UC Berkeley
UC Berkeley Electronic Theses and Dissertations

Title

Testing the Awe-Inclusion Hypothesis: The Link Between Awe and Social Inclusion

Permalink

https://escholarship.org/uc/item/4gh6j92p

Author

Monroy, Maria

Publication Date

2022

Peer reviewed|Thesis/dissertation

eScholarship.org Powered by the California Digital Library
University of California

Testing the Awe-Inclusion Hypothesis: The Link Between Awe and Social Inclusion

By

Maria Monroy

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Psychology

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Dacher Keltner, Chair

Professor Rodolfo Mendoza-Denton

Professor Iris B. Mauss

Summer 2022

Abstract

Testing the Awe-Inclusion Hypothesis: The Link Between Awe and Social Inclusion

By

Maria Monroy

Doctor of Philosophy in Psychology

University of California, Berkeley

Professor Dacher Keltner, Chair

In the present work I test, for the first time, the Awe-Inclusion Hypothesis. The results of six studies across diverse methodologies provide support for my central claim, that awe is associated with greater social inclusion—conceptualized in terms of openness, collective orientation, connectedness, and perceptions and behavioral intentions of inclusion. I first tested this claim in trait-like tendencies and found that awe prone people tend to be more open-minded, more collective oriented, feel more connectedness to others, and are more inclusive of others (Studies 1 & 6). Second, in in-vivo studies in nature, self-reports of awe were related to greater connectedness to others (Studies 2 & 3). Third, in day-to-day life, on days in which people experienced more awe than typical, they also experienced greater connectedness and openness to different cultures (Studies 4 & 5). Fourth and last, in an experimental study, people induced to experience awe were more inclusive of People of Color (Study 6). Moreover, when compared to a pride and neutral condition, people in the awe condition were the least inclusive of non-POC, white groups. Across these studies, the effects of awe were unique and beyond the effects of other positive emotions. This work provides evidence suggesting that experiences of awe are associated with different aspects of social inclusion and provides promise for interventions aiming to improve diversity and inclusion.

Dedication

A mi madre, *Ofelia.*

Table of Contents

Introduction **1**

Part I: Dispositional Awe **4**

Study 1. The Awe-Inclusive Personality 4

Part II: Awe in the Wilds of Nature **6**

Study 2. Awe and Connectedness During the 2017 Total Solar Eclipse 6

Study 3. Awe and Connectedness During Whitewater Rafting 9

Part III. Quotidian Awe **11**

Study 4. Daily Awe, Connectedness, and Openness to Other Cultures in a University Sample 11

Study 5. Daily Awe, Connectedness, and Openness to Other Cultures in a Community Sample During the COVID-19 Pandemic 14

Part IV: Experimental Awe in the (Online) Lab **17**

Study 6: Awe, Compared to Neutral and Pride, Promotes Social Inclusion 17

General Discussion **25**

References **28**

Acknowledgments

I owe so many people so much gratitude.

My academic home, the University of California Berkeley, has been the most nurturing and supportive environment. I had the great fortune to learn from trailblazers in the field, whom I owe tremendous gratitude. I would like to thank Dacher Keltner, Rodolfo Mendoza-Denton, and Iris Mauss for the guidance and support throughout the years and for their critical feedback on this work. In particular, I would like to show my appreciation toward Dacher, who inspired me through his commitment to awe, not only in theory but also in practice. Gracias to Rudy for all the charlas about life and academia. And thanks to Iris for her warmth and thorough attention to detail.

I would also like to thank all my Berkeley and IPSR folks—my mentors, colleagues, and friends. In alphabetical order: Amanda, Arianna, Craig, Daniel, Elizabeth, Felicia, Helena, Jia Wei, Jocelyn, Jordan, Joseph, Malik, Ozge, Stephen, Sydney, and Vanessa. I'm grateful for our intellectual conversations, stats chats, laughter, hikes, and the many, many, cups of coffee. I am also grateful for my global community, for exposing me to the rich intellectual diversity this world has to offer.

I am indebted to my family, whose journey paved the way; to my mother and siblings for teaching me the importance of hard work and perseverance. Thanks to Oliver, my partner in life, my largest supporter and biggest source of strength.

You, all of you, were the force that kept me going.

THANK YOU

Testing the Awe-Inclusion Hypothesis: The Link Between Awe and Social Inclusion

Humans are a social species, from the moment of birth and through the different developmental stages of life. How humans have adapted to be ultra-social has become a central focus in evolutionary inquiry. Scholars have begun to theorize about the varieties and functions of social relationships (e.g., need to belong, Baumeister & Leary, 1995; multilevel selection, Wilson & Wilson, 2007). Central to ultra-sociality is the broad theoretical idea that emotions enable the relationships so central to human social life.

Emotion as the Fabric of Social Relationships: A Social Functional Account

Emotions are central to the formation, maintenance, and negotiation of social relationships (van Kleef & Côté, 2022). Emotions enable individuals to appropriately respond to challenges and opportunities in the environment (Keltner & Haidt, 1999; Keltner & Oatley, 2022; Niedenthal & Brauer, 2012). For example, expressions of fear alert others of a particular threat (Anderson et al., 2018), thus enabling appropriate fleeing. Compassion orients people to ameliorate others' suffering (Goetz et al., 2010). Love enables the creation of long-lasting social bonds with other people (Gonzaga et al., 2006). Awe orients individuals toward the vast, the powerful —be in nature or with other people— enabling them to fold into collectives (Keltner & Haidt, 2003; Nelson-Coffey et al., 2019; van Cappellen & Saroglou, 2012; Yaden et al., 2019).

Positive emotions are thought to broaden attention and build psychological and social resources (Fredrickson, 2001; Fredrickson & Branigan, 2005). Positive emotions, or experiences of global positive affect (e.g., "I feel good about life"), bring about beneficial cognitive and social outcomes—including creativity, altruism, and overall well-being (Lyubomirsky et al., 2005; Pressman et al., 2019). In the present paper, I will focus on one specific emotion, *awe*, and examine its pro-social consequences. More specifically, I will examine how awe might lead to social inclusion—the broad tendency to include those who are different from us in our social group.

The Science of Awe and its Prosocial Consequences

Awe is an emotion that is experienced in the presence of something vast that is difficult to understand (Keltner & Haidt, 2003). Keltner and Haidt (2003) proposed two core appraisals of the awe experience: perceived vastness and need for accommodation. Vastness refers to a quality of a stimulus that is larger than one's ordinary frame of reference. This can be in terms of physical size (e.g., the Grand Canyon), explanatory power (e.g., Einstein's theory of General relativity), social significance (such as a powerful leader, e.g., MLK), and sensory detail (e.g., a complex musical or visual piece). Accommodation involves updating one's worldview in order to make sense of the new experience (Keltner & Haidt, 2003; Shiota et al., 2009). Recent daily diary work and more open-ended narrative work in 26 cultures find that people experience awe through encounters with: other people's courage and kindness, nature, collective gatherings (dance, rituals, and ceremonies), music, visual art, religious and spiritual practice, epiphanies, and birth and death (Bai et al., 2017; Bai et al., 2022).

Behaviorally, prototypical facial displays of awe include raised inner brow, widened eyes, and an open, slightly drop-jawed mouth (Campos et al., 2013; Cordaro et al., 2018; Shiota et al., 2003), and vocalizations include expressions like "wow" or "whoa" (Cordaro et al., 2016; Simon-Thomas et al., 2009). Recent computational approaches find that the facial and vocal expressions of awe are distinct amongst 25 or so expressions of distinct emotions (Cowen et al., 2018; Cowen & Keltner, 2019), are recognized across 10 cultures (Cordaro et al., 2016), and

found to occur in similar contexts— for example when watching fireworks— in 144 cultures in a machine learning analysis of expressions in over 2,000,000 videos (Cowen et al., 2021). Awe expressive displays, in particular the widening of the eyes, suggest a behavioral response adapted to allow for the absorption, greater intake, and processing of information from the environment (Shiota et al., 2003).

Select studies find that awe is marked by a relatively distinct neurophysiological profile. Awe is associated with increased goosetingles as opposed to shuddering (Maruskin et al., 2012), and increased vagal tone (Gordon et al., 2016). Studies find that the awe felt for morally courageous and kind acts was associated with increased oxytocin release (Silvers & Haidt, 2008; Thomson & Siegel, 2017). This physiological profile of awe is associated with greater pro-social outcomes, as evident in studies of increased sense of connection (e.g., Kok et al., 2013), openness to others and prosocial tendencies (Bartz, 2016; Keltner et al., 2014; Kogan et al., 2011; Kogan et al., 2014).

The awe profile thus includes expressions and neurophysiological patterns that suggest awe as an outward focused emotion. An outward focus toward the environment seems to be a core component of the awe experience. Awe is argued to be an other-focused emotion, a self-transcendent emotion (Shiota et al., 2009; Stellar, Gordon, Piff, et al., 2017; Yaden et al., 2017). Self-transcendent emotions— a family of emotions including awe, compassion, and gratitude— are those that encourage individuals to transcend their own momentary needs and desires and orient their focus on those of other individuals (Stellar, Gordon, Piff, et al., 2017). These emotions typically arise out of other-focused appraisals, shifting attention toward the needs and concerns of others, rather than self (Stellar, Gordon, Piff, et al., 2017).

Research investigating the consequences of awe find that awe leads to prosocial actions: cooperation, sacrifice, and sharing (Joye & Bolderdijk, 2014; Naclerio & Van Cappellen, 2021; Piff et al., 2015; Prade & Saroglou, 2016; Rudd et al., 2012). For example, a series of studies found that people higher in dispositional awe—as measured with items like "I often feel awe" (Shiota et al., 2006)— proved to be more generous in economic games (Piff et al., 2015; but see Naclerio & Van Cappellen, 2021). In lab studies, experimentally induced experiences of awe (via a nature video) have been found to lead people to prefer a more prosocial, equal distribution of resources (Joye & Bolderdijk, 2014; Piff et al., 2015), and to be more willing to volunteer their time to charity in comparison to another positive emotion (Rudd et al., 2012). Moreover, studies in nature find behavioral evidence for the awe prosocial association. In a study examining whether awe would influence altruistic behavior after looking up at a grove of towering eucalyptus trees (awe) or looking at a tall building (neutral), after the awe induction participants were more helpful toward the experimenter (i.e., picked up more pens) and reported feeling less entitled in comparison to the neutral condition (Piff et al., 2015). These findings provide evidence of the positive consequences of awe on prosociality. What has yet to be examined is whether this prosocial relationality of awe extends to how people perceive and behave toward other individuals different from themselves.

Awe and Inclusion: How might Awe Promote Social Inclusion?

Although the link between awe and social inclusion—i.e., the inclusion of others in one's social group— is not yet established, past research lends credence to this claim. Social inclusion can be argued to involve two processes: *feeling included* by others and *being inclusive* of others. The former has been the focus of past research assessing connectedness (Aron et al., 1992; Mashek et al., 2007) and belonging (i.e., social well-being; Keyes, 1998, 2002, 2009), which are components of social inclusion (Baumgartner & Burns, 2014; Cordier et al., 2017; Secker et al.,

2009). These measures of inclusion—consisting of either a single item picture of overlapping circles (Aron et al., 1992; Mashek et al., 2007) assessing people's connectedness to others or a community, or multiple descriptive items assessing social integration and acceptance (i.e., social well-being; Keyes, 1998, 2002, 2009)— have been found to be positively associated with awe (Anderson et al., 2018; Bai et al., 2017; Naclerio & Van Cappellen, 2021; Nelson-Coffey et al., 2019; van Cappellen & Saroglou, 2012). These measures of connectedness and belonging assess an individual's feelings of inclusion with a larger group; they do not necessarily capture whether the individual includes others in their social group, either in terms of cognition or actual social behavior. In the current investigation, I build on this work by examining how awe might influence both the inclusion of the self in larger communities (i.e., connectedness) and the inclusion others in one's social group using a novel social inclusion paradigm.

Awe might influence the inclusion of others via various pathways— connectedness, a diminished sense of self, and curiosity. A first pathway might be via an increase in feelings of connectedness. Studies find that people prone or induced to experience awe report feeling more connected to others, more integrated in their communities, feel part of a larger humanity (Bai et al., 2017; Nelson-Coffey et al., 2019; Shiota et al., 2007; van Cappellen & Saroglou, 2012), and desire more closeness (i.e., less social distance) to those with different points of view (Stancato & Keltner, 2019). In a similar way, experiences of awe should influence people to feel more connected toward other people from different cultural and/or ethnic backgrounds. Relevant research finds that closeness toward different others, such as outgroup members, is associated with improved intergroup attitudes (Davies et al., 2011). Connectedness may be a first step toward *being inclusive* of others (Cordier et al., 2017).

A second pathway by which awe might influence social inclusion is through a shift in the sense of self. This has been most robustly explored in studies of the influences of awe upon perception of self-size; awe, these studies find, makes people feel small, leading to what has been called a diminished sense of self (Bai et al., 2017; Joye & Bolderdijk, 2014; Piff et al., 2015; Shiota et al., 2007; Stellar, Gordon, Anderson, et al., 2017). This shift in the sense of self, or small-self, was found to mediate the relationship between awe and prosocial tendencies (Piff et al., 2015) and community integration (Bai et al., 2017). A small sense of self thus might explain the relationship between awe and social inclusion.

A third possibility is through a curiosity pathway. Given that awe prone people tend to be more open to experience (Shiota et al., 2006; Silvia et al., 2015)— a tendency that correlates with an increased interest and engagement with other people (Antonoplis & John, 2022)— and curious about the world, including seeking new opportunities involving new information and other people (Anderson et al., 2019; Güsewell & Ruch, 2012), it should lead people to be more curious about others from different culture/ethnic backgrounds. This would afford the perfect environment for social contact, which has been shown to reduce out-group bias (Allport, 1954; Pettigrew & Tropp, 2006) and improve intergroup attitudes in general (Davies et al., 2011). These three pathways of awe— connectedness, small-self, curiosity— lay a foundation for the prediction that awe might lead to inclusive behavior.

Present Investigation

In the present investigation, I test the Awe-Inclusion Hypothesis, using different approaches to awe. Namely, awe can be measured in trait form to assess people's tendencies and dispositions to experience awe (Anderson et al., 2019; Shiota et al., 2006), in in-vivo moments to capture in the moment experiences of awe in natural contexts (Anderson et al., 2018; Bai et al., 2017; Piff et al., 2015), in daily diaries to capture day-to-day variation of awe experiences

(Anderson et al., 2018; Gordon et al., 2016; Stellar, Gordon, Anderson, et al., 2017), and in awe inductions in the lab to capture the causal effects of awe in controlled settings (Bai et al., 2017, 2021; Piff et al., 2015).

Drawing upon these advances, in the present work I measure awe— in terms of trait-like tendencies, rich in vivo experiences, daily diary fluctuations, and laboratory inductions of the experience— and examine for the first time the Awe-Inclusion Hypothesis. I use novel measures of the inclusion of others, which clearly map onto existing measures of feeling included by others (Baumgartner & Burns, 2014; Cordier et al., 2017; Keyes, 1998) including: openness, collective orientation, connectedness, and behavioral intentions of inclusion. Critical to this endeavor is to gather evidence of the unique influence of awe and examine whether it's distinct from other positive emotions, and that its effects are not reducible to positive affect more generally (Fredrickson, 2001, 2013; Lyubomirsky et al., 2005). Across a series of studies, I test five main hypotheses:

Hypothesis 1: Dispositional awe will be associated with a greater inclusive personality—openness, collective orientation, sense of belonging (Study 1).

Hypothesis 2: Experiences of awe in nature, in everyday life, and in the lab will be associated with greater self-reported connectedness (Studies 2-6).

Hypothesis 3: Daily experiences of awe will be associated with greater openness to other cultures (different than one's own; Studies 4 & 5).

Hypothesis 4: Experimental inductions of awe will promote greater social inclusion of ethnically diverse others (Study 6).

Hypothesis 5: Awe will have a unique effect, beyond other positive emotions. That is, all results from Hypotheses 1-3 will hold when controlling for other positive emotions (e.g., joy, pride). For Hypothesis 4, experimental awe will be compared to another positive emotion induction (i.e., pride). In exploratory form, for Hypotheses 2-4, I will examine potential mediating variables in the awe-inclusion relationship. More specifically, for Hypotheses 2 and 3, I will examine small-self and curiosity as explanatory variables. For Hypothesis 4, I will examine small-self, curiosity, and connectedness as potential mediators of awe and social inclusion.

Part I: Dispositional Awe

Study 1. The Awe-Inclusive Personality

Study 1 examines awe at the dispositional level and its relation to inclusive traits. Given that feeling included by others involves feeling accepted, feeling connected, and part of a community (Baumgartner & Burns, 2014; Cordier et al., 2017), being *inclusive* of others should reflect similar tendencies—such as being open-minded and being collective oriented. In Study 1, I examine these aspects of inclusion, and test the Awe-Inclusion Hypothesis at the trait level (Hypothesis 1). I expect that awe prone people will be (1) more open-minded, (2) more collective oriented, and (3) feel more integrated in their communities. I also expect that these relationships will be unique to dispositional awe, and beyond other positive emotion dispositions (Hypothesis 5).

Method

Participants

Participants were 375 undergraduate students (M_{age} = 20.56, *SD* = 2.92; 77% women) from the University of California, Berkeley who participated in exchange for credit in a psychology course. The sample demographics were 170 (45%) Asian American, 95 (25%) European American, 58 (15%) Latinx American, 15 (4%) Middle Eastern American, 4 (1%) African American, and 33 (9%) mixed ethnicities.

Procedure

Participants first provided informed consent, completed demographic questions, and then completed a personality questionnaire. Then, they took part in a diary study that focused on daily emotion and coping, previously reported (Monroy et al., 2021). This procedure was approved by the authors' institutional review board.

Measures

Dispositional Positive Emotion Scale (DPES). Predisposition to experience awe and six other positive emotion dispositions were assessed with the DPES (Shiota et al., 2006). The DPES consists of 38 items assessing people's disposition to experience seven positive emotions: awe, amusement, compassion, contentment, joy, love, and pride. Participants indicated their agreement on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*) to statements such as: *I often feel awe* (Awe; α =.84; *M* = 4.94, *SD* = 1.01); *I find humor in almost everything* (Amusement; α =.81; *M* = 5.04, *SD* = 1.02); *I often notice people who need help* (Compassion; α =.88; *M* = 5.72, *SD* = 0.90); *I am generally a contented person* (Contentment; α =.94; *M* = 4.56, *SD* = 1.34); *I am an intensely cheerful person* (Joy; α =.87; *M* = 4.60, *SD* = 1.13); *I develop strong feelings of closeness to people easily* (Love; α =.85; *M* = 4.56, *SD* = 1.11); and *I am proud of myself and my accomplishments* (Pride; α =.85; *M* = 4.76, *SD* = 1.12).

Openness. Openness was assessed via the openness facet of the Big Five Inventory (John & Srivastava, 1999). Participants indicated their agreement to ten items with statements such as "I see myself as someone who... Is curious about many different things," on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*; α =.81; *M* = 3.49, *SD* = 0.61).

Collective Orientation. Collective orientation was assessed via the cultural orientation scale (Triandis & Gelfand, 1998). Participants indicated their agreement to sixteen items, eight for collectivism and eight for individualism, on a scale from 1 (*never or definitely no*) to 9 (*always or definitely yes*). *Collectivism* was assessed with items such as "To me, pleasure is spending time with others" and "Parents and children must stay together as much as possible" (α =.82; *M* = 6.58, *SD* = 1.15). *Individualism* was assessed with items like "I often do "my own thing"" and "It is important that I do my job better than others" (α =.81; *M* = 5.98, *SD* = 1.28).

Belonging. Sense of belonging was assessed with a single item from the social well-being scale (Keyes, 1998, 2002, 2009). Participants indicated the frequency of how often during the past month they felt "that [they] belonged to a community (like a social group)" on a scale ranging from 0 (*never*) to 5 (*every day*; *M* = 3.18, *SD* = 1.38).

Data Analytic Plan

All statistical analyses were performed using RStudio (R Core Team, 2018) in the R programming environment. Preliminary analyses included examination of missing data and data exclusion based on the planned specified criteria.

Results

First, I examined the relationship between disposition to experience awe and trait openness. Consistent with past findings (Shiota et al., 2006), people predisposed to experience awe tend to be more open-minded (β= 0.45, 95% CI [.36, .55], $t(373)$= 9.86, $p < .001$). This relationship remained significant when separately controlling for the DPES subscales (*ps* <

.001)— disposition to experience amusement, compassion, contentment, joy, love, and pride. These findings suggest that awe has a unique association with openness, beyond other positive emotion dispositions.

Next, I examined the relationship between trait awe and collective orientation. As predicted, I found that people prone to experience awe tend to be more collectivistic (β= 0.33, 95% CI [.23, .42], $t(373) = 6.67$, $p < .001$). The relationship between trait awe and individualism was not significant ($p = .79$). The relationship between trait awe and collectivism held when separately controlling for the other DPES subscales ($ps < .01$). Given the relationship between trait awe and openness, in the following models I control for openness. Once again, the association between trait awe and collectivism held (β= 0.36, 95% CI [.25, .47], $t(372)= 6.51$, $p < .001$) when controlling for openness.

Then, I examined whether dispositional awe would be related to an individual's sense of belonging. To test this, I examined a model with trait awe predicting sense of belonging, and found a positive association (β= 0.36, 95% CI [.26, .45], $t(373)= 7.37$, $p < .001$). This shows that awe prone people tend to feel part of a social group, more included. This relationship held when controlling for all the dispositional positive emotions of the DPES ($p < .01$), except for joy ($p = .22$). This relationship also held when controlling for openness (β= 0.35, 95% CI [.24, .45], $t(372)= 6.36$, $p < .001$).

Taken together, these findings are consistent with Hypothesis 1 and suggest that awe prone people tend to have a more inclusive orientation—more open-minded, more collectivistic, and feel a sense of belonging to a collective (social group). These findings are also consistent with Hypothesis 5 and suggest that these associations are unique to dispositional awe, beyond other positive emotion dispositions, with the exception of joy for belonging.

Part II: Awe in the Wilds of Nature

Study 2. Awe and Connectedness During the 2017 Total Solar Eclipse

Study 2 examines whether in-vivo state awe influences people's sense of connectedness toward others. I examined this in a natural occurring awe experience in response to a total solar eclipse. Data collection took place in the path of totality—the path of the moon's shadow across the earth, an awe inducing experience— in the state of Oregon on August 21st 2017. Totality is the maximum phase of a total solar eclipse, during which the moon's disk completely covers the sun (AAS; see Figure 1), turning a bright day into complete darkness. This provided a unique naturalistic opportunity to examine experiences of awe in response to a truly extraordinary event. In this study, I test two of the main hypotheses: Experiences of awe will predict greater connectedness (Hypothesis 2); and this effect will be unique to awe, beyond experiences of other positive emotions (Hypothesis 5).

Figure 1

A Total Solar Eclipse



Note. Almost totality during the 2017 Total Solar Eclipse, as seen from Salem, Oregon (Thompson, 2017).

Method

Participants

The sample consisted of 112 adults (M_{age} = 34.03, *SD* = 11.61; range 18-70; 47% women) who viewed the eclipse from the path of totality in Oregon. The ethnic composition of the sample was 86 (77%) European American, 6 (5%) Asian American, 4 (4%) Latinx American, 1 (1%) African American, 1 (1%) Native American, 8 (7%) Other ethnicities, and 6 (5%) no response. The total sample consisted of both an in-person sample collected onsite in Salem Oregon and an online sample collected via Amazon Mechanical Turk (Mturk) on the day of the eclipse, August 21st 2017. In total, 46 in-situ and 66 online participants were recruited. This sample size is comparable to previous studies examining awe (Piff et al., 2015; Stellar, Gordon, Anderson, et al., 2017) and other emotions (Anderson et al., 2017; Tracy & Matsumoto, 2008) in naturalistic contexts.

Procedure

Data collection took place after totality, starting at approximately 11 in the morning PST. In Oregon, totality began at approximately 10:15 am in the west coast and varied depending on location (in Salem it began at 10:17 am), lasting approximately 2 minutes and 40 seconds. Participants first consented to participate, either in person or online. Then they reported on their emotions, thoughts, and experiences they had during the eclipse. Participants also provided a short narrative about their experience of the eclipse and basic demographics. In-situ participants completed the survey in paper-and-pen format. Mturk participants were compensated 75 cents

for completing the survey. This procedure was approved by the authors' institutional review board.

Measures

Awe. Guided by previous studies measuring emotional experiences (Anderson et al., 2018; Impett et al., 2012; Srivastava et al., 2009) awe was assessed with a single item composed of a synonym cluster (*awe/amazed/wonder*), in which participants rated how much awe they experienced that day during the eclipse on a scale from 0 (*none at all*) to 10 (*completely; M* = 8.85, *SD* = 1.87).

Positive Emotions. Positive emotions were assessed with single items composed of synonym clusters, in which participants rated how much of each of five positive emotions they experienced that day during the eclipse on a scale from 0 (*none at all*) to 10 (*completely)*: Amusement (*amused/having fun/laughing*; *M* = 7.25, *SD* = 2.74), Contentment (*content/relaxed/ peaceful; M* = 6.54, *SD* = 2.61), Gratitude *(grateful/appreciative/thankful*; *M* = 7.82, *SD* = 2.58), Joy *(joyful/excited*[1]*/enthusiastic*; *M* = 8.21, *SD* = 2.31), and Pride *(proud/sense of accomplishment/successful; M* = 5.90, *SD* = 3.35).

Small-self. Small-self was measured with a single item (Piff et al., 2015), composed of a synonym cluster (*small/tiny/insignificant*), on a scale from 0 (*none at all*) to 10 (*completely*; *M* = 4.11, *SD* = 3.46).

Curiosity. Curiosity was assessed with a single item composed of a synonym cluster (*curious/interested/wanting to explore*), on a scale from 0 (*none at all*) to 10 (*completely*; *M* = 7.83, *SD* = 2.40).

Connectedness. Connectedness was assessed with two face-valid items on a scale from 0 (*not at all*) to 10 (*completely or totally)*: *Today how connected did you feel to the people around you?* (*M* = 7.05, *SD* =2.60); *Did you get along well with the people that you interacted with?* (*M* = 8.27, *SD* = 2.04). These two items were combined into a composite (α =.75; *M* = 7.67, *SD* = 2.10).

Data Analytic Plan

Data analytic plan was identical as in Study 1.

Results

In keeping with Hypothesis 2, the awe experienced during the eclipse predicted greater connectedness toward others (β= 0.54, 95% CI [.38, .70], $t(109)$= 6.67, $p < .001$). This effect held when controlling for data collection method (in-person or online; β= 0.47, 95% CI [.30, .63], $t(108)$= 5.59, $p < .001$). Second, I examined whether the effect of awe on connectedness would hold when controlling for other positive emotions (Hypothesis 5). After controlling for each positive emotion in separate models, I found that the relationship between awe and connectedness remained significant when controlling for amusement (p <.001), contentment (p < .001), gratitude ($p < .001$), pride ($p < .001$), and joy ($p = .02$). See Table 1 for models' statistics.

Then, I examined potential explanatory variables, such as small sense of self and curiosity. Given previous findings on awe and small-self (Bai et al., 2017; Naclerio & Van Cappellen, 2021; Piff et al., 2015), small sense of self may explain the association between awe and connectedness. The effect of awe on connectedness still held when adding small-self into the model ($p < .001$). Similarly, the effect of awe held after adding curiosity into the model (p < .001). See Table 1 for models' statistics.

[1] Energetic instead of excited was used for the Mturk sample.

Table 1

Analyses with Connectedness as the Outcome Variable

		Connectedness			
Predictors	*β*	*CI*	*t*	R^2	*p*
1. Awe	.54	0.38 – 0.70	6.69	.29	**<0.001**
2. Awe + Amusement	.31	0.16 – 0.47	4.01	.49	**<0.001**
3. Awe + Contentment	.52	0.36 – 0.69	6.30	.30	**<0.001**
4. Awe + Gratitude	.38	.18 – .58	3.77	.33	**<0.001**
5. Awe + Joy	.24	.04 – .43	2.40	.41	**0.018**
6. Awe + Pride	.38	.22 – .54	4.76	.42	**<0.001**
7. Awe + Curiosity	.35	.17 – .53	3.93	.38	**<0.001**
8. Awe + Small-Self	.57	.41 – .73	7.14	.33	**<0.001**

Note. Models 2-8 are multiple regression models, with awe controlling for other variables.

In sum, these findings suggest that natural occurring events, astronomical events such as a solar eclipse, can elicit awe and bring about a sense of connectedness. These findings also suggest that this effect was unique to the awe that the eclipse brought about, and not other positive emotions. Moreover, the relationship between awe and connectedness was not explained by feeling small/insignificant or curiosity, once again suggesting a unique effect of awe.

Study 3. Awe and Connectedness During Whitewater Rafting

In Study 3, I recruited a diverse sample of participants, including military veterans and youth from underserved communities. Study 3 provides further support for Hypotheses 2 and 5 by examining the unique relationship between awe and connectedness in the context of an outdoor experience, a whitewater rafting trip in the American River, CA.

Method

Participants

Participants were recruited through the Sierra Club Outdoors organization from people that were planning on attending whitewater rafting trips during the 2015 and 2016 summer rafting seasons. Participants consisted of 124 military veterans and youth from underserved communities who took part in either one-day or four-day whitewater rafting trips. In the 2015 summer, age was not measured but ranged widely—the youngest participant was middle school-aged and the oldest were veterans of the Vietnam War. For the 2016 summer, age ranged from 25 to 69 (M =38, SD = 10.97). The total sample (N = 124; 38% female), consisted of 72 veterans and 52 youth; 48% identified as White, 27% as Asian, 17% as Latinx, 12% as Black, 5% as Native American, and 4% did not respond (participants were able to select multiple categories). Parts of these data have been reported upon: from the 2015 cohort, on coherence of subjective,

expressive, and physiological components of fear (Anderson et al., 2017); and on the effects of awe on well-being (Anderson et al., 2018). For more details on this sample refer to the supplemental materials in Anderson and colleagues (2018).

Procedure

Participants were provided information about the study, including an invitation to participate and consenting materials, in advance of the trip. Within each rafting trip, there were either all veterans or all youth. All trips included people who participated and people who did not participate in the study— such as guides, chaperones, and research personnel (for details, see Anderson et al., 2017).

Participants arrived at the rafting put-in site between 9 and 10 in the morning, where self-report measures were administered and gathered by research personnel, including consent and demographics. At the end of the rafting trip, participants completed a rafting diary in which they reported on emotions, thoughts, and experiences they had that day. Participants on one-day trips completed the rafting diary once, and those on four-day trips (22.5% of sample) completed the rafting diary four times. Participants who completed the study were given a $25 gift certificate. All measures were administered in paper-and-pen format. This procedure was approved by the authors' institutional review board.

Measures

Rafting Diary

At the end of each rafting day, participants reported how much they experienced a number of feelings and thoughts during whitewater rafting. For participants who went on four-day trips, the average of each item across all the diaries completed was used in analyses. Rafting diary measures were identical to Study 2.

Awe. Awe was assessed with a single item composed of a synonym cluster (*awe/amazed/ wonder*), in which participants rated how much awe they experienced that day during whitewater rafting on a scale from 0 (*none at all*) to 10 (*completely; M* = 7.69, *SD* = 2.43).

Positive Emotions. Positive emotions were assessed with single items consisting of synonym clusters, in which participants rated each of the five positive emotions on a scale from 0 (*none at all*) to 10 (*completely*). Amusement (*amused/having fun/laughing; M* = 8.32, *SD* = 2.09), Contentment (*content/relaxed/peaceful*; *M* = 7.55, *SD* = 2.27), Gratitude (*grateful/ appreciative/thankful; M* = 8.27, *SD* = 2.09), Joy (*joyful/excited/enthusiastic*; *M* = 8.08, *SD* = 2.20), and Pride (*proud/sense of accomplishment/successful; M* = 8.07, *SD* = 2.00).

Small-self. Small-self was measured with a single item consisting of a synonym cluster (*small/tiny/insignificant*), on a scale from 0 (*none at all*) to 10 (*completely*; *M* = 1.67, *SD* = 2.74).

Curiosity. Curiosity was assessed with a single item composed of a synonym cluster (*curious/interested/wanting to explore*), on a scale from 0 (*none at all*) to 10 (*completely*; *M* = 8.04, *SD* = 2.47).

Connectedness. Connectedness was assessed with two face-valid items on a scale from 0 (*not at all*) to 10 (*completely or totally)*: *Today how connected did you feel to the people around you?* (*M* = 7.54, *SD* =2.37); *Did you get along well with the people that you interacted with?* (*M* = 8.74, *SD* = 1.69). These two items were combined into a composite (α =.71; *M* = 8.14, *SD* = 1.81).

Data Analytic Plan

Data analytic plan was identical as in Study 2.

Results

First, I examined possible differences between veterans and youth and found no significant distinctions in all the variables of interest ($p > .13$). To test Hypothesis 2, I conducted a model with awe predicting connectedness and found a significant association ($\beta = 0.57$, 95% CI [.42, .72], $t(118) = 7.47$, $p < .001$). Next, to test Hypothesis 5, I examined if this relationship would hold when controlling for each positive emotion in separate models. I found that the relationship between awe and connectedness held when controlling for amusement ($p < .001$), contentment ($p < .001$), gratitude ($p < .001$), pride ($p = .004$), and joy ($p < .001$).

Then, I examined other potential explanatory variables, such as small-self and curiosity. The significant relationship between awe and connectedness remained significant when accounting for small-self ($p < .001$) and curiosity in the model ($p < .001$).

These findings suggest that the awe experienced during whitewater rafting was uniquely related to connectedness, above and beyond experiences of other positive emotions, and not explained by feeling small or curious. These findings provide further evidence in support of Hypothesis 2 and Hypothesis 5.

Part III. Quotidian Awe

Study 4. Daily Awe, Connectedness, and Openness to Other Cultures in a University Sample

Study 4 builds on the extraordinary awe in nature findings and examines awe in quotidian contexts. Study 4 replicates the awe and connectedness findings in the context of people's daily lives. Given that my definition of inclusion refers to including others different from ourselves in our social group (e.g., ethnic group), in Study 4 I expand on the connectedness finding by examining the effect of daily awe experiences on openness to different cultures. In this study, I test three of the main hypotheses: Daily experiences of awe will predict greater daily connectedness (Hypothesis 2); Daily awe experiences will be related to greater openness to other cultures (Hypothesis 3); and these effects will be unique to daily awe and beyond other daily positive emotions (Hypothesis 5).

Method

Participants

Participants were 119 undergraduate students ($M_{age} = 21.30$, $SD = 2.79$, 74.8% women) from the University of California, Berkeley who participated in a multiphase study exchange for credit in a psychology course. This sample size is comparable to that of previous studies examining experiences of awe in daily life (Gordon et al., 2016; Stellar, Gordon, Anderson, et al., 2017). The sample ethnic composition consisted of 47.9% of participants identifying as White, 42% as Asian, 16% as Latinx (Latino/Hispanic), 7.6% as Middle Eastern, 3.4% as Black, 2.5% as Native American, and 2.5% as Pacific Islander. A portion of these data was previously reported in research focused on nature, awe, and well-being (Anderson et al., 2018).

Procedure

Participants first attended a laboratory session, where they provided informed consent, completed demographics and a personality questionnaire, and participated in a laboratory-based data collection not related to the current research. They were instructed on the diary protocol, which began the same day. During the diary period, participants were sent a link to the online diary survey via email every night for 14 consecutive days. Each daily diary began with Likert-type questions that prompted participants to report on emotions, thoughts, and experiences that

day. At the end of the diary participants were asked to write short narratives about an experience of awe or other positive emotion they experienced that day. This procedure was approved by the authors' institutional review board.

Measures

Initial Measures

Openness. Openness was assessed via the openness facet of the Big Five Inventory (John & Srivastava, 1999). Participants indicated their agreement to ten items with statements such as "I see myself as someone who... Is curious about many different things," on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*; α =.81; M = 3.59, SD = 0.61).

Daily Diary Measures

In each diary entry, participants rated how much they experienced a number of feelings and thoughts during the day. Measures of awe, other positive emotions, and curiosity were identical to those used in Studies 2 and 3.

Awe. Awe was assessed with a single item composed of a synonym cluster (*awe/amazed/ wonder*), in which participants rated how much awe they experienced that day on a scale from 0 (*none at all*) to 10 (*completely;* $M_{across\ diary}$ = 3.69, SD = 1.76).

Positive Emotions. Positive emotions were measured with single items composed of synonym clusters, in which participants rated how much of each of five positive emotions they experienced each day: Amusement (*amused/having fun/laughing;* $M_{across\ diary}$ = 6.11, SD = 1.77), Contentment, (*content/relaxed/peaceful;* $M_{across\ diary}$ = 5.87, SD = 1.57), Gratitude (*grateful/ appreciative/thankful;* $M_{across\ diary}$ = 6.38, SD = 1.95), Joy (*joyful/energetic/enthusiastic;* $M_{across\ diary}$ = 6.45, SD = 1.71), and Pride (*proud/sense of accomplishment/successful;* $M_{across\ diary}$ = 5.05, SD = 1.67). To assess daily positive emotionality, all five items were combined into a composite (α =.85; $M_{across\ diary}$ = 5.97, SD = 1.49).

Small-self. Small-self was measured with a single item (Bai et al., 2017), composed of a series of seven circles that increase linearly in size (i.e., a 7- point scale). The following instructions were also included: *Reflecting back on the moment you described [in your awe experience], how small or big did you feel at that time?* ($M_{across\ diary}$ = 4.19, SD = 0.95).

Curiosity. Curiosity was assessed with a single item composed of a synonym cluster (*curious, interested, wanting to explore*), on a scale from 0 (*none at all*) to 10 (*completely*; $M_{across\ diary}$ = 4.57, SD = 1.97).

Connectedness. Connectedness was assessed with a single face-valid item on a scale from 0 (*completely distant and cut off from other people*) to 10 (*completely connected to other people)*: *Today, did you feel distant/cutoff or connected to other people?* ($M_{across\ diary}$ = 6.73, SD = 1.40).

Openness to Other Cultures. Openness to other cultures was assessed with a single item on a scale from 0 (*not at all*) to 10 (*completely)*: *Today did you appreciate cultures or ways of life that are not your own?* ($M_{across\ diary}$ = 3.73, SD = 1.88).

Data Analytic Plan

All statistical analyses were performed using RStudio (R Core Team, 2018) in the R programming environment. Preliminary analyses included examination of missing data and data exclusion based on the planned specified criteria to assess descriptive statistics across all variables.

For the primary analyses, with daily-level variables, I used Hierarchical Linear Modeling (HLM). The repeated measures design resulted in a two-level hierarchical structure with daily diaries nested in participants, and I included random intercepts and random slopes for

participants. The models were fitted using the *lme4* and *lmerTest* packages (versions 1.1-27.1 and 3.1-3); the degrees of freedom and p-values were calculated using the Satterthwaite's method (Bates et al., 2015), which yields *df* that are somewhere between the number of total observations, the individuals, and days depending on the relative variance explained by each factor. This explains the variability in degrees of freedom from model to model.

One strength of a multilevel-modeling approach is that it allows for the examination of day-level effects (i.e., within-person effects), where we can test whether daily changes in one variable are associated with daily changes in another variable. For example, on days in which people report high levels of awe, do they also report greater connectedness? To examine day-to-day effects, I person-centered daily variables, where outcomes represent changes in a variable from that person's own average. This analytic approach is consistent with past research related to emotion at the daily level (Bai et al., 2021; Monroy et al., 2021).

Results

Preliminary Analyses

Of the total sample of 119, four participants were removed who completed one or zero entries. The remaining 115 participants completed at least 8 entries in the 14-day diary period. In total, participants generated 1,529 entries out of the possible 1,610 (95%) during the diary period.

Daily Level Analyses

To test my hypotheses, I used 2-level hierarchical linear models. First, to test Hypothesis 2, I examined the relationship between daily awe and daily connectedness. Consistent with my prediction, across the 14 daily-diaries, on days when participants reported experiencing more awe than typical, they also reported greater connectedness (β= 0.23, 95% CI [.19, .28], t(88.63)= 9.96, $p < .001$). To examine the unique effect of awe (Hypothesis 5), in lieu of running multiple models for each positive emotion, I created a positive emotionality composite (α =.85). When controlling for daily positive emotionality, the relationship between daily awe and connectedness remained significant (β= 0.07, 95% CI [.02, .11], t(323.88)= 2.97, p = .003). Given the findings in Study 1, I controlled for trait openness and found that once again the relationship between daily awe and connectedness remained significant (β= 0.23, 95% CI [.19, .28], t(88.54)= 9.94, $p < .001$). Consistent with Hypothesis 3, on days when participants reported experiencing more awe than typical, they also reported more openness to other cultures (β= 0.23, 95% CI [.18, .29], t(85.30)= 8.24, $p < .001$). The relationship between daily awe and openness to other cultures remained significant (β= 0.14, 95% CI [.08, .19], t(88.62)= 4.80, $p < .001$), when controlling for daily positive emotionality in the model (Hypothesis 5), as well as when controlling for trait openness (β= 0.23, 95% CI [.18, .28], t(85.65)= 8.21, $p < .001$).

Next, I examined possible explanatory variables such as small-self and curiosity. When accounting for small-self in the models, the association between awe and connectedness (β= 0.23, 95% CI [.18, .27], t(331.18)= 10.29, $p < .001$) and openness to other cultures (β= 0.22, 95% CI [.17, .28], t(82.04)= 8.09, $p < .001$) remained significant. In a similar vein, when accounting for curiosity in the models, the relationship between daily awe and connectedness (β= 0.16, 95% CI [.11, .21], t(86.12)= 6.36 $p < .001$) and openness to other cultures (β= 0.15, 95% CI [.09, .20], t(98.37)= 5.00 $p < .001$) remained significant.

These findings suggest that when college students experience more awe than typical, they feel more connected to others and more open to other cultures, and these unique associations are not explained by daily experiences of positive emotions, small sense of self, curiosity, or trait

openness. In other words, daily awe has a unique effect on connectedness and openness to other cultures.

Study 5. Daily Awe, Connectedness, and Openness to Other Cultures in a Community Sample During the COVID-19 Pandemic

Given my previous findings on awe and connectedness, in Study 5 I examined whether daily awe would lead people to feel connected to all people equally. That is, are there differences in the effect of awe on feelings of connectedness toward similar others and feelings of connectedness toward different others? This study also replicates the findings of Study 4, of awe and openness to other cultures. In Study 5, I tested my main Hypotheses 2, 3, and 5 in a community sample during the peak of the COVID-19 pandemic in 2020.

Method

Participants

Participants were 386 individuals (M_{age} = 53.65, *SD* = 13.79, 83% women, 14% men, 1% other, 2% no response), including patients from NorthBay Healthcare and people from the broader community in California and across the USA. The sample demographics were 301 (78%) White/Caucasian, 15 (4%) Latinx/Latinx American, 13 (3%) East Asian/Asian American, 3 (1%) Black/African American, 16 (4%) other, 33 (9%) mixed ethnicities, and 5 (1%) no response.

Procedures

This study used two methodologies in tandem, a daily diary embedded in an awe intervention. Participants were recruited during May 2020. NorthBay Healthcare, a non-profit mid-sized healthcare system serving Solano County, CA., with two hospitals and 300 healthcare professionals, reached out to thousands of patients with a HIPAA compliant email, press announcements, and online social media marketing about enrollment in the study. Friends and family of patients were also invited to enroll in the study. All interested participants provided their contact information via a Qualtrics online survey.

Participants were first instructed on the structure of the study— that there would be an awe intervention and a daily diary reporting of their experiences— via email, and they received a link to the initial online survey. In the initial survey, they provided informed consent and completed demographic and personality questions. Then two days later, the daily diary and the awe intervention began. For the daily diary, participants were sent a link to the online survey every day at 4 pm for 22 consecutive days. Each diary began with Likert-type questions that prompted participants to report on their emotions, thoughts, and experiences that day. At the end of the diary participants were asked to write a short narrative about their favorite moment of awe of that day. The awe intervention consisted of four 60-minute awe online sessions that began at 7 pm (on days 1, 8, 15, and 22). This procedure was approved by the authors' institutional review board.

Measures

Initial Measures

Openness. Openness was measured via the openness facet of the Big Five Inventory-2 Extra-Short Form (Soto & John, 2016). Participants indicated their agreement to three items with statements such as "I am someone who... Is original, comes up with new ideas" on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*; α =.56; *M* = 4.10, *SD* = 0.75).

Awe Intervention

The awe 60-minute online sessions consisted of the following. At the beginning of the first session, participants were provided an overview of the study. Then, participants were taught a simple three-step process to experience moments of awe in the ordinary, during the course of their day. The instructions were as follows:

> Discovering awe doesn't require extraordinary experiences. A.W.E. stands for Attention, Wait, Exhale & Expand. When practiced for 5–15 seconds, A.W.E. quickly takes us to an elevated level of consciousness, where our awareness of time expands, and we are fully in the present.
>
> > *Attention:* Focus your full and undivided attention on something you appreciate, value, or find amazing. In any setting, you can look around and find something that you appreciate, value, or find to be amazing.
> >
> > *Wait:* For this step, you slow down, pause, and wait for a breath or two.
> >
> > *Exhale & Expand:* Then, you take a deep breath and exhale—a little longer than a normal exhalation. Whatever sensations you are experiencing will expand and be amplified.
>
> Awe is experienced on a spectrum from subtle moments of awe to more dramatic experiences including spine-tingling, goosebumps, and an expanding feeling in the chest. There is no single 'right' way to experience awe.

Participants were asked to engage in an A.W.E. practice three times a day. The participants were provided the opportunity to share moments of awe on a website. The participants were given the opportunity to wear a bracelet with the words AWE as a reminder to practice throughout the day. Sessions over the 22-day period consisted of a review of session-1 materials and support for participants. All sessions were delivered online via zoom.

Daily Diary Measures

In each diary entry, participants were asked about the following thoughts and feelings they had that day. All measures were identical to Study 4, with slight variations.

Awe. Awe was assessed with a single item composed of a synonym cluster (*awe/amazed/ wonder*), in which participants rated how much awe they experienced that day on a scale from 1 (*none at all*) to 5 (*a great deal; $M_{across\ diary}$* = 2.75, *SD* = 0.72).

Positive Emotions. Positive emotions were assessed with single items composed of synonym clusters, in which participants rated how much of each of six positive emotions they experienced each day on a scale from 1 (*none at all*) to 5 (*a great deal)*: Amusement (*amused/ having fun/laughing*; $M_{across\ diary}$ = 2.63, *SD* = 0.71), Compassion (*compassionate/ sympathetic/ concern for others; $M_{across\ diary}$* = 3.46, *SD* = 0.81), Contentment (*content/relaxed/ peaceful; $M_{across\ diary}$* = 2.90, *SD* = 0.73), Gratitude *(grateful/appreciative/thankful*; $M_{across\ diary}$ = 3.44, *SD* = 0.81), Love *(love/affection/warmth; $M_{across\ diary}$* = 3.44, *SD* = 0.83), and Pride *(proud/sense of accomplishment/successful; $M_{across\ diary}$* = 2.77, *SD* = 0.72). To assess daily positive emotionality, all six items were combined into a composite (α =.93; $M_{across\ diary}$ = 3.11, *SD* = 0.66).

Small-self. Small-self was measured with a single item composed of a series of seven circles that increase linearly in size (i.e., a 7- point scale) asking participants the following: *Reflecting back on the awe experience you just wrote about, how small or big did you feel at that time?* (*M* = 4.43, *SD* = 1.29).

Curiosity. Curiosity was assessed with a single item composed of a synonym cluster (*curious/interested/wanting to explore*), on a scale from 1 (*none at all*) to 5 (*a great deal*; *M* = 2.83, *SD* = 0.85).

Connectedness. Connectedness was measured with eight items assessing people's sense of connectedness toward different people on a scale from 1 (*definitely not*) to 5 (*definitely yes*): *As a result of the awe experience you just wrote about, please rate whether or not you felt connected to... [1] your family… [2] your friends…[3] your community… [4] your country… [5] the world… [6] all people in general…[7] people that are similar to you…[8] people that are different than you.* To assess overall daily connectedness, all eight items were combined into a composite (α =.96; $M_{across\ diary}$ =3.18, *SD* = 0.83).

Openness to Other Cultures. Openness to other cultures was assessed with a single item on a scale from 1 (*does not describe me*) to 5 (*describes me extremely well*): *I appreciated cultures or ways of life that are not my own* ($M_{across\ diary}$ = 3.20, *SD* = 0.98).

Data Analytic Plan

Data analytic plan was identical as in Study 4.

Results

First, I examined the daily level effects of awe on connectedness at different levels: friends, family, community, country, world, all people, similar people, and different people. The results showed that when people report experiencing more awe than typical, they experienced greater connectedness and this effect was similar across all levels (βs $\geq$ .10*, ps* <. 001; see Table 2). Given that these relationships were not significantly different from each other (see overlapping 95% CIs in Table 2), I used a composite of overall connectedness for all following analyses. Consistent with Hypothesis 2, daily experiences of awe predicted greater daily overall connectedness (*β*= 0.14, 95% CI [.11, .16], *t*(231.73)= 10.80, *p* < .001). As in Study 4, I used a positive emotionality composite (α =.93), in lieu of each positive emotion separately, to examine the unique effect of awe. As expected (Hypothesis 5), the effect of daily awe on connectedness held when controlling for daily positive emotionality (*β*= 0.07, 95% CI [.04, .09], *t*(181.27)= 5.32, *p* < .001). Given the findings in Study 1, I controlled for trait openness and found that the effect of daily awe on connectedness remained significant (*β*= 0.14, 95% CI [.11, .16], *t*(227.40) = 10.75, *p* < .001). Then, I examined Hypothesis 3, and found that daily experiences of awe predicted greater openness to other cultures (*β*= 0.10, 95% CI [.08, .13], *t*(235.29)= 8.51, *p* < .001). Contrary to Hypothesis 5, the effect of daily awe on openness to other cultures did not hold when controlling for positive emotionality (*p* =.18). The effect of daily awe on openness to other cultures held when controlling for trait openness (*β*= 0.10, 95% CI [.08, .13], *t*(231.78)= 8.20, *p* < .001).

Next, I examined if the effect of daily awe on overall connectedness or openness to other cultures would hold when accounting for potential explanatory variables— small-self and curiosity. After accounting for small-self in the models, the effect of awe on connectedness (*β*= 0.10, 95% CI [.07, .12], *t*(217.73)= 7.65, *p* < .001) and openness to other cultures (*β*= 0.09, 95% CI [.06, .11], *t*(215.09)= 6.86, *p* < .001) remained significant. Similarly, when accounting for curiosity in the models, the effect of awe on connectedness (*β*= 0.12, 95% CI [.09, .14], *t*(195.27)= 9.14, *p* < .001), and openness to other cultures (*β*= 0.06, 95% CI [.04, .09], *t*(217.70)= 5.47 *p* < .001) remained significant.

These findings suggest that daily doses of awe make people feel more connected to others regardless of who they are (e.g., family, friends, different people). Moreover, this effect was unique to awe and not explained by overall positive emotions, small-self, curiosity, or trait openness. The effect of daily awe on openness to other cultures was also not explained by small-self, curiosity, or trait openness, but it was explained by positive emotionality. Suggesting that daily experience of awe predicts openness to other cultures through feelings of overall positivity

that awe brings about. These findings further suggest that daily doses of awe brought about a sense of connectedness and openness to other cultures during the peak of the COVID-19 pandemic, a time when strict quarantine and social distance restrictions were at place.

Table 2

The Relationship Between Awe and Connectedness

Outcome	*β*	95% CI
Family	0.11	[0.08, 0.13]
Friends	0.11	[0.08, 0.14]
Community	0.12	[0.09, 0.15]
Country	0.10	[0.07, 0.13]
World	0.13	[0.10, 0.15]
All people	0.13	[0.10, 0.15]
Similar people	0.11	[0.09, 0.14]
Different people	0.11	[0.08, 0.13]

Note. These are estimates of separate bivariate models.
All estimates are standardized.

Part IV: Experimental Awe in the (Online) Lab

Study 6: Awe, Compared to Neutral and Pride, Promotes Social Inclusion

In study 6, I expand on the findings of Studies 1 through 5— which focused on dispositional, in-vivo, and daily awe— by examining the influences of awe upon social inclusion at the experimental level. Although the first five studies provide a framework for understanding how awe might influence social inclusion, Study 6 directly tests this effect, compared to a neutral and a pride condition, using a novel social inclusion paradigm.

The social inclusion paradigm involved ethnically diverse groups of people and not just individuals. How people perceive groups is an important social psychological phenomenon and often studied in psychological science (Lickel et al., 2000). The stimuli used in the paradigm are considerably naturalistic— they are photos of actual people out in their daily lives, and they include the entire body of the individuals (Connor et al., 2021). I also consider and control for social class, another identity-related variable that is known to influence perceptions of and attitudes toward others (Connor et al., 2021; Kraus et al., 2010; Kraus & Keltner, 2009; Monroy et al., 2022).

In this experimental Study, in addition to a neutral control, I include pride as a comparison condition. Pride is a positive emotion commonly used to compare the effects of awe, for many reasons (Piff et al., 2015; Shiota et al., 2007; Stancato & Keltner, 2019; van Cappellen & Saroglou, 2012). Although both awe and pride are considered positive emotions, awe is typically elicited by external stimuli such as natural landscapes and vistas and diminishes focus

upon the self (Bai et al., 2017). Pride, by contrast, is typically elicited by self-relevant stimuli such as personal accomplishments that may lead to self-enhancement (e.g., Tracy & Robins, 2004). Thus, pride serves as suitable control to compare the effects of awe on social inclusion. To test primary Hypotheses 4 and 5, on the unique effect of awe on social inclusion. I test the following predictions: (1) Participants in the awe condition, compared to the neutral or pride condition, will be more inclusive of others, in particular of People of Color (POC); (2) Replicating findings on Study 1, awe prone people will feel greater connectedness; be more inclusive of others, in particular of POC; and be more open-minded; (3) Given past research (Shiota et al., 2006; Silvia et al., 2015) and findings from Study 1 suggesting that trait awe is associated with greater openness, and recent evidence suggesting that openness is related to having more diverse group of friends (Antonoplis & John, 2022), I will examine the moderations of trait awe and openness on the awe-inclusion relationship.

Method

Participants

Participants were 413 (M_{age} = 39.42, *SD* = 13.57, 50% Women, 49% Men, 1% other) adults recruited from across the USA through the Prolific online platform (www.prolific.co). This sample size estimate was obtained from a power analysis of a small effect size on the effect of awe on social distance (*F* = .175 or *d* = -.35; Stancato & Keltner, 2019), which would provide 80% power to test my predictions. The sample demographics were 307 (74%) European/ European American, 31 (8%) Latinx (Latino, Hispanic, Chicano/Latin American), 29 (7%) African /African American, 28 (7%) East Asian/Asian American, and 18 (4%) other.

Procedures

Participants first provided consent and completed a personality questionnaire. Then, they were randomly assigned to one of the three emotion conditions: Awe (*n* = 141), Neutral (*n* = 132), Pride (*n* = 140). After the emotion induction, participants provided ratings on feelings and cognitions. Then, participants were presented with ten images of different groups of people (see Figure 2) and were asked to make independent social inclusion ratings for each group one by one. Lastly, participants provided demographic information. Participants were compensated $3.35 for completing the study. This procedure was approved by the authors' institutional review board.

Materials & Measures

Dispositional Positive Emotion Scale (DPES). As in Study 1, predisposition to experience awe and six other positive emotions were assessed with the DPES (Shiota et al., 2006): Awe (α =.80; *M* = 4.80, *SD* = 1.11); Amusement (α =.82; *M* = 4.60, *SD* = 1.22); Compassion (α =.88; *M* = 5.54, *SD* = 1.03); Contentment (α =.95; *M* = 4.49, *SD* = 1.55); Joy (α =.89; *M* = 4.34, *SD* = 1.32); Love; α =.86; *M* = 4.50, *SD* = 1.28); Pride (α =.83; *M* = 4.72, *SD* = 1.20).

Openness. Openness was assessed via the openness facet of the Big Five Inventory-2 Extra-Short Form (Soto & John, 2016; α =.68; M = 3.95, SD = .87).

Emotion Induction. Participants were randomly assigned to an Awe, Neutral, or Pride condition. The emotion inductions consisted of three narrative recalls, where participants write about a time in which they were in a situation that is a prototypical elicitor of the target emotion (Griskevicius et al., 2010; Piff et al., 2015; Stancato & Keltner, 2019). The three emotion conditions were the following (Piff et al., 2015; Stancato & Keltner, 2019):

> *Awe.* Please take a few minutes to think about a particular time, fairly recently, when you encountered a natural scene that caused you to feel awe. This might have been a sunset, a

view from a high place, or any other time you were in a natural setting that you felt was beautiful.

Pride. Please take a few minutes to think about a particular time, fairly recently, when you felt pride. This might have been being accepted to a university, winning an event or competition, or any other time that you achieved a personal accomplishment.

Neutral. Please take a few minutes to think about something you did fairly recently. This might have been riding a bike, studying for a test, or any other thing that happened during your day.

Then, all participants were provided the following instructions to prompt them to be as descriptive as possible and to standardize the narratives: *Now, we'd like you to take a moment to relive the experience you just recalled and describe it to us. In the space below, in at least five sentences, please describe the situation you were in when you had this experience. That is, what exactly was it that made you feel this way? When was it? Where were you? How did you feel? And what were you thinking about during the experience? Please provide as much detail as possible.*

Emotions. Similar to Studies 2-5, emotions were assessed with single items composed of synonym clusters, in which participants rated how much of each of eleven emotions they experienced while recalling/describing the experience on a scale from 1 (*not at all*) to 7 (*very strongly*): Amusement (*amused/having fun/laughing*), Anger (*angry/irritable/mad*), Anxiety (*anxious/nervous/worried*), Awe (*awe/amazed/wonder*), Boredom (*bored/tired/inattentive*), Compassion (*compassionate/sympathetic/concern for others*), Fear (*fearful/afraid/scared*), Gratitude *(grateful/appreciative/thankful*), Pride *(proud/sense of accomplishment/successful*), Sadness (*sad/depressed/down*), and Surprise (*surprise/startled/taken aback*). See Table 3 for descriptive statistics for the conditions.

Curiosity. Curiosity was assessed, similar to Studies 2-5, with a single item composed of a synonym cluster (*curious/interested/wanting to learn more*) on a scale from 1 (*not at all*) to 7 (*very strongly*; See Table 3).

Small-self. Small-self was measured using the same measure as Studies 4 and 5, with a single item composed of a series of seven circles that increase linearly in size (i.e., a 7- point scale): *How small or big did you feel? Think about one of the circles below as representing your size at that moment. Please choose the circle that best describes how big or small you felt* (see Table 3).

Connectedness. Connectedness was assessed with two items on a scale from 1 (*not at all*) to 7 (*very strongly)* assessing personal level of connectedness and universal level of connectedness: *Did you feel… (1) connected to other people? (2) part of everything and everyone (humanity)?* See Table 3.

Social Inclusion. Social inclusion was assessed with two measures: Inclusive Ratings and Inclusion of Other in Self. Participants made ratings for the ten groups independently. Each image was displayed in a 10.4 x 6.9" and the ratings were presented under each image. Images were selected from the Connor dataset (Connor et al., 2021). To create a diverse set of groups, selected images varied in terms of ethnicity and social class. Images were selected to be within a standard deviation from the mean on attractiveness, and within a standard deviation above the mean for each respective class. For lower class I used images rated as "working class" and for higher class I used images rated as "upper class." For more details on these images see Connor and colleagues (2021). Groups were formed for every possible combination of Black and white: BBBB, BBBW, BBWW, BWWW, WWWW. In order to balance for social class, two groups—

one high and one low social class— were created for each combination. See Figure 2. Thus, groups varied in terms of the proportion of Black folks in the group —and were balanced in social class signaling (Low and High). This proportion was used as a measure of group Diversity, with 0 being not diverse (white) and 1 being fully diverse (all Black).

Inclusive Ratings. Inclusive ratings were measured with thirteen items: six items adapted from studies on emotions, self-other similarity, group attitudes (Duckitt et al., 2005; Oveis et al., 2010), as well as face-valid items of closeness and connectedness; and six social distance items modified from the Social Distance Scale (Bogardus, 1933). Participants were asked to rate each group on a scale from 0 to 100 using the following instructions: *Considering the people above. How much do you...* [1] *Like them?* [2] *Feel a sense of connection toward them?* [3] *Feel similar to them?* [4] *Feel close to them?* [5] *Think positive of them?* [6] *Think highly of them?* [7] *Consider them part of your social group*? [And] *Would you...* [8] *move next door to them?* [9] *spend an evening socializing with them?* [10] *become friends with them?* [11] *start working closely with them?* [12] *have them for dinner at your home?* [13] *become housemates with them?* To assess overall inclusive ratings, these thirteen items were combined into a composite (α =.91; see Table 3).

Inclusion of Other in Self (IOS). To assess perceived closeness, interconnectedness, with a validated measure, I used the IOS scale (Aron et al., 1992). The IOS scale consists of a single-item picture of seven pairs of overlapping circles, with each pair of same-sized circles labeled as "Self" and "Other" overlapping slightly more than the preceding pair: from 1= No overlap at all, to 7 = Complete overlap. Participants were instructed to select the picture that best described how they felt toward each group of people, where "Self" referred to them and "Other" referred to the group (see Table 3).

Figure 2

Group Inclusion Paradigm





5



6



7



8



9



10

Note. Groups varied by Ethnicity (Black | White) and Social Class (High | Low).
1. BBBB (high) 2. BBBB (low)
3. BBBW (high) 4. BBBW (low)
5. BBWW (high) 6. BBWW (low)
7. BWWW (high) 8. BWWW (low)
9. WWWW (high) 10. WWWW (low)

Data Analytic Plan

Data analytic plan was similar as in Study 4 and 5. For the primary analyses, I used Hierarchical Linear Modeling (HLM). The repeated measures design resulted in a two-level hierarchical structure with ratings nested in participants, and I included random intercepts for participants.

Results

Preliminary Analyses

The preliminary analyses included examination of missing data and data exclusion based on a specified criterion. Of the initial sample size of 471, a total of 58 participants were excluded due to failure to follow instructions as examined by attention checks throughout the survey. The final sample used for all descriptive statistics and analyses was $N = 413$.

Primary Analyses

First, to examine the validity of the emotion induction, I tested differences in emotion means per condition. As expected, the emotion manipulation worked: the awe induction induced more awe compared to the neutral and pride conditions (p <.001; see Table 3). Awe was also the most reported emotion in the awe induction. Those in the awe condition, compared to the neutral and pride condition, reported more curiosity (p <.001), and felt a smaller sense of self (p <.001). Those in the awe condition felt more universal connectedness—part of everything and everyone (p = .03)— but surprisingly less connected to other people (personal connectedness; p = .006), compared to pride and not different from the neutral control (see Table 3). People reported more pride in the pride condition, compared to awe and neutral (p <.001). See Table 3 for descriptive statistics.

Table 3

Descriptive Statistics for each Experimental Condition

	Awe (n =141)	**Neutral** (n = 132)	**Pride** (n = 140)
Emotions			
Amusement	3.99 (0.16)	3.71 (0.18)	3.84 (0.17)
Anger	**1.21 (0.05)**	**2.02 (0.16)**	**1.30 (0.08)**
Anxiety	**1.50 (0.08)**	**2.33 (0.16)**	**2.12 (0.14)**
Awe	**6.04 (0.12)**	**3.55 (0.18)**	**4.43 (0.16)**
Boredom	**1.21 (0.05)**	**1.65 (0.11)**	**1.29 (0.05)**
Compassion	3.38 (0.17)	3.51 (0.17)	3.49 (0.17)
Fear	**1.31 (0.07)**	**1.70 (0.11)**	1.46 (0.09)
Gratitude	**5.82 (0.13)**	**5.00 (0.17)**	**5.82 (0.13)**
Pride	**3.82 (0.17)**	**4.33 (0.18)**	**6.20 (0.1)**
Sadness	1.48 (0.09)	2.05 (0.14)	1.60 (0.1)
Surprise	**2.77 (0.16)**	**2.09 (0.14)**	**2.51 (0.16)**
Other Outcomes			
Curiosity	**4.71 (0.16)**	**3.70 (0.17)**	3.93 (0.17)
Small-Self	**3.24 (0.15)**	**4.11 (0.15)**	**5.20 (0.11)**
Social Inclusion			

Connectedness:			
Personal	**3.77 (.17)**	4.19 (.18)	**4.43 (.17)**
Universal	**4.45 (.17)**	3.98 (.17)	**3.94 (.17)**
Group:			
Inclusive Ratings	48.42 (2.05)	53.84 (2.02)	50.80 (1.99)
IOS	**2.65 (0.11)**	**3.07 (0.12)**	2.81 (0.12)

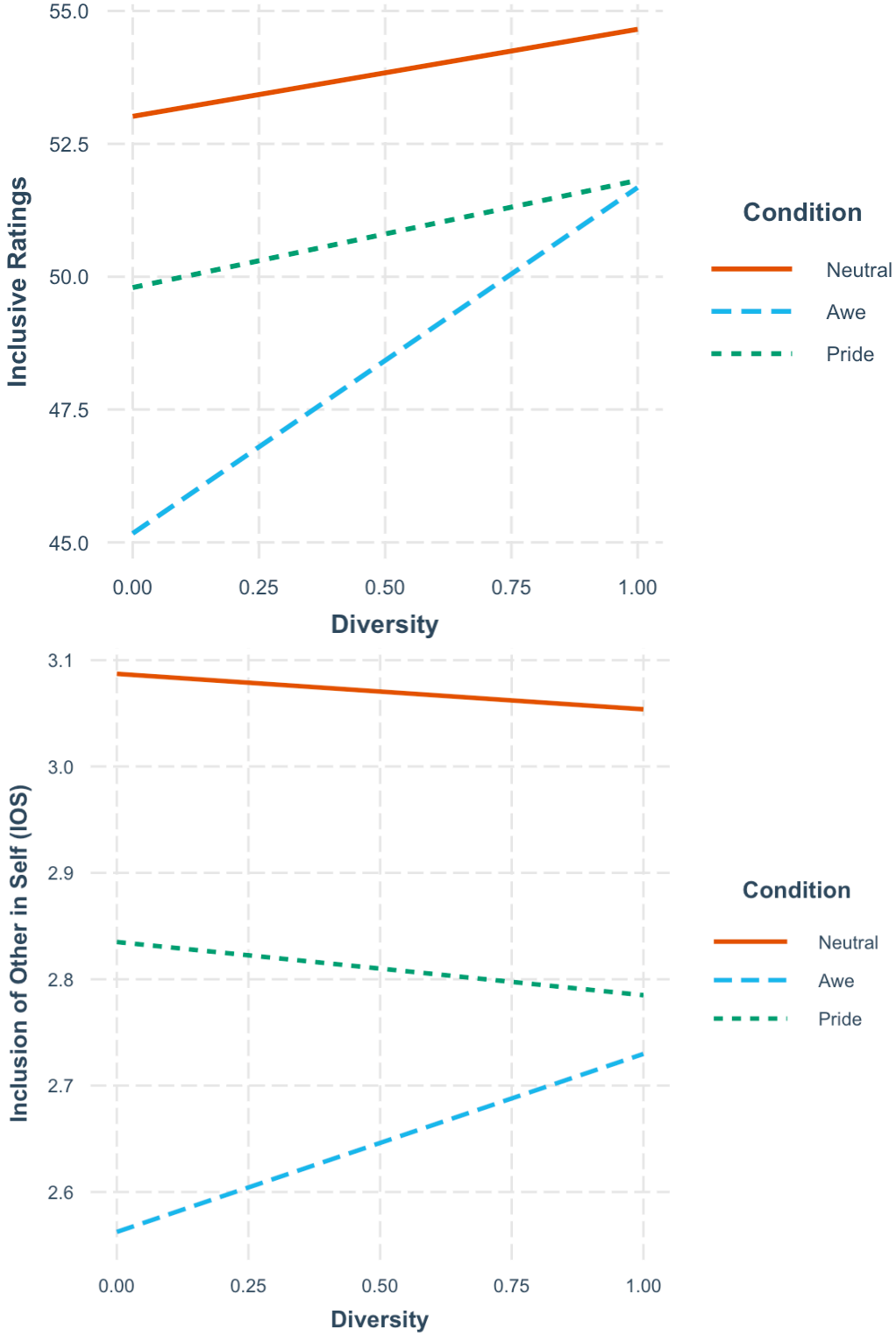
Note. **Bold** numbers indicate significant differences at $p < .05$. Scores within the parenthesis represent the standard errors (*SE*).

To test my main prediction (primary Hypothesis 4) that awe would influence social inclusion of others, I first examined the main effects of the experimental conditions on the two social inclusion measures. In two separate hierarchical linear models with experimental condition predicting Social Inclusion—Inclusive ratings and inclusion of other in self (IOS)— I found that there was no main effect of experimental condition for inclusive ratings ($ps > .06$). Inconsistent with my predictions, I found that the awe condition compared to neutral (β= -0.27, b= -0.42, SE = .16, $t(410)$= -2.60, p <.01), but not pride (p = .31), lead to less IOS. Though these effects are null, the effects of awe on inclusion might be contingent on the level of diversity.

Then, I examined the interactions of Condition and Diversity predicting Social Inclusion. As predicted, I found significant interaction models predicting Inclusive Ratings in the awe condition compared to neutral (b= 4.87, SE = 1.39, $t(3714)$= 3.49, p <.001) and pride (b= 4.49, SE = 1.37, $t(3714)$= 3.27, p =.001). As well as for models predicting IOS in the awe condition compared to neutral (b= .20, SE = .09, $t(3714)$= 2.21, p = .027) and pride (b= .22, SE = .09, $t(3714)$= 2.43, p = .015). Simple slopes analyses revealed that for inclusive ratings both slopes for awe (b= 6.51, p <.001) and pride (b= 2.01, p =.038) were significant, though the estimate for awe was three times larger than the one of pride. For the IOS model, only the awe slope was significant (b= .17, p = .008). These findings suggest that as the level of group diversity increased, people induced to experiencing awe, compared to neutral and pride, felt greater affiliation, closeness, and desired less social distance. See Figure 3. Unexpectedly, the differences between conditions were for the least diverse or most white groups (left side of all the panels in Figure 3). These significant awe moderations held when independently controlling for the curiosity, small-self, and connectedness reported after the emotion induction. Given Study 1's findings, I also controlled for trait openness, and the moderation remained significant. All simple effects also remained significant.

Figure 3

Moderation Plots of Condition X Diversity



Note. Moderation plots of experimental condition and diversity predicting social inclusion.

To build on and replicate findings from Study 1, I examined the effects of trait awe on connectedness, social inclusion, and openness. I found that awe prone people felt greater personal ($p < .001$) and universal connectedness ($p < .001$), see Table 4. These effects held when controlling for condition ($p < .001$), and the main effect of the awe induction on universal connectedness held ($p = .04$). Awe prone people were also more inclusive of others: provided more inclusive ratings ($p < .001$) and greater IOS ($p < .001$). See Table 4 for models' statistics. There were no significant interactions between trait awe and experimental condition predicting social inclusion measures ($ps > .09$). In an interaction model of trait awe and diversity controlling for condition, the relationship between trait awe and social inclusion were stronger for People of Color: inclusive ratings ($b = 2.07$, $SE = .51$, $t(3715) = 4.05$, $p < .001$) and IOS ($b = 0.15$, $SE = .03$, $t(3715) = 4.41$, $p < .001$). Replicating Study 1, I found that awe prone people reported greater openness ($\beta = 0.45$, $b = 0.35$, $SE = .03$, $t(411) = 10.26$, $p < .001$). There were no significant interactions between openness and experimental condition predicting social inclusion measures ($ps > .13$).

Table 4

DPES-Awe Predicting Connectedness and Social Inclusion

Outcome	*b*	*β*	*CI*	*t*	*df*	*p*
Personal Connectedness	.38	.21	.11 – .30	4.34	411	**<.001**
Universal Connectedness	.68	.38	.29 – .47	8.23	411	**<.001**
Inclusive Ratings	6.95	.29	.21 – .37	6.96	411	**<.001**
IOS	0.29	.20	.12 – .28	4.93	411	**<.001**

Note. These are outputs of separate bivariate models.

Taken together, findings from Study 6 suggest that when people are induced to experience awe, they're more inclusive of People of Color than of white folks. This effect was more pronounced in the awe condition as compared to pride, and no difference from neutral. As illustrated in Figure 3, most of the differences between experimental conditions were for the least diverse or most white groups (left side of the panels), and people in the awe condition were the least inclusive of those groups. In other words, this suggest that people in the awe condition, compared to neutral and pride, rejected the lack of diversity or white homogeneity. These effects were not explained by the curiosity, small sense of self, or connectedness brought by the awe induction. Replicating and extending on Study 1, this study suggests that awe prone people feel greater overall connectedness, are more open-minded, and are more inclusive of others, in particular of People of Color.

General Discussion

Empirical work in the science of awe reveals it to be a distinct positive emotion that promotes prosocial behavior (for review see Monroy & Keltner, 2022). In the present

investigation, I build on this literature and examine, for the first time, the Awe-Inclusion Hypothesis.

The results of six studies provide support for my central claim, that awe is associated with social inclusion—conceptualized in terms of openness, collective orientation, connectedness, and perceptions and behavioral intentions of inclusion. The awe-inclusion relationship was observed at the trait level (Study 1), in experiences out in nature (Studies 2-3), in the context of everyday life (Studies 4-5), and in an experimental manipulation (Study 6).

In the examination of trait-like tendencies, I found that awe prone people tend to have a more inclusive orientation— more open-minded, more collectivistic, and feel part of a community (Studies 1 & 6). In in-vivo studies of awe—during an extraordinary event such as a total solar eclipse (Study 2) and whitewater rafting (Study 3)— experiences of awe were uniquely associated with a sense of connectedness, above and beyond experiences of other positive emotions. In the study of quotidian awe, across diverse samples—university students (Study 4) and community adults during the COVID-19 pandemic (Study 5)— when people experienced more daily awe than typical, they felt more connected to others and more open to other cultures. In an experimental design (Study 6), assessing people's perceptions and behavioral intentions of inclusion—in terms of attitudes, closeness, and social distance— when people were induced to experience awe, they were more inclusive of diverse groups. In other words, people in the awe condition reported liking groups of People of Color more and were more willing to socialize with them, compared to non-POC, white groups. Interestingly, the differences between experimental conditions were more pronounced toward non-POC, white groups, suggesting that people induced to experience awe reject the lack of diversity or white homogeneity (more on this below) in comparison to neutral and pride. Across these six studies, the effects of awe were not explained by curiosity or small self (studies 1-5) or connectedness (Study 6), suggesting that awe has a unique effect beyond feeling curious or small or connected.

The results of the present investigation are consistent with and build on the science of awe in substantial ways. First, evidence across six studies is consistent with past work suggesting that awe is associated with greater openness (Shiota et al., 2006; Silvia et al., 2015), connectedness (Nelson-Coffey et al., 2019; Shiota et al., 2007), and community integration (Anderson et al., 2018; Bai et al., 2017). Second, given recent work suggesting that openness (and openness to others) is associated with having more diverse group of friends (Antonoplis & John, 2022), it was crucial to demonstrate that the effect of awe on inclusion was not just an effect of overall openness, in particular for Study 6. The results of all six studies held when controlling for openness, which suggest that awe has unique effect on inclusion of diverse others beyond overall openness. Third, results from an experiment provide preliminary evidence that awe inductions can shift attitudes, perceptions, and behavioral intentions of inclusion of diverse others.

The present set of studies, with a wide range of methodologies, provide converging evidence that awe is associated with social inclusion— in both feeling included and being inclusive of others. Critically, these studies used different measures of awe across different designs (correlational, diary, experimental)—trait awe to examine individual differences, in vivo experiences to capture at the moment experiences of awe in natural contexts, daily diaries to capture daily variation of awe experiences, and in experimental inductions to capture the effects of awe compared to control conditions—and across diverse samples of participants (ethnicities, age, and social class). As well as across a wide range of statistical methods to examine both between and within-person effects. Evidence across these six studies, across diverse

methodologies and realms of awe, highlights the robustness of the effect of awe on social inclusion and the promise for future work.

Implications

These studies have important implications for future research and the current understanding of social inclusion. Foremost, the six studies presented in this paper suggest that awe—whether having a dispositional tendency, experienced in nature, in everyday life, or in an experimental manipulation by writing a short narrative—has the potential to promote social inclusion of ethnically diverse people. These findings have important implications for intervention work aiming to promote diversity and inclusion. Second, Study 6 suggests that social inclusion—in terms of being inclusive of others—might not be a unitary concept. On the contrary, being inclusive of diverse others appears to have two paths: the acceptance of diversity/POC, and the rejection of the lack of diversity/white homogeneity. This is consistent with past work suggesting that people tend to have two different types of goals when making decisions, one that prevents negative outcomes and another one that promotes positive outcomes (Higgins, 1998). Future work should explore these possible paths to the inclusion of diverse others.

Limitations

Several limitations of the present work warrant consideration. Although the present work provides important evidence for the Awe-Inclusion Hypothesis, I did not find main effects of condition on social inclusion measures in Study 6. These null findings might be due power issues. Although Study 6 is adequately powered (80%) for an effect size of .35, an effect of awe on social inclusion is still unknown and might be too small to be captured with the current sample size. It's also worth considering that being inclusive—which is different from feeling included—has not yet been examined in psychological science; thus, the social inclusion paradigm needs refinement. Moreover, because of restrictions due to the COVID-19 pandemic, the experimental study took place online and in-person lab studies might be best suited to examine social inclusion. Future work can expand on this research in the lab and examine people's inclusive behavior of different others, for example via expressions of affiliation such as: smiles, touch, and closeness.

Conclusion

As our society becomes ever more diverse— in cultural and ethnic backgrounds, values, and ideals— it is critical to promote inclusion of people from diverse backgrounds into our nation's social fabric. Experiences of awe, the present work suggests, are a key ingredient to promote social inclusion. This research could be directly translated into interventions—with a 3-minute awe inducing video or a nature walk (Sturm et al., 2020)— that can give schools, businesses, and families an easy-to-use tool to promote inclusive behavior.

References

American Astronomical Society. (n.d.). *A Solar Eclipse Glossary*. https://eclipse.aas.org/eclipse-america/eclipse-glossary

Anderson, C. L., Dixson, D. D., Monroy, M., & Keltner, D. (2019). Are Awe-Prone People More Curious? The Relationship Between Dispositional Awe, Curiosity, and Academic Outcomes. *Journal of Personality*, jopy.12524. https://doi.org/10.1111/jopy.12524

Anderson, C. L., Monroy, M., & Keltner, D. (2017). Emotion in the wilds of nature: The coherence and contagion of fear during threatening group-based outdoors experiences. *Emotion*. https://doi.org/10.1037/emo0000378

Anderson, C. L., Monroy, M., & Keltner, D. (2018). Awe in nature heals: Evidence from military veterans, at-risk youth, and college students. *Emotion*. https://doi.org/10.1037/emo0000442

Antonoplis, S., & John, O. P. (2022). Who Has Different-Race Friends, and Does It Depend on Context? Openness (to Other), but Not Agreeableness, Predicts Lower Racial Homophily in Friendship Networks. *Journal of Personality & Social Psychology*, *122*(5), 894–919. https://doi.org/DOI:10.1037/pspp0000413

Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of Other in the Self Scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, *63*(4), 596–612. https://doi.org/10.1037/0022-3514.63.4.596

Bai, Y., Maruskin, L. A., Chen, S., Gordon, A. M., Stellar, J. E., McNeil, G. D., Peng, K., & Keltner, D. (2017). Awe, the Diminished Self, and Collective Engagement: Universals and Cultural Variations in the Small Self. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/pspa0000087

Bai, Y., Ocampo, J., Jin, G., Chen, S., Benet-Martinez, V., Monroy, M., Anderson, C., & Keltner, D. (2021). Awe, daily stress, and elevated life satisfaction. *Journal of Personality and Social Psychology*, *120*(4), 837–860. https://doi.org/10.1037/pspa0000267

Bartz, J. A. (2016). Oxytocin and the Pharmacological Dissection of Affiliation. *Current Directions in Psychological Science*, *25*(2), 104–110. https://doi.org/10.1177/0963721415626678

Baumeister, R. F., & Leary, M. R. (1995). The Need to Belong: Desire for Interpersonal Attachments as a Fundamental Human Motivation. *Psychological Bulletin*, *117*(3), 497–529. https://doi.org/10.1037/0033-2909.117.3.497

Baumgartner, J. N., & Burns, J. K. (2014). Measuring social inclusion-a key outcome in global mental health. *International Journal of Epidemiology*, *43*(2), 354–364. https://doi.org/10.1093/ije/dyt224

Bryan, C. J., Tipton, E., & Yeager, D. S. (2021). Behavioural science is unlikely to change the world without a heterogeneity revolution. *Nature Human Behaviour*, *5*(8), 980–989. https://doi.org/10.1038/s41562-021-01143-3

Campos, B., Shiota, M. N., Keltner, D., Gonzaga, G. C., & Goetz, J. L. (2013). What is shared, what is different? Core relational themes and expressive displays of eight positive emotions. *Cognition & Emotion*, *27*(October 2014), 37–52. https://doi.org/10.1080/02699931.2012.683852

Connor, P., Varney, J., Keltner, D., & Chen, S. (2021). Social Class Competence Stereotypes Are Amplified by Socially Signaled Economic Inequality. *Personality and Social Psychology Bulletin*, *47*(1), 89–105. https://doi.org/10.1177/0146167220916640

Cordaro, D. T., Keltner, D., Tshering, S., Wangchuk, D. D., & Flynn, L. M. (2016). The Voice Conveys Emotion in Ten Globalized Cultures and One Remote Village in Bhutan. *Emotion*, *16*(1), 117–128. https://doi.org/10.1037/emo0000100

Cordaro, D. T., Sun, R., Keltner, D., Kamble, S., Huddar, N., & McNeil, G. (2018). Universals and Cultural Variations in 22 Emotional Expressions Across Five Cultures. *Emotion*, *18*(1), 75–93.

Cordier, R., Milbourn, B., Martin, R., Buchanan, A., Chung, D., & Speyer, R. (2017). A systematic review evaluating the psychometric properties of measures of social inclusion. In *PLoS ONE* (Vol. 12, Issue 6). https://doi.org/10.1371/journal.pone.0179109

Cowen, A. S., Elfenbein, H. A., Laukka, P., & Keltner, D. (2018). Mapping 24 emotions conveyed by brief human vocalization. *American Psychologist*. https://doi.org/10.1037/amp0000399

Cowen, A. S., & Keltner, D. (2019). What the Face Displays: Mapping 28 Emotions Conveyed by Naturalistic Expression. *American Psychologist*. https://doi.org/10.1037/amp0000488

Cowen, A. S., Keltner, D., Schroff, F., Jou, B., Adam, H., & Prasad, G. (2021). Sixteen facial expressions occur in similar contexts worldwide. *Nature*, *589*(7841), 251–257. https://doi.org/10.1038/s41586-020-3037-7

Davies, K., Tropp, L. R., Aron, A., Pettigrew, T. F., & Wright, S. C. (2011). Cross-group friendships and intergroup attitudes: A meta-analytic review. *Personality and Social Psychology Review*, *15*(4), 332–351. https://doi.org/10.1177/1088868311411103

Dhont, K., & van Hiel, A. (2009). We must not be enemies: Interracial contact and the reduction of prejudice among authoritarians. *Personality and Individual Differences*, *46*(2), 172–177. https://doi.org/10.1016/j.paid.2008.09.022

Duckitt, J., Callaghan, J., & Wagner, C. (2005). Group identification and outgroup attitudes in four South African ethnic groups: a multidimensional approach. *Personality and Social Psychology Bulletin*, *31*(5), 633–646. https://doi.org/10.1177/0146167204271576

Fredrickson, B. L. (2001). The Role of Positive Emotions in Positive Psychology. *The American Psychologist*, *56*(3), 218–226. https://doi.org/10.1037/0003-066x.56.3.218

Fredrickson, B. L. (2013). Positive Emotions Broaden and Build. In *Advances in Experimental Social Psychology* (Vol. 47, pp. 1–54).

Fredrickson, B. L., & Branigan, C. (2005). Positive emotions broaden the scope of attention and thought-action repertoires. *Cognition & Emotion*, *19*(3), 313–332. https://doi.org/10.1080/02699930441000238

Goetz, J. L., Keltner, D., & Simon-Thomas, E. (2010). Compassion: An evolutionary analysis and empirical review. *Psychological Bulletin*, *136*(3), 351–374. https://doi.org/10.1037/a0018807

Gonzaga, G. C., Turner, R. A., Keltner, D., Campos, B., & Altemus, M. (2006). Romantic love and sexual desire in close relationships. *Emotion*, *6*(2), 163–179. https://doi.org/10.1037/1528-3542.6.2.163

Gordon, A. M., Stellar, J. E., Anderson, C. L., McNeil, G. D., Loew, D., & Keltner, D. (2016). The Dark Side of the Sublime: Distinguishing a Threat- Based Variant of Awe. *Journal of Personality & Social Psychology*.

Griskevicius, V., Shiota, M. N., & Neufeld, S. L. (2010). Influence of different positive emotions on persuasion processing: a functional evolutionary approach. *Emotion*, *10*(2), 190–206. https://doi.org/10.1037/a0018421

Güsewell, A., & Ruch, W. (2012). Are only Emotional Strengths Emotional? Character Strengths and Disposition to Positive Emotions. *Applied Psychology: Health and Well-Being*, *4*(2), 218–239. https://doi.org/10.1111/j.1758-0854.2012.01070.x

Higgins, E. T. (1998). Promotion and Prevention: Regulatory Focus as A Motivational Principle. *Advances in Experimental Social Psychology*, *30*(C), 1–46. https://doi.org/10.1016/S0065-2601(08)60381-0

Hudson, S. kiera T. J., Cikara, M., & Sidanius, J. (2019). Preference for hierarchy is associated with reduced empathy and increased counter-empathy towards others, especially out-group targets. *Journal of Experimental Social Psychology*, *85*(May), 103871. https://doi.org/10.1016/j.jesp.2019.103871

Impett, E. a., Kogan, a., English, T., John, O., Oveis, C., Gordon, a. M., & Keltner, D. (2012). Suppression Sours Sacrifice: Emotional and Relational Costs of Suppressing Emotions in Romantic Relationships. *Personality and Social Psychology Bulletin*, *38*(6), 707–720. https://doi.org/10.1177/0146167212437249

John, O. P., & Srivastava, S. (1999). Big Five Inventory (Bfi). *Handbook of Personality: Theory and Research*, *2*, 102–138. https://doi.org/10.1525/fq.1998.51.4.04a00260

Joye, Y., & Bolderdijk, J. W. (2014). An exploratory study into the effects of extraordinary nature on emotions, mood, and prosociality. *Frontiers in Psychology*, *5*(OCT). https://doi.org/10.3389/fpsyg.2014.01577

Keltner, D., & Haidt, J. (1999). Social Functions of Emotions at Four Levels of Analysis. *Cognition & Emotion*, *13*(5), 505–521. https://doi.org/10.1080/026999399379168

Keltner, D., & Haidt, J. (2003). Approaching awe, a moral, spiritual, and aesthetic emotion. *Cognition & Emotion*, *17*(2), 297–314. https://doi.org/10.1080/02699930302297

Keltner, D., Kogan, A., Piff, P. K., & Saturn, S. R. (2014). The sociocultural appraisals, values, and emotions (SAVE) framework of prosociality: Core processes from gene to meme. *Annual Review of Psychology*, *65*, 425–460. https://doi.org/10.1146/annurev-psych-010213-115054

Keyes, C. L. M. (1998). Social Well-Being. *Social Psychology Quarterly*, *61*(2), 121–140. https://www.jstor.org/stable/2787065

Keyes, C. L. M. (2002). The mental health continuum: from languishing to flourishing in life. *Journal of Health and Social Behavior*, *43*(2), 207–222.

Keyes, C. L. M. (2009). Brief description of the Mental Health Continuum – Short Form (MHC – SF). *Atlanta*.

Kogan, A., Oveis, C., Carr, E. W., Gruber, J., Mauss, I. B., Shallcross, A., Impett, E. A., van der Lowe, I., Hui, B., Cheng, C., & Keltner, D. (2014). Vagal activity is quadratically related to prosocial traits, prosocial emotions, and observer perceptions of prosociality. *Journal of Personality and Social Psychology*, *107*(6), 1051–1063. https://doi.org/10.1037/a0037509

Kogan, A., Saslow, L. R., Impett, E. A., Oveis, C., Keltner, D., & Rodrigues Saturn, S. (2011). Thin-slicing study of the oxytocin receptor (OXTR) gene and the evaluation and expression of the prosocial disposition. *Proceedings of the National Academy of Sciences*, *108*(48), 19189–19192. https://doi.org/10.1073/pnas.1112658108

Kok, B. E., Coffey, K. A., Cohn, M. A., Catalino, L. I., Vacharkulksemsuk, T., Algoe, S. B., Brantley, M., & Fredrickson, B. L. (2013). How Positive Emotions Build Physical Health: Perceived Positive Social Connections Account for the Upward Spiral Between Positive Emotions and Vagal Tone. *Psychological Science*, *24*(7), 1123–1132. https://doi.org/10.1177/0956797612470827

Kraus, M. W., Côté, S., & Keltner, D. (2010). Social Class, Contextualism, and Empathic Accuracy. *Psychological Science*, *21*(11), 1716–1723. https://doi.org/10.1177/0956797610387613

Kraus, M. W., & Keltner, D. (2009). Signs of socioeconomic status: A thin-slicing approach. *Psychological Science*, *20*(1), 99–106. https://doi.org/10.1111/j.1467-9280.2008.02251.x

Lickel, B., Hamilton, D. L., Lewis, A., Sherman, S. J., Wieczorkowska, G., & Uhles, A. N. (2000). Varieties of groups and the perception of group entitativity. *Journal of Personality and Social Psychology*, *78*(2), 223–245. https://doi.org/10.1037/0022-3514.78.2.223

Lyubomirsky, S., King, L., & Diener, E. (2005). The benefits of frequent positive affect: does happiness lead to success? *Psychological Bulletin*, *131*(6), 803–855. https://doi.org/10.1037/0033-2909.131.6.803

Ma, D. S., Correll, J., & Wittenbrink, B. (2015). The Chicago face database: A free stimulus set of faces and norming data. *Behavior Research Methods*, *47*(4), 1122–1135. https://doi.org/10.3758/s13428-014-0532-5

Maruskin, L. A., Thrash, T. M., & Elliot, A. J. (2012). The chills as a psychological construct: content universe, factor structure, affective composition, elicitors, trait antecedents, and consequences. *Journal of Personality and Social Psychology*, *103*(1), 135–157. https://doi.org/10.1037/a0028117

Mashek, D., Cannaday, L. W., & Tangney, J. P. (2007). Inclusion of community in self scale: A single-item pictorial measure of community connectedness. *Journal of Community Psychology*, *35*(2), 257–275. https://doi.org/10.1002/jcop

Monroy, M., Cowen, A. S., & Keltner, D. (2022). Intersectionality in Emotion Signaling and Recognition: The Influence of Gender, Ethnicity, and Social Class. *Emotion*. https://doi.org/http://dx.doi.org/10.1037/emo0001082

Monroy, M., Garcia, S. B., Mendoza-Denton, R., & Keltner, D. (2021). The Dynamics of Coping, Positive Emotions, and Well-Being: Evidence From Latin American Immigrant Farmworkers and College Students During a Time of Political Strife. *Emotion*. https://doi.org/http://dx.doi.org/10.1037/emo0001009

Monroy, M., & Keltner, D. (2022). Awe as a Pathway to Mental and Physical Health. *Perspectives on Psychological Science*.

Naclerio, M., & Van Cappellen, P. (2021). Awe, Group Cohesion, and Religious Self-Sacrifice. *International Journal for the Psychology of Religion*, *00*(00), 1–16. https://doi.org/10.1080/10508619.2021.1975423

Nelson-Coffey, K. S., Ruberton, P. M., Chancellor, J., Cornick, J. E., Blascovich, J., & Lyubomirsky, S. (2019). The proximal experience of awe. *PLoS ONE*, *14*(5), 1–19. https://doi.org/10.1371/journal.pone.0216780

Niedenthal, P. M., & Brauer, M. (2012). Social functionality of human emotion. *Annual Review of Psychology*, *63*(January), 259–285. https://doi.org/10.1146/annurev.psych.121208.131605

Oveis, C., Horberg, E. J., & Keltner, D. (2010). Compassion, pride, and social intuitions of self-other similarity. *Journal of Personality and Social Psychology*, *98*(4), 618–630. https://doi.org/10.1037/a0017628

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology*, *90*(5), 751–783. https://doi.org/10.1037/0022-3514.90.5.751

Piff, P. K., Dietze, P., Feinberg, M., Stancato, D. M., & Keltner, D. (2015). Awe, the Small Self, and Prosocial Behavior. *Journal of Personality & Social Psychology*, *108*(6), 883–899. http://media.wix.com/ugd/80ea24_0ca3eda3711d4fbc958a77bb74cef73a.pdf

Prade, C., & Saroglou, V. (2016). Awe's effects on generosity and helping. *Journal of Positive Psychology*, *11*(5), 522–530. https://doi.org/10.1080/17439760.2015.1127992

Pratto, F., Çidam, A., Stewart, A. L., Zeineddine, F. B., Aranda, M., Aiello, A., Chryssochoou, X., Cichocka, A., Cohrs, J. C., Durrheim, K., Eicher, V., Foels, R., Górska, P., Lee, I. C., Licata, L., Liu, J. H., Li, L., Meyer, I., Morselli, D., … Henkel, K. E. (2013). Social Dominance in Context and in Individuals: Contextual Moderation of Robust Effects of Social Dominance Orientation in 15 Languages and 20 Countries. *Social Psychological and Personality Science*, *4*(5), 587–599. https://doi.org/10.1177/1948550612473663

Pratto, F., & Shih, M. (2000). Social dominance orientation and group context in implicit group prejudice. *Psychological Science*, *11*(6), 515–518. https://doi.org/10.1111/1467-9280.00299

Pressman, S. D., Jenkins, B. N., & Moskowitz, J. T. (2019). Positive Affect and Health: What Do We Know and Where Next Should We Go? *Annual Review of Psychology*, *70*, 627–650. https://doi.org/10.1146/annurev-psych-010418-102955

Rudd, M., Vohs, K. D., & Aaker, J. (2012). Awe Expands People's Perception of Time, Alters Decision Making, and Enhances Well-Being. *Psychological Science*, *23*(10), 1130–1136. https://doi.org/10.1177/0956797612438731

Secker, J., Hacking, S., Kent, L., Shenton, J., & Spandler, H. (2009). Development of a measure of social inclusion for arts and mental health project participants. *Journal of Mental Health*, *18*(1), 65–72. https://doi.org/10.1080/09638230701677803

Shiota, M. N., Campos, B., & Keltner, D. (2003). The Faces of Positive Emotion: Prototype Displays of Awe, Amusement, and Pride. *Annals of the New York Academy of Sciences*, *1000*, 296–299. https://doi.org/10.1196/annals.1280.029

Shiota, M. N., Keltner, D., & John, O. P. (2006). Positive emotion dispositions differentially associated with Big Five personality and attachment style. *The Journal of Positive Psychology*, *1*(2), 61–71. https://doi.org/10.1080/17439760500510833

Shiota, M. N., Keltner, D., & Mossman, A. (2007). The nature of awe: Elicitors, appraisals, and effects on self-concept. *Cognition & Emotion*, *21*(5), 944–963. https://doi.org/10.1080/02699930600923668

Shiota, M. N., Thrash, T. M., Danvers, A. F., & Dombrowski, J. T. (2009). Transcending the Self: Awe, Elevation, and Inspiration. In M. M. Tugade, M. N. Shiota, & L. D. Kirby (Eds.), *Handbook of positive emotions* (pp. 362–377). Guilford Press.

Silvers, J. A., & Haidt, J. (2008). Moral Elevation Can Induce Nursing. *Emotion*, *8*(2), 291–295. https://doi.org/10.1037/1528-3542.8.2.291

Silvia, P. J., Fayn, K., Nusbaum, E. C., & Beaty, R. (2015). Openness to Experience and Awe in Response to Nature and Music: Personality and Profound Aesthetic Experiences. *Psychology of Aesthetics, Creativity, and the Arts*, *9*(4), 376–384. https://doi.org/10.1037/aca0000028

Simon-Thomas, E. R., Keltner, D. J., Sauter, D., Sinicropi-Yao, L., & Abramson, A. (2009). The voice conveys specific emotions: evidence from vocal burst displays. *Emotion*, *9*(6), 838–846. https://doi.org/10.1037/a0017810

Soto, C. J., & John, O. P. (2016). Short and extra-short forms of the Big Five Inventory-2: The BFI-2-S and BFI-2-XS. *Journal of Research in Personality*, *68*, 69–81. https://doi.org/10.1016/j.jrp.2017.02.004

Srivastava, S., Tamir, M., McGonigal, K. M., John, O. P., & Gross, J. J. (2009). The social costs of emotional suppression: a prospective study of the transition to college. *Journal of Personality and Social Psychology*, *96*(4), 883–897. https://doi.org/10.1037/a0014755

Stancato, D. M., & Keltner, D. (2019). Awe, ideological conviction, and perceptions of ideological opponents. *Emotion*. https://doi.org/10.1037/emo0000665

Stellar, J. E., Gordon, A., Anderson, C. L., Piff, P. K., McNeil, G. D., & Keltner, D. (2017). Awe and Humility. *Journal of Personality and Social Psychology*. https://doi.org/dx.doi.org/10.1037/str0000014

Stellar, J. E., Gordon, A. M., Piff, P. K., Cordaro, D., Anderson, C. L., Bai, Y., Maruskin, L. A., & Keltner, D. (2017). Self-Transcendent Emotions and Their Social Functions: Compassion, Gratitude, and Awe Bind Us to Others Through Prosociality. *Emotion Review*, *9*(3), 200–207. https://doi.org/10.1177/1754073916684557

Sturm, V. E., Datta, S., Roy, A. R. K., Sible, I. J., Kosik, E. L., Veziris, C. R., Chow, T. E., Morris, N. A., Neuhaus, J., Kramer, J. H., Miller, B. L., Holley, S. R., & Keltner, D. (2020). Big Smile, Small Self: Awe Walks Promote Prosocial Positive Emotions in Older Adults. *Emotion*. https://doi.org/10.1037/emo0000876

Thompson, E. (2017). *The moon almost totally eclipses the sun during a near total solar eclipse as seen from Salem, Oregon [Online image]*. Here Are the Most Amazing Photos of the 2017 Total Solar Eclipse. Space.com

Thomson, A. L., & Siegel, J. T. (2017). Elevation: A review of scholarship on a moral and other-praising emotion. *Journal of Positive Psychology*, *12*(6), 628–638. https://doi.org/10.1080/17439760.2016.1269184

Tracy, J. L., & Matsumoto, D. (2008). The spontaneous expression of pride and shame: evidence for biologically innate nonverbal displays. *Proceedings of the National Academy of Sciences of the United States of America*, *105*(33), 11655–11660. https://doi.org/10.1073/pnas.0802686105

Tracy, J. L., & Robins, R. W. (2004). Show your pride: evidence for a discrete emotion expression. *Psychological Science*, *15*(3), 194–197. https://doi.org/10.1111/j.0956-7976.2004.01503008.x

Triandis, H. C., & Gelfand, M. J. (1998). Converging measurement of horizontal and vertical individualism and collectivism. *Journal of Personality and Social Psychology*, *74*(1), 118–128. https://doi.org/10.1037/0022-3514.74.1.118

Unzueta, M. M., Knowles, E. D., & Ho, G. C. (2012). Diversity is what you want it to be: How social-dominance motives affect construals of diversity. *Psychological Science*, *23*(3), 303–309. https://doi.org/10.1177/0956797611426727

Valdesolo, P., & Graham, J. (2013). Awe, Uncertainty, and Agency Detection. *Psychological Science*, *25*(1), 170–178. https://doi.org/10.1177/0956797613501884

van Cappellen, P., & Saroglou, V. (2012). Awe activates religious and spiritual feelings and behavioral intentions. *Psychology of Religion and Spirituality*, *4*(3), 223–236. https://doi.org/10.1037/a0025986

van Kleef, G. A., & Côté, S. (2022). The Social Effects of Emotions. *Annual Review of Psychology*, *73*(1), 1–30. https://doi.org/10.1146/annurev-psych-020821-010855

Wilson, D. S., & Wilson, E. O. (2007). Rethinking the theoretical foundation of sociobiology. *Quarterly Review of Biology*, *82*(4), 327–348. https://doi.org/10.1086/703580

Yaden, D. B., Haidt, J., Hood, R. W., Vago, D. R., & Newberg, A. B. (2017). The varieties of self-transcendent experience. *Review of General Psychology*, *21*(2), 143–160. https://doi.org/10.1037/gpr0000102

Yaden, D. B., Kaufman, S. B., Hyde, E., Chirico, A., Gaggioli, A., Zhang, J. W., & Keltner, D. (2019). The development of the Awe Experience Scale (AWE-S): A multifactorial measure for a complex emotion. *The Journal of Positive Psychology*, *14*(4), 474–488. https://doi.org/10.1080/17439760.2018.1484940