d = 0.61$) and *jack-in-the-box* images ($M = 0.29$, $p = 0.48$, $d = 0.10$) images significantly higher than chance level (0.33), showing that children did not perceive awe-inspiring scenes as a primary elicitor for happiness expressions. To examine potential age changes, we conducted generalized linear models using age to predict children's responses. We found that children become more likely to select the vast nature image as an elicitor for the awe expression with age ($p = .04$), and there are no age effects on other responses ($ps > .08$).

The results from this study suggest that consistent with the theorizing in the literature (Keltner & Haidt, 2003), children perceive a mixed composition of relevant basic emotions after an awe-inspiring experience, which involves happiness and some levels of surprise, fear, and sadness but not anger or disgust. In particular, our findings show that an awe experience led to a much higher level of *surprise* in both children and adults compared to their baseline feelings, which is consistent with the view that awe experiences involve an element of surprise and sense of accommodation (Keltner & Haidt, 2003). The results also show that children and adults are generally accurate at identifying the facial expression of awe and recognizing vast nature as its elicitor, which is distinct from the expression and elicitor of happiness. Together, these initial findings suggest that basic perceptions and understanding of awe-inspiring experiences are present in childhood, which inspire questions about whether children are also able to appreciate awe-inspiring experiences differentially from other kinds of experiences in terms of social, cognitive and motivational dimensions, the focus of our next three studies.

Study 2

Study 2 investigates children's perceptions of awe-inspiring experience in comparison to another neutral experience. Existing adult research has utilized neutral experiences that involve simple moving shapes (Oveis et al., 2009; Stellar et al., 2015) or an individual describing crafting processes, such as the construction of a kitchen countertop (Piff, 2015) or the production of beer (Saroglou et al., 2008), the content of which differs substantially from the vast nature scenes that were used to elicit awe. To examine whether children distinguish an awe experience from a more closely related neutral experience, we presented children with a video that involves visual and thematic focuses on nature (e.g., backyard garden scenes involving different plants) but not the defining characteristic of awe experiences— perceptual vastness. It has been shown that experiences with everyday nature have positive effects on people (Berman et al., 2012; Berman et al., 2008; Kaplan, 1995), and it is unknown if children feel differently about awe experiences elicited by vast nature scenes from everyday varieties of nature experiences. We measured children's perceptions of several major dimensions of awe experiences that have been theorized and found in adult literature (e.g., perceived vastness, sense of connection , motivation to explore, and epistemic humility).

Methods

Participants

We preregistered a sample size of at least 60 child participants. We recruited 71 4-to-9-year-old participants, and 9 participants were excluded due to inattention or parental interaction, leaving a final sample of 62 participants (*M* age = 7.52 years, *SD* = 1.66 years, *range* = 4.30 to 9.91, male = 25, female = 37). According to G*Power (Faul et al., 2007), this sample size has at least 80% power to detect a medium effect size of $g = 0.19$ for a two-tailed, binomial test. We also recruited an adult sample of 100 participants on MTurk. Three adult participants were excluded due to incomplete data, leaving a final sample of 97 adult

participants (*M* age = 40.80 years, *SD* = 13.93 years, *range* = 18 to 74, male = 43, female = 54).

Procedure

Each child participant watched two videos in a randomized order: an *Awe* video and a *Neutral* video. The *Awe* video was used in our Study 1 and previously validated in investigations of awe experience among adults (Rivera et al., 2020). The *Neutral* video comprised footage of small plants growing in an ordinary backyard garden — a context which involves nature scenes like the *Awe* video but without the defining feature of perceived vastness (Keltner & Haidt, 2003). Both videos were approximately 45 seconds in length and included original, pleasant background music (Piff et al., 2015; Rivera et al., 2020; Valdesolo & Graham, 2014).

After watching each video, to stimulate children to think about how the videos made them feel, children were first asked to rate on four familiarization questions (see supplemental materials for the descriptions and results for these measures). To examine whether children perceived the awe experience and neutral experience differently, after children watched both videos, we also directly asked children to indicate which video made them feel more intensely in terms of five testing questions: *Perceived Vastness* ("Which video makes you feel like the world is bigger?"), *Sense of Connection* ("Which video makes you feel like you are connected to more things in the world?"), *Motivation to Explore* ("Which video makes you feel like there are a lot more interesting things in the world you would like to explore?"), *Epistemic Humility* ("Which video makes you feel like there are a lot more things in the world you want to understand?"), as well as a *Hedonic Preference* measure at the very end about which video they would like to watch again if given the opportunity. Adult participants watched the same videos and responded to the same questions through a Qualtrics survey on MTurk.

Results

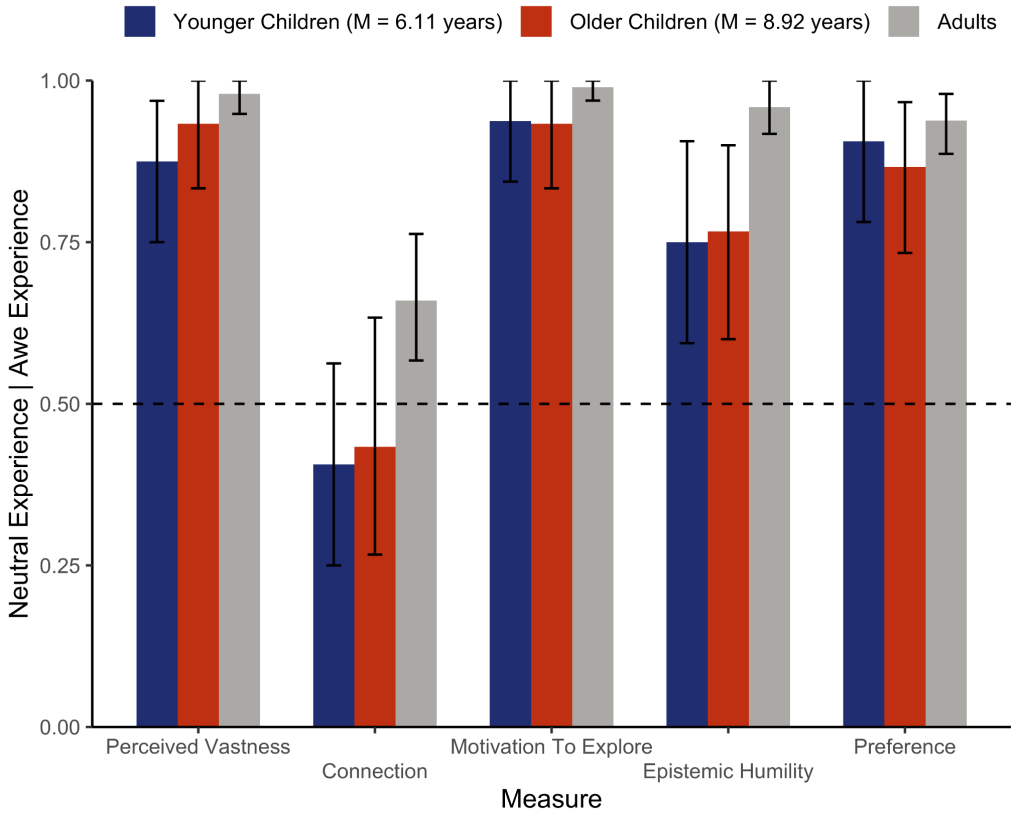
We first analyzed adult responses to the *Awe* and *Neutral* videos (choice for *Awe* video = 1, choice for *Neutral* video = 0). As preregistered, to get an overall sense of if participants respond to the different measures differently, we first conducted an overall generalized linear mixed effects model to see if their responses were significantly predicted by measure, with a random intercept for each participant. According to the drop1 function in R, we found that measure significantly improves model fit, $\chi^2(4, N = 97) = 117.5$, $p < .001$. Binomial tests indicated that the awe video, in comparison to the neutral video, led adults to perceive the world as bigger ($M = 0.98$, $p < .001$, $d = 3.36$), to feel a somewhat greater sense of connection to more things in the world ($M = 0.66$, $p = .002$, $d = 0.34$), to feel an increased motivation to explore interesting things in the world ($M = 0.99$, $p < .001$, $d = 4.82$) and to understand unknown things ($M = 0.96$, $p < .001$, $d = 2.30$). Adults also overwhelmingly preferred the awe experience video over the neutral experience ($M = 0.94$, $p < .001$, $d = 1.81$). The results suggest that adults perceived higher levels of social, cognitive, and motivational benefits in response to the awe experience than to the neutral experience.

To see if children distinguish the two experiences and whether age plays a role in their responses, we conducted an overall generalized linear mixed effects model using measure, age, and their interaction predicting their responses, with a random intercept for each participant. According to the "drop1" function in R, measure significantly improves model fit: $\chi^2(4, N = 62) = 61.09$, $p < .001$. We did not find a significant two-way interaction of measure and age, $\chi^2(4, N = 62) = 1.32$, $p = 0.86$. Binomial tests indicated that the *Awe* video, in comparison to the neutral video, led children to perceive the world as bigger ($M = 0.90$, $p < .001$, $d = 1.35$), to feel an increased motivation to explore interesting things ($M = 0.94$, $p < .001$, $d = 1.76$) and to understand unknown things in the world ($M = 0.76$, $p < .001$, $d = 0.60$), but did not lead them to feel more connected to everything in the world ($M = 0.42$,

$p = 0.31$, $d = 1.62$). Children preferred to watch the awe video over the neutral video ($M = 0.89$, $p < .001$, $d = 1.21$). These results suggest that children feel an overall greater impetus to learn and discover in response to the awe-inspiring experience than to the neutral experience. These results are presented in Figure 1.

Figure 1

Adult and Child Responses to Positive Awe-Inspiring Experiences Compared to Neutral Experiences in Study 1



Study 3

Study 2 found that children perceive positive awe experiences and distinguish them from neutral experiences across diverse measures of perceived vastness, motivation to explore, epistemic humility, and hedonic preference. It has been theorized and found that awe could be elicited not only by positive stimuli, but also be elicited by negative, threatening stimuli (Gordon et al., 2017; Takano & Nomura, 2022). Adults' experience of threat-based

awe are accompanied by increased feelings of fear and uncertainty (Chadhury et al., 2022), mediated by a sense of powerlessness (e.g., lower reports of self-control, increased sympathetic autonomic arousal) (Gordon et al., 2017). It is known that children learn and explore less when they feel insecure and fearful (Cooke et al., 2019; Easterbrooks et al., 1993; Fearon et al., 2010). Therefore, children might be aversive to threatening stimuli and respond less positively to threatening awe experiences than to neutral experiences. To explore this possibility, Study 3 investigates children's responses to threatening awe experiences in comparison to neutral experiences.

Methods

Participants

As in Study 2, we preregistered to have a sample size of at least 60 participants. Data collection was stopped once this goal was met. We recruited 78 4-to-9-year-old participants from Chicago, Illinois, and surrounding areas. Six participants were excluded due to inattention or distractions in the environment, leaving a final sample of 72 participants (*M* age = 7.31 years, *SD* = 1.67 years, *range* = 4.01 to 9.92, male = 30, female = 42). According to G*Power (Faul et al., 2007), this sample size has at least 80% power to detect a medium-small effect size of $g = 0.16$ for a two-tailed, binomial test. We also recruited a sample of 100 adult participants on MTurk (*M* age = 37.87 years, *SD* = 11.33 years, *range* = 22 to 71, male = 58, female = 42).

Procedure

To explore how children perceive threatening awe experiences, Study 3 followed the same design as Study 2, but in this study, the *Threatening-Awe* video consisted instead of destructive, threatening footage of natural disasters (e.g., tornadoes, avalanches, volcanic eruptions) (see supplemental materials for images). Children also watched the same *Neutral* video of garden scenery, and then answered the same questions as in Study 2. Both videos

were about 45 seconds in length. Adult participants watched the same videos and responded to the same questions through a Qualtrics survey on MTurk.

Results

As in Study 2, we first analyzed adult responses to the *Threatening-Awe* and *Neutral* videos with an overall linear mixed effects model to see if the adult responses to the videos were significantly predicted by measure. According to the "drop1" function in R, we found that "measure" significantly improves model fit, $\chi^2(4, N = 100) = 195.13$, $p < .001$. Binomial tests indicated that in comparison to the *Neutral* video, the *Threatening-Awe* video led adults to perceive the world as bigger ($M = 0.92$, $p < .001$, $d = 1.54$), to feel an increased motivation to explore interesting things ($M = 0.74$, $p < .001$, $d = 0.54$) and to understand unknown things in the world ($M = 0.87$, $p < .001$, $d = 1.09$), but the *Neutral* video led adults to feel a greater sense of connection to everything in the world ($M = 0.27$, $p < .001$, $d = 0.52$). Adults preferred to watch the awe video over the neutral video ($M = 0.77$, $p < .001$, $d = 0.64$).

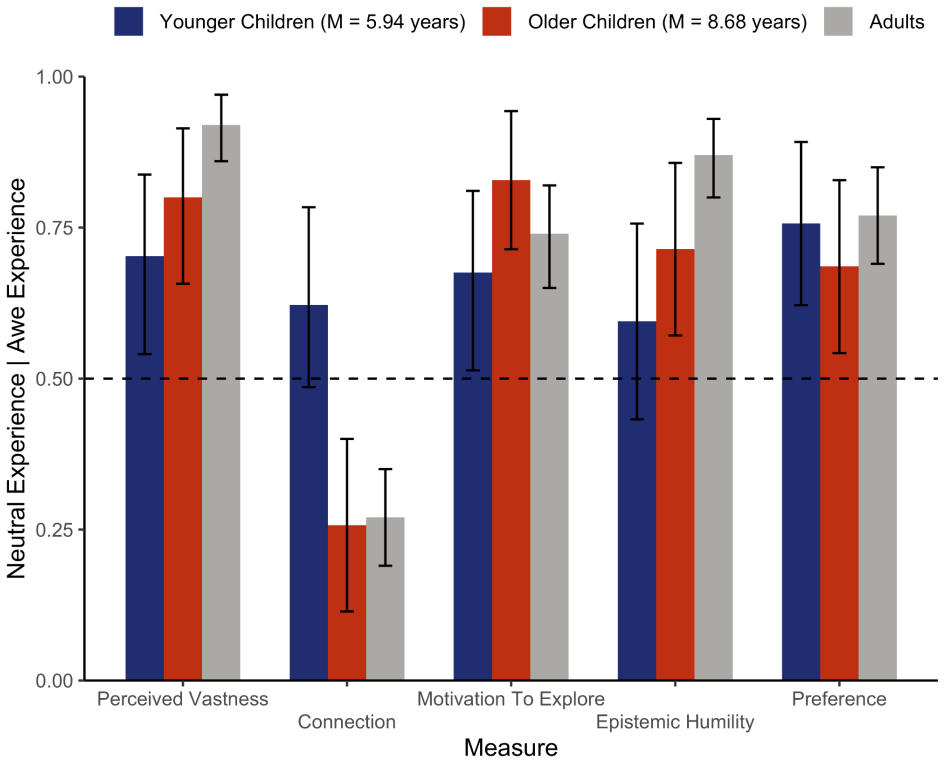
To examine children's responses, we conducted a linear mixed effects model using measure, age (in years), and their interaction predicting responses, with a random intercept for each participant. According to the "drop1" function in R, we found a significant two-way interaction of measure and age on child responses, $\chi^2(4, N = 72) = 15.13$, $p = .005$. To further understand the interaction effects, we conducted separate generalized linear models using age to predict each measure. We found that with age children became less likely to feel connected to the world in response to the threatening awe video ($B = -0.42$, $SE = 0.16$, $z = -2.64$, $p = .008$), and age does not have a significant effect on any of the other measures ($ps > .096$), Figure 2.

Binomial tests indicated that the *Threatening-Awe* video, in comparison to the neutral garden video, led children to perceive the world as bigger ($M = 0.75$, $p < .001$, $d = 0.57$), to feel and overall increased motivation to explore interesting things ($M = .75$, $p < .001$, $d =$

0.57) and to understand unknown things in the world ($M = 0.65$, $p = .013$, $d = 0.32$). Children also preferred the *Awe* video over the neutral video ($M = 0.72$, $p < .001$, $d = 0.49$). Because we found an age effect for the connection measure, we conducted binomial tests with younger children ($M = 5.94$ years) and older children ($M = 8.68$ years) separately based on median split of age. We found that similarly to adults, the neutral garden video actually led older children to feel more connected to everything in the world ($M = 0.28$, $p = .011$, $d = 0.49$), whereas younger children did distinguish the two experiences ($M = 0.61$, $p = 0.24$, $d = 0.22$). These results are presented in Figure 2.

Figure 2

Adult and Child Responses to Threatening Awe Experiences Compared to Neutral Experiences in Study 2



This study finds that similar to the positive awe-inspiring experiences, children and adults felt that the threatening awe experiences also were more likely than neutral experiences to make them perceive vastness, and motivate them to explore new things and

understand more unknown things in the world. But older children and adults felt the neutral experience made them feel a stronger connection to the world. Taken together, Studies 2 and 3 show that children perceive and enjoy both positive and threatening awe experiences and discern them from neutral experiences, in terms of perceived vastness and cognitive and motivational effects. The findings are consistent with the possibility that awe-inspiring experiences in general may spark children's intrinsic drive to learn about the world around them.

Study 4

The first three studies reveal that children perceive awe-inspiring experiences as different from neutral experiences. In Study 4, we aim to further examine if scenes that involve perceptual vastness can all be similarly awe-inspiring. We would like to particularly examine if children and adults respond similarly to vast nature scenes (as tested in previous studies) versus vast social scenes (i.e., crowds of people in a range of diverse contexts and locations). Existing research shows that awe's positive effects occur through an induced sense of "small self" (Bai et al., 2017; Piff et al., 2015; Preston & Shin, 2017; Strum et al., 2020). We hypothesize that while both awe and crowd experiences involve perceptual vastness (and may both elicit a sense of being small), crowd experiences may nevertheless be perceived as trivializing the self and may be less likely to elicit a positive sense of the self. For this purpose, in addition to the measures we used in previous studies, we also include a variety of new measures on the positive sense of self, including one's sense of self-transcendence, self-efficacy, perception of uniqueness, and aspirations to be better.

Methods

Participants

We predetermined a sample size of 100 child participants and 100 adult participants. We recruited 119 and 8 participants were excluded due to child inattention or parental

influence, leaving a final sample of 111 child participants (*M* age = 7.09 years, *SD* = 1.68 years, *range* = 4.03 to 9.88, male = 57, female = 54). According to G*Power (Faul et al., 2007), this sample size has at least 80% power to detect a small effect size of $g = 0.14$ for a two-tailed, binomial test. We also recruited a sample of 101 adult participants on MTurk (*M* age = 39.89 years, *SD* = 11.02 years, *range* = 21 to 73, male = 48, female = 52, other = 1).

Procedure

As in Study 2 and Study 3, each child watched two videos in a randomized order: an *Awe* video and a *Crowd* video. The *Awe* video comprised footage of the same nature-montage used in Studies 1 and 2. The *Crowd* video comprised footage of large groups of people moving through city streets (see supplemental materials for images). Each video was approximately 1 minute in length. Both videos included the same background music as in the control condition of Piff et al. (2015). Children then answered questions about similar measures as in Study 2 and Study 3, except that we replaced the *Perceived Vastness* measure with the *Small Self* measure ("Which video makes you feel smaller?"), and we slightly modified the wording of the previous *Sense of Connection* measure ("Which video makes you feel like you are connected to more things in the world?") to better capture the sense of oneness that is often described by individuals who have experienced awe ("Which video makes you feel like you are more closely related to everything in the world?").

In addition to these questions, all children then answered questions about additional measures related to their sense of self: *Self-Transcendence* ("Which video makes you think more beyond your usual needs and desires?"), *Self-Efficacy* ("Which video makes you feel more like you can make your life better?"), *Perceived Uniqueness* (reverse coded: "Which video makes you feel more like you can be easily replaced in the world?"), and *Self Aspirations* ("Which video makes you want to be nicer and kinder?"). Adult participants watched the same videos and responded to the same questions through a Qualtrics survey on MTurk.

Because the crowd video had not been used in any previous adult studies, we were interested to learn how adults emotionally reacted to it. Therefore, we also asked adults to report how much they feel *awe* (awe, wonder, amazement)*, positive affect* (cheerful, pride, amusement) and *negative affect* (anger, sad, fear) on a five-point scale (1= not at all, 5= very much), before and immediately after they watched each video.

Results

To get a sense of how watching the videos made adults feel, we first conducted an overall linear mixed effects model using their self-reported feelings using condition (baseline, awe video, crowd video), emotion type (awe-related emotions, positive emotions, negative emotions), and their interaction to predict their responses, with a random intercept for each participant. We found that the interaction term significantly improved model fit, $F = 135.7$, $p < .001$. To understand the interaction, we then conducted separate linear mixed effects models using "condition" to predict their responses to each type of emotion, with crowd video as the reference level. We found that the *Crowd* video ($M = 2.33$) elicited lower average levels of awe-related emotions (*awe, wonder, amazement*) compared to the *Awe* video ($M = 4.04$; $B = 1.71$, $SE = 0.08$, $t = 22.03$, $p < .001$), but higher levels of these emotions compared to their baseline feelings ($M = 1.97$; $B = -0.36$, $SE = 0.08$, $t = -4.69$, $p < .001$). At the same time, the *Crowd* video ($M = 1.92$) also elicited significantly lower levels of positive emotions (*cheerfulness, pride, amusement*) compared to both the *Awe* video ($M = 2.70$; $B = 0.78$, $SE = 0.08$, $t = 10.08$, $p < .001$) and their baseline feelings ($M = 2.39$; $B = 0.47$, $SE = 0.08$, $t = 6.02$, $p < .001$). Finally, the *Crowd* video ($M = 1.60$) elicited significantly higher levels of negative emotions (*anger, sadness, fear*) compared to the *Awe* video ($M = 1.27$; $B = -0.33$, $SE = 0.05$, $t = -6.4$, $p < .001$) and their baseline feelings ($M = 1.37$; $B = -0.23$, $SE = .05$, $t = -4.422$, $p < .001$).

We then analyzed adult responses to the *Awe* and *Crowd* videos with an overall linear mixed effects model using the "drop1" function in R, to see if adult responses to the videos were significantly predicted by our key measures, with a random intercept for each participant. We found that measure significantly improves model fit, $\chi^2(7, N = 101) = 94.31$, $p < .001$. Binomial tests indicated that in comparison to the *Crowd* video (coded as 0), the *Awe* video (coded as 1) led adults to feel smaller ($M = 0.63$, $p = .017$, $d = 0.28$), to feel a somewhat greater sense of connection to everything in the world ($M = 0.60$, $p = .045$, $d = 0.21$), to feel an overall increased motivation to explore interesting things ($M = 0.95$, $p < .001$, $d = 2.07$) and to understand unknown things in the world ($M = 0.90$, $p < .001$, $d = 1.34$). In addition, the *awe* video led adults to think more beyond their usual needs and desires ($M = 0.91$, $p < .001$, $d = 1.44$), to feel a greater sense of self-efficacy ($M = 0.81$, $p < .001$, $d = 0.79$), to feel more unique (reverse coded) ($M = 0.92$, $p < .001$, $d = 1.56$), and to aspire to be nicer and kinder ($M = 0.69$, $p = .001$, $d = 0.42$). Adults also overwhelmingly preferred watching the awe video over the crowd video ($M = 0.95$, $p < .001$, $d = 2.07$).

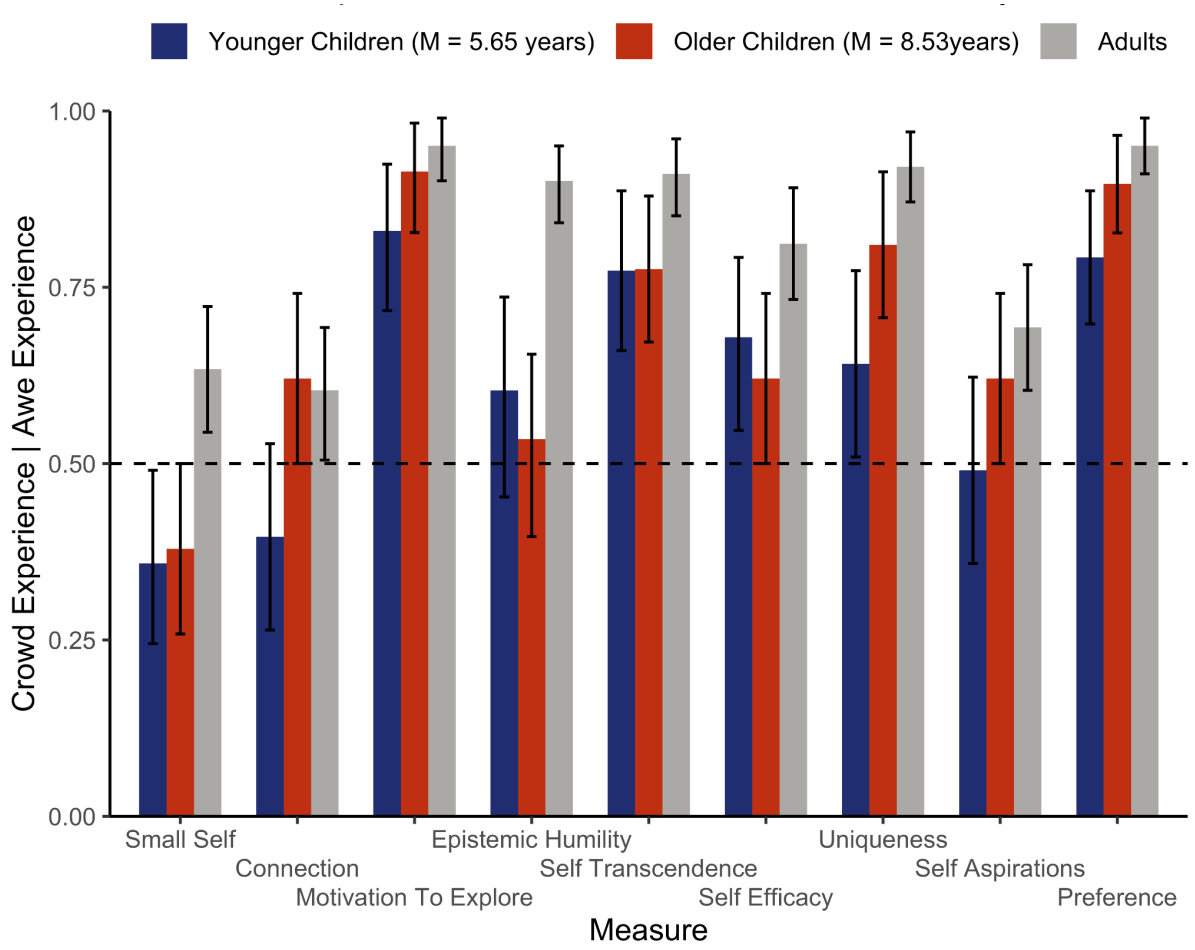
For children's data, as in Study 2 and Study 3, we conducted an overall linear mixed effects model, to see if children's responses to the *Awe* and *Crowd* videos were significantly predicted by measure, age, and their interaction, with a random intercept for each participant. We found that the two-way interaction of measure and age did not significantly improve model fit, $\chi^2(7, N = 111) = 6.78$, $p = .45$. Inspection of Figure 3 suggests potential age difference for some measures, so we conducted separate generalized linear models using age to predict each measure. We found that age only significantly affects children's sense of feeling more connected to everything in the world ($B = 0.24$, $SE = 0.12$, $z = 2.03$, $p = .043$) and their sense of uniqueness ($B = 0.40$, $SE = 0.14$, $z = 2.88$, $p = .004$), but does not have a significant effect on any of the other measures ($ps > .05$).

Binomial tests indicated that the *Crowd* experience actually made children feel smaller than the *Awe* experience ($M = 0.37$, $p = .008$, $d = 0.27$), suggesting the vast social scenes successfully elicited a basic sense of being small among children. But the *Awe* experience, in comparison to the *Crowd* experience, led children to feel an overall increase in motivation to explore interesting things in the world ($M = 0.87$, $p < .001$, $d = 1.12$), to think more beyond their usual needs and desires ($M = 0.78$, $p < .001$, $d = 0.65$), and to feel a greater sense of self-efficacy ($M = 0.65$, $p = .002$, $d = 0.31$), although did not lead them to feel an overall motivation to understand unknown things ($M = 0.57$, $p = .18$, $d = 0.14$), or aspire to be nicer and kinder ($M = 0.56$, $p = .25$, $d = 0.12$). Children strongly preferred watching the *Awe* video over the *Crowd* video ($M = 0.85$, $p < .001$, $d = 0.96$).

For the measures that we have found an age difference, we compared younger children ($M = 5.66$ years) and older children's ($M = 8.51$ years) responses separately to chance level (based on median split of age). We found that neither younger ($M = 0.42$, $p = .28$, $d = 0.16$) nor older children ($M = 0.61$, $p = .14$, $d = 0.22$) distinguished the two types of experiences in terms of their sense of connection, but the older children's pattern is more similar to adults. Older children ($M = 0.82$, $p < .001$, $d = 0.83$) felt more uniqueness in response to the awe experience than the crowd experience, and a similar but weaker trend was found among younger children too ($M = 0.64$, $p = .058$, $d = 0.28$). These Results are presented in Figure 3.

Figure 3

Adult and Child Responses to Vast Nature and Crowd Experiences in Study 4



Taken together, the results in this study suggest that children and adults distinguish awe-inspiring experience from the crowd experience, despite that both involve perceptually vast scenes (indeed, children actually reported that the crowd experience made them feel smaller compared to the awe experience). Children indicated stronger motivation to explore interesting things in response to the awe experience than to the crowd experience, an effect that we found consistently in Studies 2–4. We also found multiple effects in relation to their sense of self: Children reported that awe experiences made them think more beyond their usual needs and desires, to feel a greater sense of self-efficacy, and to feel more unique. Adults showed similar effects, as well as reported that awe experience motivated them to understand unknown things and aspire to become nicer and kinder. These results suggest that the felt positive effects of awe-inspiring experiences cannot be accounted for by perceptual

vastness alone. Children and adults perceive not only positive cognitive and motivational effects of awe-inspiring experiences but also multiple effects on their sense of self.

General Discussion

Across four studies, our findings provide novel evidence on how children perceive and respond to awe-inspiring experiences. Children recognize vast nature as an elicitor for awe expressions and they react to awe-inspiring experiences with a blend of happiness, surprise, and fear (Study 1). Both positive (Study 2) and threatening (Study 3) awe experiences, relative to neutral experiences, make children feel themselves as smaller and more motivated to explore and to understand unknown things. In addition to these cognitive and motivational effects, vast nature scenes were also more likely than vast social scenes to lead children to think beyond their usual needs and desires, to feel more capable of improving their own lives, and to feel more unique (Study 4). Children strongly preferred awe-inspiring experiences to neutral and crowd experiences (Studies 1-4). These findings suggest that awe-inspiring experiences and their effects are enjoyed and appreciated early in life.

Awe is a profound self-transcendent emotion that has been theorized to have evolutionary roots, which originally may have signaled a safe natural environment for survival (Chirico & Yaden, 2018) and led humans to develop social bonds and fold into social hierarchies (Bai et al., 2017; Keltner & Haidt, 2003; Piff et al., 2015). These evolutionary functions of awe predict the possibility that an appreciation of awe-inspiring experiences may emerge relatively early in life. Our paper presents new evidence showing children's ability to appreciate awe-inspiring experiences and differentiate them from other kinds of experiences, even though awe experiences are considered as complex subjective states involving multiple facets (Keltner & Haidt, 2003; Shiota et al., 2007; Yaden et al., 2019). This work thus moves us one step closer to understanding the nature and origins of awe experiences.

Across studies, our most consistent finding is that children across ages (and adults) feel awe experiences motivated them to explore and to understand more things, even when the comparison experiences shared some key features of the awe experiences in our studies (e.g., similarly involving nature, perceptual vastness, background music and diversity of scenes). Consistent with the view that awe is an "epistemic emotion" (e.g., Gottlieb et al., 2018; McPhetres, 2019; Valdesolo et al., 2017), these findings suggest that the effects of awe experiences on learning are readily perceived early in life, which may have important implications for promoting children's motivation and achievement.

Notably, these epistemic effects were found both with positive and threatening awe experiences, despite that threatening awe experiences have been found to induce fear and uncertainty (Gorden et al., 2017). It is known that children, too, tend to learn and explore less when they feel insecure and fearful (Cooke et al., 2019; Easterbrooks et al., 1993; Fearon et al., 2010). In our work, we indeed found that threatening awe experiences do not make adults or older children feel more connected to the world than neutral experiences. Nevertheless, the threatening awe experiences led both children and adults to feel more motivated to explore more than neutral experiences did—one positive effect of threat-based awe not found before. The fact that we found this motivational effect with both positive and threatening awe experiences also suggests that perceptual beauty or pleasantness alone may not account for the effect of awe-inspiring experiences. Instead, the "schema liberation" effect of threatening awe experiences (Takano & Nomura, 2022) might give rise to the greater motivation to explore and learn. It will be fruitful to investigate awe's effects on children's actual learning and exploration behaviors in future studies.

Importantly, we also found that children and adults perceive that awe-inspiring experiences (compared to crowd experiences) make them feel more positively about the self—inspired them to think more beyond themselves, to feel capable of making their lives

better, to aspire to become nicer and kinder, and to feel an increased sense of uniqueness. It is known that awe experiences induce a sense of "small self" (e.g., Bai et al., 2017; Piff et al., 2015; Preston & Shin, 2017). Our findings further suggest that awe experiences may have multiple additional positive aspects on the sense of the self. Children's ideas of who they are change with age, and the developing self-views can have lasting impacts on their social relationships and well-being (Starmans, 2017). Our findings thus motivate future research on the role of awe-inspiring experiences in positively shaping children's self-identity.

We did not find equally strong evidence for the effects of awe on children's sense of connection (and the connection effect for adults was also somewhat weaker compared to the effects on motivation and sense of self). Children's everyday direct experiences mostly involve concrete people and contexts in life (Bronfenbrenner & Morris, 2006), and their abstract reasoning about the physical and social world is still developing (e.g., Marini & Case, 1994; Uttal et al., 2009). Therefore, it is possible that connection to "everything in the world" may be a feeling too abstract to be readily experienced. There is evidence that awe experiences (compared to neutral experiences) make adults feel closer to their community (Bai et al., 2017). It is an interesting open question if awe's effects on connections to *related others* versus *everything in the world* are of similar nature and strength.

Perceptual vastness has been theorized as one key component of awe experiences (Keltner & Haidt, 1999) and a great majority of existing studies have relied on vast nature stimuli to evoke awe. But our findings suggest that not all novel scenes involving perceptual vastness can be equally awe-inspiring. Children and adults reported more positive effects of experiences involving large nature scenes than those involving large social scenes, despite that children reported crowd experiences similarly made them feel small. The effects are consistent with the findings that people often experience a trivialized and deindividualized sense of self while being in a large crowd (Crossey et al., 2021; Neal, 1993). Our findings

thus highlight that awe-inspiring experience is special in eliciting a sense of being small without feelings of trivialization and deindividuation. It is worth noting that our crowd experiences involved collections of unrelated people. Perhaps collective crowds could possibly lead to self-transcendent experiences, when the members feel socially connected by synchronized movements or shared purposes (e.g., protestors, music and sports fans; Haidt et al., 2008; Hopkins et al., 2016; Levine et al., 2005). Our study raises interesting questions about what features of vast experiences might lead to a sense of trivialization versus elevation.

More broadly, our work helps shed light on a new dimension of emotional experiences among children, namely, self-transcendent experiences — experiences that take one beyond the self. Extensive research has revealed children's experiences and perceptions of basic emotions (e.g., happy, sad, anger, Barrera & Maurer, 1981; Bornstein & Arterberry, 2003; Farroni et al., 2007) and self-centered emotions (e.g., guilt, pride; Bafunno & Camodeca, 2013; Kochanska et al., 2002; Lewis et al., 1991; Lewis & Sullivan, 2005; Thompson & Hoffman, 1980). Young children also experience prosocial emotions such as empathy (Decety et al., 2018; Eisenberg et al., 2006; Kim & Kochanska, 2017; Michalson & Lewis, 1985), value gratitude displays (Vaish & Savell, 2022), and show elevated body postures when seeing other's needs fulfilled (Hepach et al., 2017). Our findings contribute to this body of work by revealing children's capacity to perceive and appreciate awe-inspiring experiences, which serves as an initial step along an intriguing journey into the development of self-transcendence experiences. It will be fruitful for future research to study the emergence, development, and benefits of a more expansive range of self-transcendent experiences, such as awe, compassion, love, flow, and gratitude during childhood. Together, the findings will give us a much more complete understanding of children's rich emotional world.

To conclude, across four studies, we found that children discern awe-inspiring experiences from other kinds of experiences, and they perceive diverse positive effects of awe-inspiring experiences — in terms of their motivation to explore, awareness of things to understand, and multiple aspects of their sense of self. Consistent with the view that awe experience serves evolutionary functions, our work provides evidence that awe-inspiring experiences, such as seeing nature's beauties and power, are readily appreciated even from an early age. Therefore, as complex and profound as awe experiences are, it seems we do not have to wait until adulthood to appreciate and benefit from them. Instead, we are given the gift to appreciate awe experiences even as children, which we carry into adulthood as we are continually awed and inspired in life.

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