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Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA, IRVINE

Sharing the extraordinary: Shared awe-inspiring experiences, social connection, and meaning

DISSERTATION

submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in Psychological Science

by

Sean Patrick Goldy

Dissertation committee:

Associate Professor Paul K. Piff, Chair

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First, I thank my family, especially my parents, Paul and Rose, and my sister, Alex, for their unconditional love and support. It has taken me a long time to realize how incredibly lucky I am to have a family who never pushed me down a certain path and instead valued finding happiness in life's journey. I'm not quite sure of that path yet, but I'm forever grateful to have you in my corner as I search for it.

Next, I thank Melissa Keith and Lenny Martin, two former professors of mine who were kind, and patient, enough to take me under their wings. Melissa taught me the importance and beauty of good writing, the emotion and soul that it can convey, and how it can transport readers and reflect inner and outer worlds. More importantly, she recognized a soul in need and provided a guiding light, one that I still cherish seeking out. Lenny opened my mind to the rich questions that social psychology could investigate and encouraged me to start asking my own. Our discussions in his office, which would somehow invariably include topics like near-death experiences, good sandwiches, and the Three Stooges, always left me laughing, my mind reeling, and, overall, profoundly shaped my thinking. Lenny is the chief reason why I pursued graduate school and social psychology.

In graduate school, I have been tremendously privileged to find another set of outstanding academic mentors in my advisors Paul Piff and Roxane Cohen Silver.

Paul, your unwavering support, sincerity, and seemingly unstoppable positivity over the years has buoyed me throughout grad school's rollercoaster ups and downs. Thank you for taking a chance on me, for providing a wellspring of intellectual curiosity and creativity, for introducing me to the wonders of Little Coyote's white pie, and for many long, wonderful talks—I look forward to so many more in the future. It's hard to believe that a serendipitous click on a little news article about something called awe took me this far.

Roxy, I cannot thank you enough for your guidance, kindness, candor, and sage advice on so many decisions and situations. It has been amazing to have had the opportunity to learn from you, and I have cherished each of our meetings, starting with that very first one on interview day—our conversation about why some people don't seem to search for meaning in the wake of tragedy felt like a lightning bolt, a spark for so many more talks to come.

I would also like to thank Oliver Sng for providing razor sharp insight on my research, for incredibly thought-provoking discussions, and for setting up the much-needed social psych happy hour get-togethers. How else could I try all of Eureka's appetizers multiple times and bond with some brilliant folks?

Speaking of bonding, the peers and friends I have had the good fortune to know before and throughout grad school have left an indelible impact on my life. There are too many to list here,

and I wouldn't want to miss anyone by singling a few out, but please know that I have deeply appreciated bonding with you over grad school's woes and joys, sharing so many laughs, maybe some tears, and numerous drinks and meals.

Finally, I would like to thank Emma Grisham, whose significance in my life is impossible to convey in a few quips and musings, but I'll try. Emma, meeting you is the single greatest thing to come out of this journey. I can't believe that I have been so lucky to know and be close with someone who is so wise, so kind, and so funny. Life's a riot with you, and I can't wait to see where it takes us. Here's to many more shared experiences—if the past and present are any indication, I have a feeling there will be many more awe-inspiring ones to come.

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ABSTRACT OF THE DISSERTATION

Sharing the extraordinary: Shared awe-inspiring experiences, social connection, and meaning

By

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Doctor of Philosophy in Psychological Science

University of California, Irvine

Associate Professor, Paul K. Piff, Chair

Much of people's lives is spent in the presence of others, sharing and co-experiencing life's moments. These shared experiences are a core component of social life, and they can vary not only in the activities they entail but also in the emotions they inspire. What are the types of shared experiences worth seeking out and having? As sources of social connection and meaning, shared awe-inspiring experiences may be especially beneficial relative to shared experiences tinged by other positive emotions. Guided by work on the different qualities of discrete positive emotions, I investigated whether co-experienced moments of awe increased social connection and meaning via a variety of methodologies across several studies.

Five studies yielded mixed support for this hypothesis. In Study 1, expressions of awe in reviews of Airbnb Experiences—guided, group-based activities (e.g., surfing lessons, restaurant tours, nature excursions)—were positively associated with expressions of connection and meaning, controlling for general positivity. In Study 2, recalled shared experiences of awe were associated with greater perceived social connection to one's experience partner and, in turn, meaningfulness, relative to recalled shared ordinary and amusing experiences. In Studies 3a and 3b, participants who anticipated watching an awe-inspiring video with an acquaintance reported

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greater anticipated meaningfulness, but not social connection, compared to those who imagined watching an amusing or neutral video. Finally, in Study 4 participants who were instructed to seek out an awe-inspiring experience with someone else reported that the experience was more meaningful, but not connecting, than participants who shared an experience of their choosing as a control condition. Together, this research contributes to and expands the literature on both shared experiences and awe, suggesting that shared awe-inspiring moments might be especially potent sources of meaning relative to other shared experiences.

Introduction

Humans are a fundamentally social species (Cacioppo & Hawkley, 2009). From the moment they enter the world, the great majority of people's lives is spent in the presence of other people. On average, 45% of Americans' lives are spent with another person and 20% is spent directly interacting with others (U.S. Bureau of Labor Statistics, 2016). Whether it is shopping for groceries with a partner, visiting a comedy club with friends, or hiking on a mountain top with a companion, the sharing of experiences with others is a central feature of social life that provides valuable opportunities to connect and foster closeness.

However, shared experiences are not all alike. As the examples above illustrate, they can be characterized by different emotions, like amusement (in the case of a comedy club), contentment (shopping with a partner), or awe (hiking). Given that experiences can be prototypical elicitors of positive emotion and positive emotions have distinct cognitive and behavioral effects (Shaver, Schwartz, Kirson, & O'Connor, 1987; Shiota et al., 2017), shared experiences may have different outcomes depending on the emotions they elicit. Do certain positive shared experiences pose greater personal and interpersonal benefits than others? In this dissertation, I aim to answer this question by investigating how certain positive shared experiences—namely, those characterized by awe—are more socially connecting and meaningful than others.

Shared experiences refer to moments simultaneously co-experienced with at least one other person. These experiences help satisfy the drive to be social (e.g., Baumeister & Leary, 1995; Cacioppo & Cacioppo, 2014) and are associated with a host of individual and interpersonal benefits. For example, couples who engage in novel, positive shared experiences exhibit decreased relationship boredom and enhanced relationship quality (Aron, Norman, Aron,

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& Lewandowski, 2002; Aron, Norman, Aron, McKenna, & Heyman, 2000). Additional research indicates that individuals report boosted positive affect during social activities experienced in the course of a day (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004), and shared moments are often more enjoyable than solo ones (Boothby, Clark, & Bargh, 2014; Boothby, Smith, Clark, & Bargh, 2016). Crucially, shared experiences facilitate social connection—interpersonal connection and closeness—and represent a critical source of well-being (Baumeister & Leary, 1995).

Prior work has examined the benefits of generally positive shared experiences compared to solo ones. Building on this framework, and guided by research on the specificity and distinctness of different positive emotions (Campos, Shiota, Keltner, Gonzaga, & Goetz, 2013; Frederickson, 2001; Shiota et al., 2017), I will examine whether certain types of shared experiences might differ from each other in their benefits. To the extent that the emotional and contextual makeup of shared experiences can vary within individuals' lives, certain types of shared experiences might lead to comparatively greater connection and meaning. In particular, shared experiences that evoke awe—an emotion linked to enhanced connection with others (e.g., Bai et al., 2017; Shiota et al., 2007; Stellar et al., 2017)—might be especially likely to enhance feelings of connection to others who are present. Insofar as experiences and emotions are amplified when shared (e.g., Boothby, Clark, & Bargh, 2014), shared awe experiences should elicit greater connectedness relative to other shared experiences. Furthermore, as social connection is a driver of meaning (Lambert et al., 2013, Stavrova & Luhmann, 2015; Stillman et al., 2009), shared awe experiences should be perceived as more meaningful, relative to other shared experiences, via enhanced connection. In the present investigation, I assess whether

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sharing awe-inspiring experiences is associated with greater social connection and meaning relative to sharing positive or ordinary experiences.

In the sections below, I will first discuss the benefits of shared experiences, outlining their positive impacts on emotion and experiential qualities. I will then describe evidence linking shared experiences to enhanced social connection, a driver of meaning. Finally, drawing upon research on discrete positive emotions, I discuss how shared experiences that evoke awe may be particularly like to trigger social connection and meaning—the central hypotheses guiding this investigation.

Benefits of shared experiences

Sociality is evolutionarily adaptive (Tomasello, 1999), likely driving the persistent human tendency to seek out social presence, social interactions, and interpersonal relationships (Tamir & Hughes, 2018). Indeed, the fundamentally advantageous desire to be social is reflected in individuals' needs to belong (Baumeister & Leary, 1995), align with others (Ryan & Deci, 2000), and maintain a good reputation (Romano, Balliet, Yamagishi, & Liu, 2017). Given that socializing, broadly construed, serves an adaptive purpose and satisfies core motivations, opportunities to interact with and be in the presence of others can yield numerous beneficial outcomes relative to being alone.

Shared experiences tend to be associated with greater positive emotion relative to solo activities. In one study, when people were asked to reconstruct an ordinary day, co-experiences (e.g., relaxing with friends, lunch with coworkers) were reported as more positive than other solitary activities of that day and were typically rated as the most positive of all daily experiences (Kahneman et al., 2004). In a series of ecological momentary assessment (EMA) studies, Reis, O'Keefe, and Lane (2016) documented that fun activities experienced with others were

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associated with greater positive affect than solitary fun activities. Relatedly, Jaremka, Gabriel, and Carvallo (2011) found that participants were more likely to write about interdependent than independent experiences when asked to write about emotionally intense events. Additionally, after recalling the most positive interdependent and independent experiences of their lives, participants were more likely to indicate that interdependent positive experiences had a longer-lasting emotional impact relative to independent experiences (Jaremka, Gabriel, & Carvallo, 2011). In an examination of the difference between social and solitary flow—a highly absorbing state in which people lose sense of time and the self (Csikszentmihályi, 1990)—flow experienced with others elicited greater joy than solitary flow (Walker, 2010). These findings demonstrate that positive shared experiences have a greater emotional impact than solo experiences.

In addition to increasing emotional intensity, simultaneously sharing a moment with someone else can enhance one's sensations and perceptions associated with the experience. For instance, Boothby and colleagues (2014, 2016, 2017) found that experiences can be amplified when people engage in them together, even in the absence of direct communication. In one representative series of studies, participants tasted sweet chocolate either side-by-side with a confederate or while the confederate was doing something different (i.e., viewing a booklet of paintings). Results indicated that the chocolate was deemed more flavorful and enjoyable when tasted simultaneously with the confederate than when tasted alone (Boothby et al., 2014), and this effect was particularly likely to emerge when participants had been briefly acquainted immediately prior to chocolate tasting or were spatially proximate (i.e., in the same room; Boothby et al., 2016). Similarly, pleasant images were better liked and seemed more real when viewed with a friend than with a stranger or when viewed alone (Boothby, Smith, Clark, & Bargh, 2017). Together, these findings show that sharing an experience with someone else can

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amplify one's reactions: chocolate tastes better, pleasant pictures appear more beautiful, and images seem more real.

The research above indicates that shared experiences are more emotionally and experientially intense than solitary ones; they foster enhanced positive affect and amplified sensory experiences—effects with important consequences for well-being (e.g., Fredrickson, 2001). One particularly powerful benefit of shared experiences that I focus on here is social connection.

Shared experiences, social connection, and meaning

One of the foremost outcomes of shared experiences is their ability to promote interpersonal connection and closeness between those sharing the experience. Extensive research has addressed the importance of social connection. Given that it satisfies a fundamentally adaptive need to belong (Baumeister & Leary, 1995), social connection is a crucial driver of well-being. Indeed, the relationship between social connection and positive functioning is so strong as to be called “one of the most robust findings in the literature on well-being” (Lyubomirsky et al., 2005, p. 823).

Connection with others is associated with numerous benefits, including enhanced physical health (Eisenberger & Cole, 2012; Holt-Lunstad, Smith, & Layton, 2010; Miller, Chen, & Cole, 2009), self-esteem (Lee & Robbins, 1998), and happiness (Lyubomirsky et al., 2005). Complementarily, social isolation and loneliness, the absence of social connection, can have a detrimental impact on mental health, including increased depressive symptoms (Cacioppo, Hawkley, & Thisted, 2010; Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006; Cacioppo & Patrick, 2009) and distress (Eisenberger, Lieberman, & Williams, 2003). Social connection is a

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fundamental component of physiological and psychological flourishing, underscoring its place as a chief benefit of shared experiences.

One key benefit of social connection, and, by implication, shared experiences, is an enhanced sense of meaning, itself a critical component of subjective well-being (for a review, see Steger, 2012). The subjective sense of meaning refers to the extent to which one personally resonates with, comprehends, and values one's activities and experiences (Huta & Ryan, 2010). Meaningful experiences make sense, fit into or contribute to frameworks for understanding the world, feel significant and valuable, and resonate with one's values and goals (Huta, 2015; Mekler & Hornbaeck, 2019).

Numerous lines of evidence link social connection to an enhanced sense of meaning. Correlational and experimental work indicates that social bonds predict meaning in life (Hicks & King, 2009; Krause, 2007; Martela, Ryan, & Steger, 2018; Steger, Kashdan, Sullivan, & Lorentz, 2008)—the sense that one's life is coherent, worthwhile, and purposeful (Martela & Steger, 2016). Additionally, different meaning threats (e.g., mortality salience, loneliness) promote endeavors for social connection in order to reestablish meaningfulness (Moynihan, Igou, & van Tilburg, 2017; Stillman et al., 2009). Indeed, a lack of social connection in the form of ostracism (Williams, 2002, Zadro et al., 2004), social exclusion, or loneliness (Stillman et al., 2009), reduces perceived meaning in life and the meaningfulness of specific events (e.g., participation in a ball-tossing game; Williams, 2002, Zadro et al., 2004). Finally, social connection appears in naive theories of meaning in life. When individuals are asked to list what makes their lives meaningful, sources related to social relationships are among the most frequent and highly ranked sources listed (Ebersole, 1998; Hicks & King, 2009; Wong, 1998). Relatedly, films that are described as meaningful are more likely to feature connectedness as a central theme than

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pleasurable films (Janicke & Oliver 2015; Oliver & Hartmann, 2010; Oliver, Hartmann, & Woolley, 2012). By satisfying the fundamental motivation to belong and instilling a sense that one is functioning well and can predict and control one's world, social connection makes life more meaningful (Heine, Proulx, & Vohs, 2006).

In summary, prior work documents the link between social connection and meaning and highlights each as core drivers of well-being. Social connection, and the sense of meaning it provides, can vary in its elicitors. Research that directly investigates positive shared experiences establishes them as important sources of social connection and, thus, meaning.

Empirical work on shared experiences provides evidence for their positive impact on social connection. Given their inherently social context, shared experiences are prime opportunities for the creation and strengthening of social bonds, facilitating social connection. For instance, the more that a positive shared experience enhances feelings of connectedness—a sense of interpersonal closeness with others (Lee & Robbins, 1995; Lee & Robbins, 1998)—the greater and longer lasting its emotional benefits (Jaremka et al., 2011). Likewise, perceiving that one has simultaneously had the same in-the-moment subjective experience as another can also foster connectedness (Pinel, Long, Landau, Alexander, & Pyszczynski, 2006) and generosity (Huneke & Pinel, 2016). In a series of studies, Kumar and colleagues (2014) found that reflecting on experiential purchases, which tend to be social (Caprariello & Reis, 2012) relative to more solitary material purchases, increased reports of social connection and inclinations to engage in more social than solitary activities.

Work also suggests that individuals can intuit that social connection is a core motivation for sharing an experience. For example, when asked to indicate why an imagined target would choose to share an experience with a friend (e.g., watching a video) over a solo experience,

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participants were more likely to indicate that the target did so to feel more connected to her friend than any other given explanation (e.g., to enjoy the video more, have a more positive memory of the experience, invest in the friendship, or she chose randomly). Similarly, when asked to indicate whether they would like to watch a video alone or with a friend, participants were more likely to report that they would choose to share the experience, in order to feel more connected toward their friend (Jolly, Tamir, Burum, & Mitchell, 2019). These findings establish that shared experiences can foster social connection. As social connection is an important fount of meaning, shared experiences should also promote a greater sense of meaning relative to solo experiences.

Accordingly, emerging empirical work documents that shared experiences feel more meaningful and valuable than solitary ones via social connection. For instance, experiential purchases are valued more than material ones (e.g., Gilovich, Kumar, & Jampol, 2014; Van Boven & Gilovich, 2003), in part because they are more likely to be social in context and offer opportunities to connect with others (Van Boven, 2005; Caprariello & Reis, 2012). Indeed, experiential purchases tend to be more social than material ones, and experiential purchases that are social (e.g., seeing a movie with friends) are valued more than solitary experiential purchases (Caprariello & Reis, 2012). Additionally, preliminary longitudinal work provides evidence for the importance of social connection in meaningful events. In a daily diary study, Martela and colleagues (2018) examined the extent to which the fulfilment of different sources of meaning was related to a given day's meaningfulness and significance. Results indicated that on days when participants felt close and connected to others, they reported that their day was more significant and meaningful. Together, these findings suggest that experiences that involve others feel more meaningful than solo experiences, in part because they are more socially connecting.

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Thus far, the research I have reviewed underscores the relationship between positive shared experiences, social connection, and meaning. However, this work has focused on experiences that are generally positive (e.g., tasting chocolate, watching humorous videos). Experiences can be more complex than that, involving different positive emotions that, while similar in valence, have specific social-cognitive and behavioral tendencies associated with them. Thus, by way of the prototypical emotions they elicit, positive shared experiences can differ in their outcomes. Extending prior research on shared experiences and guided by work on discrete positive emotions, I aim to investigate whether certain types of positive shared experiences elicit greater social connection and meaning than others.

Positive emotion differentiation

A rich literature on the distinct appraisals and consequences of different positive emotions (e.g., Campos et al., 2013; Frederickson, 2001; Shiota et al., 2017) suggests that different positive shared experiences can have varying outcomes via the emotions they elicit. In general, positive emotions propel individuals to pursue a wider range of thoughts and actions than is typical, which serves to build a variety of personal resources (e.g., intellectual, social, physical, psychological; Frederickson, 2001). Positive emotions prompt thoughts and actions, which, in turn, prompt the adaptive building of different personal resources. However, positive emotions are not all the same in their antecedents, consequences, and other correlates. Indeed, an expanding literature provides evidence for positive emotion differentiation across phylogenetic, neurological, and behavioral domains (Shiota et al., 2017). In particular, positive emotions differ in the facial expressions, postures (Campos et al., 2013), tendencies for touch (Hertenstein, Holmes, McCullough, & Keltner, 2009), and vocal bursts (Simon-Thomas, Keltner, Sauter, Sinicropi-Yao, & Abramson, 2009) that they evoke. They also correspond to different markers of

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physiological activation, including cardiac, vascular, and electrodermal systems (Kreibig, 2010; Maruskin, Thrash, & Elliot, 2012; Shiota, Neufeld, Yeung, Moser, & Perea, 2011; Tomaka, Blascovich, Kibler, & Ernst, 1997).

Broadly, positive emotions enable the management of and response to opportunities to acquire material, social, and/or informational resources critical for promoting fitness (Shiota et al., 2017). However, positive emotions differ in the functions that they serve and the thoughts, actions, and consequences that they elicit. For instance, pride—elicited from socially valued personal accomplishments—facilitates the acquiring, sustaining, and signaling of social status (Tracy, Shariff, & Cheng, 2010). Amusement is a response to social or cognitive play that elicits urges to continue in such play, fostering cognitive and behavioral skills (Griskevicius, Shiota, & Neufeld, 2010; Gervais & Wilson, 2005; Pellegrini & Smith, 2005). Additionally, gratitude arises from the acknowledgement that one's good fortune is due to an external source (Emmons & McCullough, 2003), and it reinforces reciprocity between benefactors and givers (McCullough, Kimeldorf, & Cohen, 2008), as well as increasing prosociality toward novel others (Bartlett & DeSteno, 2006).

Insofar as discrete positive emotions are associated with different cognitive and behavioral outcomes, certain positive shared experiences might vary in the degree to which they elicit social connection, and, thus, meaningfulness. In what follows, I describe work indicating that awe is a unique source of social connection and meaning to lay the foundation for the key hypothesis I pursue in the present investigation: shared experiences that evoke awe are particularly potent drivers of social connection and meaning.

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Awe, a driver of social connection and meaning

Awe involves positively valenced feelings of wonder and amazement triggered by two distinct appraisals: perceptions of vastness and a need for cognitive accommodation (Keltner & Haidt, 2003). Perceptions of vastness refer to the sense that one is in the presence of something larger than the self. Vastness is commonly a matter of physical size, but it can also concern conceptual domains, such as ability, complexity, fame, power, or prestige (Keltner & Haidt, 2003; Piff et al., 2015; Stellar et al., 2017). Need for accommodation refers to the process by which an individual creates new, or revises existing, mental schemas for understanding the world to account for the uncertainty created by schema-defying awe-inspiring stimuli (Stellar et al., 2018). Vast stimuli that transcend current frames of reference result in a need to expand knowledge structures in order to make sense of the experience, evoking feelings of awe (Keltner & Haidt, 2003).

Awe can arise from many different stimuli—including architectural marvels, religious epiphanies, and music—but awe typically arises in encounters with nature (e.g., sunsets, mountain ranges, scenic vistas) and interpersonal events (Bai et al., 2017; Gordon et al., 2017; Shiota, Keltner, & Mossman, 2007). Importantly, a budding literature on awe documents that awe can enhance connection and engagement with others, effects attributed to awe's ability as a self-transcendent emotion (Stellar et al., 2017) to diminish the sense of the self, reduce preoccupation with everyday concerns, and shift focus toward others and the collective (Gordon et al., 2017; Shiota et al., 2007; Stellar et al., 2017).

Several studies link solitary experiences of awe to connection with others (Shiota et al., 2007; Stellar et al., 2017). In one study, feeling awe, compared to other positive emotions (e.g., amusement), caused participants to be more humble: they mentioned fewer strengths when

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listing their own strengths and weaknesses, and they were more likely to factor external forces into their explanations of their own life successes, reflecting a less grandiose sense of self and heightened awareness of the strengths and contributions of others (Stellar et al., 2018). In other work, feeling awe led participants to report increased feelings of oneness with others (Van Cappellan & Saroglou, 2012) and a sense of interconnectedness and common humanity (Shiota et al., 2007). In a cross-cultural examination, experiencing awe led to a closer social network among Chinese participants, an expanded one among US participants, and heightened feelings of belonging in one's community among US and Chinese participants (Bai et al., 2017), findings driven, in part, by diminished self-interest.

Awe-inspiring experiences can also foster prosocial behavior (Piff et al., 2015), an antecedent and reinforcer of social connection (Klein, 2016). In a series of studies, Piff and colleagues (2015) found that feeling awe, relative to other positive emotions (e.g., amusement, pride), increased ethical decision-making, generosity in a dictator game, prosocial values, and helping behavior, as a function of a reduced sense of self. In related work, participants reported greater prosocial values after seeing awe-inspiring images (Joye & Bolderdijk, 2014). By promoting prosocial behavior, awe paves the way for the formation and strengthening of interpersonal bonds, fostering social connection.

Although the majority of work assessing awe and social connection involves solitary awe experiences, one study examined awe experienced in the company of others. In a field study of awe among military veterans and underserved youth while whitewater rafting, awe was specifically linked to increased social well-being—feeling that one belongs to a community, has something important to contribute to society, and has warm and trusting relationships with others (Anderson, Monroy, & Keltner, 2018). Importantly, none of the other positive emotions that

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participants felt during the rafting trip—amusement, contentment, gratitude, joy, and pride—predicted social well-being, indicating that awe experienced in the company of others can have unique effects on social connection.

These findings document how awe-inspiring experiences enhance social connection in various ways, from feelings of connectedness to behaviors that foster it, and they do so in part because awe shifts focus away from the self toward others and the larger entities of which one is a part. Furthermore, in addition to facilitating social connection, awe's qualities present it as a prime method for finding meaning in life.

Theoretical reasoning suggests that awe's ability to reduce self-interest and highlight one's connections to others make awe-inspiring experiences a unique source of meaning (Danvers, O'Neil, & Shiota, 2016). Emerging empirical work provides evidence for the relationship between awe and meaning. For example, accounting for general feelings of happiness, viewing an awe-inspiring video led to increased meaning in life (Rivera, Vess, Hicks, & Routledge, 2019). Also, dispositional tendencies to experience awe have been positively correlated with meaning in life (Zhao, Zhang, Xu, He, & Lu, 2019). In related research, when asked to recall their most significant life experience in the past year and rate how meaningful this experience was, participants indicated that their experiences were more meaningful when they were highly arousing, positive, and socially connecting (Murphy & Bastian, 2019), all of which are qualities of awe (Campos et al., 2013; Stellar et al., 2017). Furthermore, a large body of work establishes a connection between transcendent experiences, which include awe-inspiring events (Stellar et al., 2017), and meaning (Steger, 2012).

The research reviewed here depicts awe's ability to facilitate social connection and meaning, effects due in part to a reduced sense of self. However, with the exception of Anderson

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et al.'s work (2018), these findings examine awe experienced in solitude. Do awe's effects on social connection and meaning translate to shared contexts? Anderson et al.'s (2018) results indicate that, controlling for other positive emotions, awe experienced with others can still enhance social connection, which, given social connection's positive relationship with meaning, also suggests that shared awe can evoke a sense of meaning. Still, although shared awe might yield outcomes similar to awe experienced alone, important differences between the two contexts may exist. Critically, shared awe likely results in greater social connection, and, subsequently, meaningfulness, than solo awe. Given that shared experiences are more emotionally intense than solo ones, shared awe experiences should evoke greater awe than in solitary contexts, driving greater social connection and meaning. Likewise, the physical presence of another person provides a target for the general sense of social connection that solo awe experiences evoke. Indeed, work on shared experiences indicates that individuals think about and empathize with their co-experiencer, amplifying the experience's intensity (Boothby et al., 2014; Martin et al., 2015). As shared experiences foster increased emotional intensity and mentalizing of target others, shared awe should elicit greater social connection and meaning than awe experienced alone.

Although research suggests that shared awe likely evokes greater connection and meaning than solo awe, why might shared awe elicit these outcomes to a greater degree than other positive shared experiences? Awe's intrapsychic effects may hold the key. Specifically, awe's ability to elicit a diminished sense of self promotes greater attunement to the concerns of others, enabling greater interconnectedness and cohesion (Bai et al., 2017; Stellar et al., 2017). Research comparing awe with other positive emotions (e.g., amusement, joy, pride, general positive affect) indicates that awe's impact on self-diminishment is unique (Bai et al., 2017, Piff

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et al., 2015). Other positive emotions can even serve to enhance one's sense of self, as is the case with pride (Tracy & Robbins, 2004), potentially buffering any additional effects that a positive shared experience may have on fostering connectedness among co-experiencers.

In addition to promoting self-diminishment, the need for cognitive accommodation that is associated with a sense of awe may make shared awe experiences especially socially connective. Given that shared experiences promote greater thinking about one's experience partners and their thoughts (Boothby et al., 2014; Martin et al., 2015), co-experience members may be part of each other's accommodation process when sharing an awe-inspiring experience. As schema are created or updated, those who took part in the experience together may be bound to the stimuli and each other in their frameworks for understanding the world, enhancing connection. In summary, self-diminishment and a need for accommodation are qualities of awe that may make shared awe experiences especially likely to foster social connection and meaning.

The findings I have reviewed on shared experiences, social connection, meaning, and awe set the stage for the hypotheses I test in the current investigation. Given that awe is a unique driver of social connection relative to other positive emotions and that co-experiences are amplified relative to solo ones, I predict that shared awe-inspiring experiences will elicit greater social connection than other positive shared experiences. Likewise, insofar as social connection is a key source of meaning, I predict that shared awe experiences will be perceived to be more meaningful via enhanced social connection.

Related work provides preliminary support for these predictions. Sharing an unusual experience (e.g., purchasing black toilet paper) can foster greater feelings of closeness and connection than sharing an ordinary one (Min, Liu, & Kim, 2018). By definition, an awe-inspiring event involves an unanticipated and extraordinary experience that defies one's existing

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frames of reference for understanding the world (Keltner & Haidt, 2003). Additionally, mixed-method analyses of shared extraordinary experiences frequently identify social connection as a core component behind the personal meaning that individuals derive from their experiences (Abrahams, 1986; Caprariello & Reis, 2012). For example, in a study of multi-day river-rafting trips, results highlighted participants' sense of closeness with guides and other participants as the foundation for the heightened sense of purpose and personal meaning experienced over the course of the trip (Arnould & Price, 1993). Social connection has also been identified as a central aspect of other extraordinary experiences, such as skydiving (Celsi, Rose, & Leigh, 1993), attendance at collective festivals like Burning Man (Kozinets, 2002), and psychedelic experiences (Forstmann, Yudkin, Prosser, Heller, & Crockett, 2019).

The present research

I conducted five studies using university and nationwide samples to test the general prediction that awe-inspiring shared experiences will elicit greater social connection and meaning than other positive shared experiences. First, using naturalistic data, I examined the extent to which awe expressions following a shared experience were related to social connection and meaning, relative to expressing other positive emotions. In studies 2, 3a and 3b I tested whether recalling or imagining a shared awe experience elicited greater perceived or anticipated connection and meaningfulness, respectively, relative to a shared positive emotion or neutral experience. Finally, in Study 4, I extended this work by examining whether manipulating a shared awe experience in the lab, compared to a shared positive or control experience, increased self-report and behavioral measures of social connection and meaningfulness.

Study 1

In Study 1, I examined how awe, relative to positive emotion in general, related to social connection and meaning in naturally-occurring shared experiences. Specifically, I used text data from reviews of Airbnb Experiences to assess whether expressions of awe were associated with social connection and meaning-related sentiments. Airbnb Experiences offer travelers unique opportunities to explore locales with a resident guide. These Experiences vary widely in content and context, such as surfing excursions in Los Angeles, Chinatown tasting tours with a professional chef in New York City, and mural painting in Miami. Experiences can also vary in group size, but they are always social in context: they are conducted with at least two group members, and there are no self-directed Experiences. After participating in an Airbnb Experience, individuals can review it by leaving descriptions of their experience detailing the thoughts and feelings. Thus, Airbnb Experiences reviews present a unique opportunity for examining shared experiences outside of the laboratory. To assess how awe relates to social connection and meaning, relative to general positive emotions, I coded review text for expressions of awe, positive emotion, social connection and meaning. I expected that awe conveyed in Experiences' reviews would be associated with social connection and meaning-related expressions, accounting for expressions of general positive emotion.

Method

Procedure. Airbnb Experiences data were manually scraped by a team of naïve research assistants who copied relevant information (defined below) from Airbnb's Experiences website into a datafile. In order to obtain a substantial corpus of reviews and to account for variation in the word length of individual reviews, text data from the most recent 50 reviews of 90 Experiences were collected, as well as meta data about the Experiences available on each

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Experience's individual webpage (e.g., average rating, Experience type, duration). If an Experience did not have 50 reviews, all reviews were collected. Because Airbnb's website does not enable searching across all available Experiences and locations at a time, data collection focused on Experiences hosted at the top 3 most popular Experience hubs in the US: Los Angeles, Miami, and New York City. The top 30 Experiences that appeared on each location's Experiences webpage were scraped. A total of 3,923 reviews were collected. The average number of reviews per Experience was 43.54 reviews ($SD = 12.08$).

Measures

Review-level awe, social connection, general positivity, and meaning codes. Two naïve human coders rated each review for the extent to which it conveyed awe, meaning, and general positivity using separate 5-point scales (1 = *Not at all*, 5 = *Extremely*), as well as social connection using a 7-point scale (1 = *Extremely disconnected*, 7 = *Extremely connected*). Reviews that did not convey any terms or phrases regarding social connection (e.g., "This was an excellent experience and a great value") were coding as missing.

The coders were given the following instructions for rating a review for each construct: Awe: "Review conveys awe. Awe is an emotion people feel in the presence of something vast that they can't easily wrap their minds around. It's often associated with feelings of wonder or amazement"(adapted from Gordon et al., 2017); Meaning: "Review conveys that the experience was valuable, important, memorable, or contributed to a broader sense of understanding" (adapted from definitions of meaningful experiences: Huta, 2015; Mekler & Hornbaeck, 2019); General positivity: "Review conveys general positivity (e.g., fun, amusement, enjoyability)"; Social connection: "Review conveys interpersonal connection/closeness, feeling connected/close

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to the Experience guide and/or other members of the experience, that they got to know/learn from/bond with each other”.

I trained the coders on example reviews from Experiences not included in the main dataset. Once it was clear that both coders grasped each construct and we aligned with one another after multiple training sessions, they moved on to coding the main dataset of reviews. See below for an example of a review that both coders gave a 5 (the highest possible score) on the awe scale and a 7 (also the highest possible score) on the social connection scale:

Kevin (Dr. Dan) was a wonderful tour guide! He is extremely passionate and genuine. He remembered everyones names throughout the trip and truly cared for each one of us. He led the way for our tour across the manhattan bridge, through the streets of Brooklyn, and back over the bridge stopping along the way to give us some history of the area in his unique way! He helped me with an amazing proposal to my girlfriend and the group really interacted well together, I even made some friends from people in different corners of the world. All around this was an amazing experience and you should request Kevin as your guide aka Dr. Dan for a truly amazing experience !!!

Interrater reliability for each outcome was good ($ICC_{awe} = .63$, $ICC_{meaning} = .81$, $ICC_{general\ positivity} = .56$, $ICC_{connection} = .76$); thus, coders' raters were averaged to form composites for each separate outcome (Awe: $M = 1.55$, $SD = 0.78$; General positivity: $M = 2.51$, $SD = 0.75$; Social connection: $M = 4.27$, $SD = 1.00$; Meaning: $M = 1.44$, $SD = 0.73$).

Experience-level covariates. Experience cost ($M = \$70.64$, $SD = 52.24$), maximum group size ($M = 7.41$ people, $SD = 2.86$), duration ($M = 122.2$ minutes, $SD = 67.21$), and type (based on Airbnb's categories: "Art and culture", "Entertainment", "Food and drink", "Nature and outdoors", "Sports", "Transportation activities", "Wellness") were also collected from each

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Experience's webpage. An Experience's type, group size, and duration could present greater opportunities to interact with others, potentially driving social connection. For instance, individuals who take part in a group cooking class may be better able to interact with each other and the host than those in a group kayaking tour. And, people may be more inclined to express that an Experience was important or meaningful in an effort to justify a higher cost (Inzlicht, Shenhav, Olivola, 2018). See Table 1 for mean awe and general positivity for each Experience type.

Exploratory Experience-level variables. To explore whether an Experience's likelihood of evoking awe and general positivity could be captured and linked to awe and positivity conveyed in an Experience's reviews, I trained a separate team of two naïve human coders to examine each Experience's webpage, taking note of its photos and description, and rate the an Experience's likelihood of evoking awe and general positivity, respectively, using 5-point scales (1 = *Not at all*, 5 = *Extremely*) and the same definitions for awe and general positivity as the review level outcomes.

Interrater reliability for each outcome was good ($ICC_{awe} = .70$, $ICC_{general\ positivity} = .61$, $ICC_{connection} = .76$), so coders' raters were averaged to form composites for each separate outcome (Awe: $M = 2.90$, $SD = 0.93$; General positivity; $M = 3.65$, $SD = 0.60$).

Analytic strategy

To account for the clustering of reviews in Experiences, I fit a series of regressions with cluster-robust standard errors for each dependent variable (e.g., meaning, social connection). To account for positive skew in meaning ratings, I used a generalized linear model using a Gamma distribution and log-link when meaning was the dependent variable, whereas I used a OLS model when social connection was the dependent variable. Each model tested whether awe conveyed in

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a review predicted either meaning or social connection, controlling for general positivity, Experience cost, maximum group size, duration, type (dummy coded, 0 = sports), and city (e.g., Los Angeles, Miami, or New York; dummy coded, 0 = Los Angeles).

Results

Does awe conveyed in reviews predict social connection and meaning conveyed in reviews? As expected, awe significantly and positively predicted social connection ($b = 0.10$, 95% CI[0.05, 0.16], $p < .001$) and meaning ($b = 1.07$, 95% CI[1.04, 1.10], $p < .001$). These results held when accounting for general positivity, Experience cost, maximum group size, duration, type, and city (social connection: $b = 0.06$, 95% CI[0.01, 0.11], $p = .01$; meaning: $b = 1.04$, 95% CI[1.02, 1.07], $p < .001$). See Tables 2 and 3 for complete model estimates. Notably, experience cost also significantly and positively predicted meaning ($b = 1.00$, 95% CI[1.00, 1.00], $p < .001$), possibly reflecting individuals' drive to indicate that an Experience was impactful to justify a high cost (Inzlicht et al., 2018).

Exploratory analyses: Does an Experience's likelihood of evoking awe predict social connection and meaning in its reviews? Likelihood of evoking awe was not significantly related to social connection ($b = -0.08$, $SE = 0.07$, 95% CI[-0.22, 0.05], $p = .24$) or meaning ($b = 1.01$, $SE = 1.03$, 95% CI[0.96, 1.06], $p = .77$) conveyed in Experience reviews, accounting for Experience cost, maximum group size, duration, type, city, and likelihood of evoking general positivity.

Are Experiences in nature stronger elicitors of awe than other types of Experiences? Given that nature is one of the most common elicitors of awe, and nature scenes have frequently been documented as reliable and powerful sources of the emotion (Bai et al., 2017; Gordon et al., 2017; Shiota et al., 2007; Piff et al., 2015), shared moments in nature may evoke awe more

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readily than other types of shared experiences. Results partially reflected this notion: reviews of Experiences in the “Nature and outdoors” category had significantly higher awe scores than reviews of Experiences in the Sports ($b = -0.12$, $SE = 0.07$, 95% CI[-0.23, -0.01], $p = .03$), Art and culture ($b = -0.16$, $SE = 0.05$, 95% CI[-0.25, -0.06], $p = .001$), Entertainment ($b = -0.16$, $SE = 0.08$, 95% CI[-0.31, -0.01], $p = .03$), and Food and drink categories ($b = -0.21$, $SE = 0.06$, 95% CI[-0.33, -0.10], $p < .001$), but not the in the Transportation activities ($b = -0.06$, $SE = 0.07$, 95% CI[-0.20, -0.08], $p = .41$), or Wellness categories ($b = -0.06$, $SE = 0.12$, 95% CI[-0.29, -0.18], $p = .62$), controlling for Experience cost, maximum group size, duration, city, and likelihood of evoking general positivity. As Experiences in the Transportation activities and Wellness categories can involve activities that take place in nature (e.g., yoga on the beach for Wellness; a bus tour in the country side for Transportation activities), differences in awe between these types and Experiences in the Nature and outdoors category may be attenuated.

Discussion

Study 1 provides initial insight into the relationship between awe, social connection, and meaning in the context of shared experiences. The extent to which a review of an Airbnb Experience—a naturalistic example of a shared experience—conveyed awe was positively related to expressions of social connection and meaning in a review. Importantly, this relationship held when accounting for general positivity expressed in a review—an important control to consider, given that positive affect is associated with social connection (Mauss et al., 2011)—suggesting that shared awe is a distinct correlate of social connection and meaning.

However, Study 1 has important limitations. First, given this study’s cross-sectional nature, it is not possible to establish a causal link between awe, social connection, and meaning. Although there is theoretical and empirical precedent for awe leading to social connection and

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meaning, the correlational nature of the data make it difficult to establish a temporal link from awe to these outcomes. An experimental framework would help determine such a causal link.

Second, assessing awe, social connection, and meaning from reviews is likely an imperfect method of measuring these outcomes. For instance, it is not possible to determine with certainty whether a review's degree of awe conveyed is related to how much awe an individual felt. Although Study 1's data provide a more ecologically-valid approach to examining shared experiences of awe relative to traditional data collection methods, self-reported measures of emotion, connection, and meaning would strengthen these findings.

Finally, given that Airbnb Experiences are guided by a host, they likely differ from typical instances of shared experiences, in which at least two people simultaneously co-experience something. The following studies were designed to address these limitations.

Study 2

In Study 2, I sought to provide initial causal evidence for the effects of sharing an awe-inspiring experience on connectedness and meaningfulness. Specifically, I tested whether recalling a shared awe-inspiring experience would increase perceptions of connectedness and meaningfulness, relative to participants who recalled a shared amusing or neutral experience. Recalling an experience of a target emotion is a well-validated technique for inducing specific emotions (e.g., Griskevicius et al., 2010, Piff et al., 2015, Stancato & Keltner, 2019). In order to ensure that the effect of awe on connectedness and meaningfulness was independent of general positive emotion, I included amusement as a comparison condition. Amusement is a commonly employed method for inducing general positivity (Bartlett & DeSteno 2006) and has been used in prior work to contrast the effects of awe (e.g., Piff et al., 2015; Valdesolo & Graham, 2014).

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I hypothesized that participants who recalled a shared awe-inspiring experience would report greater perceived meaningfulness of the experience, and that this increased meaningfulness would be explained by participants having felt more connected toward their experience partner.

Method

Participants. 775 participants were recruited from a major public university and received course credit in exchange for participation. 93 participants were excluded from all analyses for failing attention checks. 254 participants were Asian or Asian-American, 10 were Black or African American, 240 were Hispanic/Latinx, 25 were Middle Eastern, 75 were White, and 75 were Bi or Multiracial. 555 participants were women, 128 were men, 5 were Other.

Procedure. Participants accessed the survey online. Participants were randomly assigned to recall either the most recent awe-inspiring, amusing, or ordinary experience that they had shared with an unfamiliar other. Focusing on experiences shared with an acquaintance is a paradigm that has been used in past work (Min, Liu, & Kim, 2018) to mitigate the likelihood that participants may tend to report sharing certain experiences with close others when asked to recall them, potentially confounding effects of recall condition on perceptions of connectedness.

Participants in the awe condition read the following instructions:

When experiencing awe, people usually feel like they are in the presence of something or someone that is so great in terms of size or intensity that their current understanding of the world, their surroundings, or themselves is challenged in some way. Please take a few minutes to recall the most recent awe-inspiring experience that you shared with someone you do not know very well. Please describe this experience in a few sentences.

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After describing their experience, participants completed measures of emotion, connectedness, meaningfulness, and demographics.

Measures

Emotion. Participants reported the degree to which they felt several different emotions during the experience they described using single items (1 = *Not at all*, 5 = *Extremely*): Amusement, Anger, Anxiety, Awe, Disgust, Fear, Happiness, Pride, Sadness, Surprise.

Connectedness. Connectedness was assessed using an index adapted from past work on perceived connection (Min, Liu, & Kim, 2018). Participants were asked to first write the initials of the acquaintance and then completed the following three items assessing connectedness toward this person: “How close did you feel to this person by sharing the experience you described?” (1 = *Extremely distant*, 7 = *Extremely close*), “How connected did you feel to this person by sharing the experience you described?” (1 = *Extremely disconnected*, 7 = *Extremely connected*), and a modified Inclusion of Other in Self (IOS) scale (Aron, Aron, & Smollan, 1992; 1 = no overlap, 7 = complete overlap; $\alpha = .86$).

Meaningfulness. Participants completed a face-valid single-item measure of meaningfulness: “How meaningful was the experience you described?” (1 = *Not at all*, 5 = *Extremely*).

Results

Manipulation check. Participants in the awe condition ($M = 4.21$, $SD = 0.89$) reported feeling greater awe during their recalled experience than the amusement ($M = 2.13$, $SD = 1.26$; $b = 2.08$, $SE = .11$, $t(675) = 19.54$, $p < .001$, $d = 1.85$) and neutral conditions ($M = 1.85$, $SD = 1.18$; $b = 2.36$, $SE = .11$, $t(675) = 22.54$, $p < .001$, $d = 2.14$). Likewise, participants in the amusement condition ($M = 4.10$, $SD = 0.96$) reported feeling greater amusement during their recalled

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experience than the awe ($M = 3.07$, $SD = 1.39$; $b = 1.03$, $SE = 0.11$, $t(679) = 9.07$, $p < .001$, $d = 0.85$) and neutral conditions ($M = 2.44$, $SD = 1.23$; $b = .64$, $SE = 0.11$, $t(679) = 5.61$, $p < .001$, $d = 0.52$). Table 4 presents descriptive statistics for each emotion variable.

Does recalling a shared awe experience elicit greater connectedness? I next conducted planned comparisons to test whether connectedness was significantly higher in the awe condition ($M = 4.63$, $SD = 1.28$), relative to the amusement ($M = 4.27$, $SD = 1.26$) and neutral ($M = 3.62$, $SD = 1.32$) conditions. Two orthogonal contrasts were used (paralleling past work on awe, e.g., Piff et al., 2015). The first contrast (“awe contrast”) compared the awe condition to the neutral and amusement conditions (coded as awe = 1, neutral = -.5, amusement = -.5) and tested whether awe enhanced perceptions of connectedness. The second contrast (“control contrast”) tested the residual difference between the neutral and amusement conditions (coded as awe = 0, neutral = -1, amusement = 1). The awe contrast was significant ($b = 0.69$, $SE = 0.11$, $t(679) = 6.49$, $p < .001$, $d = 0.53$), such that connectedness ratings were higher in the awe condition compared with the amusement and neutral conditions. The control contrast was also significant ($b = 0.65$, $SE = 0.12$, $t(679) = 5.42$, $p < .001$, $d = 0.50$), indicating that connectedness ratings were also higher in the amusement condition than in the neutral condition. However, an additional comparison indicated that perceptions of connectedness were significantly greater in awe condition than in the amusement condition ($b = 0.36$, $SE = 0.12$, $t(679) = 2.99$, $p = .003$, $d = 0.28$). Thus, the awe condition led to greater connectedness ratings than did the amusement or neutral conditions. Figure 1 depicts connectedness by condition.

Does recalling a shared awe experience elicit greater meaningfulness? I next tested whether condition influenced meaningfulness. I used the orthogonal contrasts described above to test whether meaningfulness was higher in the awe condition ($M = 3.67$, $SD = 0.94$) than in the

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amusement ($M = 2.55$, $SD = 1.11$) or neutral conditions ($M = 2.22$, $SD = 1.07$). The awe contrast was significant ($b = 1.28$, $SE = .09$, $t(678) = 14.95$, $p < .001$, $d = 1.22$), such that meaningfulness ratings were higher in the awe condition compared with the amusement and neutral conditions. The control contrast was also significant ($b = 0.33$, $SE = 0.10$, $t(678) = 3.37$, $p = .001$, $d = 0.31$), indicating that meaningfulness ratings were also higher in the amusement condition than in the neutral condition. However, an additional comparison indicated that perceptions of meaningfulness were significantly greater in the awe condition than in the amusement condition ($b = 1.12$, $SE = 0.10$, $t(678) = 11.37$, $p < .001$, $d = 1.07$). Thus, the awe condition led to greater meaningfulness ratings than did the amusement or neutral conditions (Figure 2).

Mediation analysis. I next tested whether the effect of awe (in contrast to the amusement and neutral conditions) on meaningfulness was mediated by perceived connectedness, controlling for the orthogonal control contrast. This analysis (and all following mediation models) were conducted using the PROCESS macro (Hayes, 2013) for R (R Core Team, 2022), with 5,000 bootstrap samples to test for indirect effects. The 95% confidence interval for the indirect path did not include zero, indicating that the greater likelihood of reporting that a shared awe experience was meaningful, relative to a shared amusing and neutral experience, was mediated by increased connectedness ($b = 0.29$, 95% CI[0.20, 0.39]). The effect of recalling a shared awe experience on meaningfulness when connectedness was included in the model (i.e., the direct effect of recalling shared awe) was still significant ($b = 0.99$, 95% CI[0.84, 1.14], $p < .001$), indicating that connectedness was a partial mediator.

However, these mediation results, and all mediation results in the present work, should be interpreted with caution because connectedness and meaningfulness were measured at roughly

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the same time point (though, connectedness was assessed directly before meaningfulness); thus, alternative models cannot be completely excluded (Maxwell & Cole, 2007).

Given this concern and some documented evidence for increased social connection via meaning in life (Stavrova & Luhmann, 2015), I examined whether the effect of awe on social connection was mediated by meaningfulness. The 95% confidence interval for the indirect path did not include zero, indicating increased social connection from sharing an awe-inspiring experience, relative to a shared amusing and neutral experience, was mediated by increased meaningfulness ($b = 0.41$, 95% CI[0.26, 0.56]). However, this reverse mediation should still be interpreted with caution, as reverse mediation testing generally does not help distinguish whether one pathway is better than another, especially when the initial mediator variable is not measured as reliably (e.g., meaningfulness measured via a single item) as the outcome variable (Lemmer & Gollwitzer, 2017). Indeed, empirical tests of reverse mediation testing find that when an initial mediating variable is measured less reliably than an initial outcome variable, models testing reverse mediation are “more likely to (a) yield larger indirect effects and (b) become significant” than the initial mediation models (Lemmer & Gollwitzer, 2017).

Discussion

Study 2 provides experimental evidence that sharing an awe-inspiring experience is related to connectedness and meaningfulness. Participants who recalled a time when they shared an awe-inspiring experience with an acquaintance reported greater connectedness and meaningfulness, relative to an amusement or neutral condition. Additionally, connectedness partially mediated the effect of awe on meaningfulness. In other words, recalled shared awe experiences felt more meaningful, in part because they instilled a sense of connectedness with one's experience partner.

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However, Study 2 is not without caveats. The recall paradigm is useful for potentially capturing the effect of actually shared awe-inspiring experiences on feelings of connectedness and meaningfulness. But, although participants were asked to think of an experience they shared with an unfamiliar other, it is still possible that people might tend to recall awe-inspiring experiences with more connected/closer others than when asked to recall amusing or ordinary experiences. Additionally, demand characteristics may have prompted individuals to indicate that an awe-inspiring experience felt more meaningful, relative to other experiences. Specifically, insofar as individuals might associate something labeled “awe-inspiring” as being meaningful, participants may have been more likely to indicate that an experience was meaningful after asked to recall and describe an awe-inspiring moment. Study 3a was designed to address these issues.

Study 3a

In Study 3a, I induced awe in situ by exposing participants to awe-inspiring stimuli. Participants watched a video that elicited awe, a video that elicited amusement, or a neutral control video, and imagined doing so with an acquaintance. I hypothesized that participants who imagined sharing an awe-inspiring video would report greater anticipated meaningfulness of the experience, and that this increased meaningfulness would be explained by participants anticipating feeling more connected toward their experience partner.

Method

Participants. 345 participants were recruited from a major public university and received course credit in exchange for participation. 35 participants were excluded from all analyses for failing attention checks. 105 participants were Asian or Asian-American, 6 were Black or African American, 111 were Hispanic/Latinx, 15 were Middle Eastern, 35 were White, and 38 were Bi or Multiracial. 243 participants were women, 63 were men, 4 were Other.

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Procedure and measures. Participants were first asked to think about someone they recently met for the first time and write that person's initials in a text box. They were then told that they would be presented with a brief video to watch. Participants were instructed to imagine watching the video with the person whose initials they listed. Next, participants were randomly assigned to watch one of three 5-min videos: an awe-inspiring clip (composed of grand nature scenes from the BBC's *Blue Planet II*), an amusing video (consisting of a montage of comedic nature clips from the BBC's *Walk on the Wild Side*), or a neutral video (featuring a man describing the construction of a picture frame). The amusement and neutral videos have been validated in prior research (Piff et al., 2015; Valdesolo & Graham, 2014). Immediately after watching the video, participants were asked to describe what it would be like to watch the video with their acquaintance. Participants then completed the same measures of emotion, connectedness ($\alpha = .90$), and meaningfulness as in Study 2.

Results

Manipulation check. Participants in the awe condition ($M = 3.95$, $SD = 1.19$) reported feeling greater awe in the awe condition than participants in the amusement ($M = 2.32$, $SD = 1.18$; $b = 1.63$, $SE = 0.16$, $t(307) = 9.94$, $p < .001$, $d = 1.38$) and neutral conditions ($M = 2.24$, $SD = 1.18$; $b = 1.71$, $SE = 0.16$, $t(307) = 10.51$, $p < .001$, $d = 1.44$). Likewise, participants in the amusement condition ($M = 3.99$, $SD = 1.02$) reported feeling greater amusement than those in the awe ($M = 3.43$, $SD = 1.27$; $b = 0.52$, $SE = 0.16$, $t(306) = 3.52$, $p = .001$, $d = 0.49$) and neutral conditions ($M = 2.66$, $SD = 1.20$; $b = 1.33$, $SE = .17$, $t(306) = 8.01$, $p < .001$, $d = 1.19$).

Does imagining sharing an awe experience elicit greater connectedness? I next conducted planned comparisons to test whether connectedness was significantly higher in the awe condition ($M = 4.39$, $SD = 1.26$), relative to the amusement ($M = 4.22$, $SD = 1.34$) and

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neutral ($M = 3.86$, $SD = 1.25$) conditions, using the same orthogonal contrasts as in Study 2. The awe contrast was significant ($b = 0.35$, $SE = 0.15$, $t(307) = 2.28$, $p = .02$, $d = 0.27$). Thus, the awe induction increased connectedness relative to the amusement and neutral conditions. The control contrast was marginally significant ($b = 0.35$, $SE = 0.18$, $t(307) = 1.93$, $p = .05$, $d = 0.27$). An additional comparison indicated that perceptions of connectedness were not significantly greater in awe condition than in the amusement condition ($b = 0.17$, $SE = 0.18$, $t(307) = 0.97$, $p = .33$, $d = 0.13$). Figure 3 depicts connectedness by condition.

Does imagining sharing an awe experience elicit greater meaningfulness? I used the orthogonal awe and control contrasts to test whether meaningfulness was higher in the awe condition ($M = 2.67$, $SD = 1.04$) than in the amusement ($M = 2.39$, $SD = 0.97$) or neutral conditions ($M = 1.89$, $SD = 0.99$). The awe contrast was significant ($b = 0.53$, $SE = 0.12$, $t(306) = 4.48$, $p < .001$, $d = 0.53$), such that meaningfulness ratings were higher in the awe condition compared with the amusement and neutral conditions. The control contrast was also significant ($b = 0.50$, $SE = 0.14$, $t(306) = 3.50$, $p = .001$, $d = 0.50$), indicating that meaningfulness ratings were also higher in the amusement condition than in the neutral condition. However, an additional comparison indicated that perceptions of meaningfulness were significantly greater in the awe condition than in the amusement condition ($b = 0.29$, $SE = 0.14$, $t(306) = 2.05$, $p = .04$, $d = 0.28$). Thus, the awe condition led to greater meaningfulness ratings than did the amusement or neutral conditions (Figure 4).

Mediation analysis. I next tested whether the effect of awe (in contrast to the amusement and neutral conditions) on anticipated meaningfulness was mediated by anticipated connectedness. The 95% confidence interval for the indirect path did not include zero, indicating that the greater likelihood of anticipating a shared awe experience as being meaningful, relative

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to a shared amusing and neutral experience, was mediated by increased anticipated connectedness ($b = 0.17$, 95% CI[0.03, 0.32]). The effect of the awe condition on meaningfulness when connectedness was included in the model was still significant ($b = 0.36$, 95% CI[0.18, 0.55], $p < .001$), indicating that connectedness was a partial mediator. Participants reported that the shared awe experience would be more meaningful than the amusing and neutral conditions, in part because they anticipated feeling connected to their imagined experience partner.

Exploratory alternative mediation model. As in Study 2, I explored whether meaningfulness would mediate the effect of awe on social connection. The 95% confidence interval for this model's indirect path did not include zero ($b = 0.43$, 95% CI[0.24, 0.65]); however, as with Study 2, these results should be interpreted with caution.

Study 3b

In Study 3b, I aimed to replicate the effects of the Study 3a in a pre-registered study (https://aspredicted.org/GSR_6XG) using a different, well-powered sample.

Method

Participants. 802 participants were recruited from Prolific Academic. 4 participants were excluded from all analyses for failing attention checks. This sample size reflects an expected power of .80 using an initial effect size estimate from Study 2 ($d = 0.28$), after incorporating the uncertainty of the initial effect size estimate into the analysis (Biesanz & Schragar, 2017; McShane & Böckenholt, 2016; see also the `fabs` package for R: `github\jbiesanz\fabs`). As a buffer against dropped observations, I aimed to recruit a total of 800 participants.

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53 participants were Asian or Asian American, 67 were Black or African American, 30 were Hispanic/Latinx, 2 were Middle Eastern, 5 were Native American, 580 were White, and 101 were Bi or Multiracial. 421 participants were women, 370 were men, 6 were Other.

Procedure and measures. Participants followed the same procedures and completed the same measures as in Study 3a.

Results

Manipulation check. Participants in the awe condition ($M = 3.98$, $SD = 1.20$) reported feeling greater awe in the awe condition than participants in the amusement ($M = 2.13$, $SD = 1.15$; $b = 1.85$, $SE = 0.10$, $t(795) = 18.14$, $p < .001$, $d = 1.57$) and neutral ($M = 2.25$, $SD = 1.18$; $b = 1.73$, $SE = 0.10$, $t(795) = 16.90$, $p < .001$, $d = 1.47$) conditions. Likewise, participants in the amusement condition ($M = 3.88$, $SD = 1.28$) reported feeling greater amusement than those in the awe ($M = 2.91$, $SD = 1.34$; $b = .97$, $SE = 0.11$, $t(795) = 8.85$, $p < .001$, $d = 0.77$) and neutral conditions ($M = 2.35$, $SD = 1.16$; $b = 1.53$, $SE = 0.11$, $t(795) = 13.99$, $p < .001$, $d = 1.21$).

Does imagining sharing an awe experience elicit greater connectedness? I next conducted planned comparisons to test whether connectedness was significantly higher in the awe condition ($M = 4.13$, $SD = 1.29$), relative to the amusement ($M = 4.08$, $SD = 1.35$) and neutral ($M = 3.73$, $SD = 1.32$) conditions, using the same orthogonal awe and control contrasts. The awe contrast was significant ($b = 0.23$, $SE = 0.10$, $t(795) = 2.31$, $p = .02$, $d = 0.17$), such that connectedness ratings were higher in the awe condition compared with the amusement and neutral conditions. The control contrast was also significant ($b = 0.35$, $SE = 0.12$, $t(795) = 3.04$, $p = .003$, $d = 0.26$), indicating that connectedness ratings were also higher in the amusement condition than in the neutral condition. An additional comparison indicated that perceptions of connectedness were not significantly greater in awe condition than in the amusement condition

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($b = 0.05$, $SE = 0.11$, $t(795) = 0.48$, $p = .63$, $d = 0.04$). Although the awe and amusement conditions elicited greater anticipated connectedness than the neutral condition, the awe and amusement conditions were not significantly different from each other. Figure 5 depicts connectedness by condition.

Does imagining sharing an awe experience elicit greater meaningfulness? I next tested whether condition influenced meaningfulness. I used the orthogonal contrasts described above to test whether meaningfulness was higher in the awe condition ($M = 2.50$, $SD = 1.10$) than in the amusement ($M = 2.19$, $SD = 1.06$) or neutral conditions ($M = 1.92$, $SD = 0.96$). The awe contrast was significant ($b = 0.44$, $SE = 0.08$, $t(795) = 5.64$, $p < .001$, $d = 0.42$), such that meaningfulness ratings were higher in the awe condition compared with the amusement and neutral conditions. The control contrast was also significant ($b = 0.27$, $SE = 0.09$, $t(795) = 2.99$, $p = .003$, $d = 0.26$), indicating that meaningfulness ratings were also higher in the amusement condition than in the neutral condition. However, an additional comparison indicated that perceptions of meaningfulness were significantly greater in the awe condition than in the amusement condition ($b = 0.31$, $SE = 0.09$, $t(533) = 3.38$, $p = .001$, $d = 0.29$). Thus, the awe condition led to greater meaningfulness ratings than did the amusement or neutral conditions (Figure 6).

Mediation analysis. Next, I tested whether the effect of awe (in contrast to the amusement and neutral conditions) on anticipated meaningfulness was mediated by anticipated connectedness. The 95% confidence interval for the indirect path did not include zero, indicating that the greater likelihood of anticipating a shared awe experience as being meaningful, relative to a shared amusing and neutral experience, was mediated by increased anticipated connectedness ($b = 0.13$, 95% CI[0.02, 0.24]). The effect of the awe condition on

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meaningfulness when connectedness was included in the model was still significant ($b = 0.31$, 95% CI[0.20, 0.41], $p < .001$), indicating that connectedness was a partial mediator.

Exploratory alternative mediation model. When testing the reverse mediation pathway (i.e., Awe \rightarrow Meaning \rightarrow Social connection), 95% confidence interval for the indirect path did not include zero ($b = 0.41$, 95% CI[0.26, 0.56]).

Discussion

Studies 3a and 3b's results again showed an effect of awe on meaningfulness that differed from positive emotion and neutral states. When participants imagined watching an awe-inspiring video with someone they met recently, they indicated that the experience would be more meaningful than participants who imagined watching an amusing or neutral video with someone else. Further, mediation analyses again indicated that enhanced connectedness explained, in part, the heightened sense of meaningfulness reported by participants in the shared awe condition, relative to those in the amusement and neutral conditions. Unlike Study 2, however, Studies 3a and 3b did not find that sharing an awe experience led to greater connectedness than sharing an amusing one. Although both the awe and amusing conditions led to higher anticipated connectedness than the neutral condition, the awe and amusing conditions did not differ from each other.

Of course, anticipating how one might feel while sharing an imaged experience is an imperfect proxy of an actual shared experience. Actually sharing an experience with someone else who is physically present is likely quite different from experiencing something alone while imagining another person is present and anticipating how that experience would feel. This difference might be exacerbated by individuals' tendency to underestimate how much experience partners like them and enjoy their company (Boothby, Cooney, Sandstrom, & Clark, 2018). This

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liking gap could potentially mitigate anticipated feelings of connectedness when imagining a shared experience. Furthermore, to the extent that the physical presence of others can amplify the experience of a shared event (Boothby et al., 2016), imagining a shared awe experience is likely less awe-inspiring than an actually co-experienced moment. Thus, although the awe condition elicited greater anticipated connectedness than the neutral condition, the imagined experience may not have been awe-inspiring enough to yield greater feelings of connectedness than the amusement condition. I designed Study 4 to address these limitations.

Study 4

In Study 4, I examined whether seeking out and sharing an awe experience, relative to a shared ordinary experience, elicited greater feelings of connectedness and meaningfulness. Over the course of a weekend, participants were instructed to do an activity with one other person of their choosing that was either awe-inspiring or simply any type of activity that they desired, after which they completed a survey that assessed connection to one's experience partner and how meaningful the experience felt. Importantly, this study builds on the previous studies by not relying on recalled or hypothetical experiences and instead examining whether seeking out shared awe-inspiring experiences generated connection and meaning. Additionally, Study 4's control condition—seeking out a shared experience of one's choosing (i.e., with no target emotion given)—enabled me to compare the effects of shared awe experiences to experiences that individuals might naturalistically choose to do with someone else. And, whereas Studies 2-3b restricted participants to recalling or anticipating a shared experience with an acquaintance, Study 4 allowed participants to actually engage in a shared moment with another person of their choosing, bolstering ecological validity. I hypothesized that participants who shared an awe-

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inspiring experience would report greater connectedness and, in turn, indicate that the experience felt more meaningful than participants who did not.

Method

Participants. Participants were recruited from Prolific Academic. A power analysis for a one-tailed independent samples t-test indicated that 244 total participants would yield 80% power to detect an effect size of $d = .32$, which reflects a median effect size of 93 pre-registered studies in psychology—a more conservative estimate than studies that were not pre-registered (Schäfer & Schwarz, 2019). To account for dropped observations, I aimed to recruit 290 participants. The final sample consisted of 291 participants.

17 participants were Asian or Asian American, 8 were Black or African American, 12 were Latinx/Hispanic, 2 were Middle Eastern, 244 were White/Caucasian, and 10 were Bi or Multiracial. 135 participants were women, 154 were men, and 3 identified as nonbinary. Average age was 35.1 years ($SD = 12.2$).

Procedure. Participants were first recruited from Prolific Academic to participate in an initial intake survey delivered on a Friday that asked whether they would be “able to meet up with someone of your choosing (who is at least 18 years old) to do an activity together” at some point during the upcoming weekend. Participants who indicated “Yes” ($n = 416$) were randomly assigned to either an awe or control condition in which they instructed to do either an awe-inspiring activity or an activity of their choosing with one other person during the upcoming weekend (see Appendix A). Participants in the awe condition received the following definition of awe adapted from prior work (Sturm et al., 2020):

Awe is an emotion people feel in the presence of something vast, powerful, or beautiful that they can't easily wrap their minds around. Awe helps you to

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appreciate the wonders of the world around you. It's often associated with feelings of wonder or amazement. With the right outlook, awe can be found almost anywhere.

In both conditions, participants received an online survey Friday evening with instructions to complete the survey after finishing their activity during the weekend. This survey asked participants to write about their experience, and it assessed their emotions during the experience, connection towards one's experience partner, and how meaningful the experience felt via self-report items, in addition to demographics. Of the 416 participants who were eligible and invited to participate in the study, 291 completed the survey, yielding a 70% retention rate with 152 participants in the control condition and 139 participants in the awe condition.

Measures

Emotion. Participants reported the degree to which they felt several different emotions during their shared experience using single items (1 = *Not at all*, 5 = *Extremely*): Amusement, Anger, Anxiety, Awe, Compassion, Disgust, Fear, Gratitude, Happiness, Pride, Sadness, Surprise.

Connectedness. Participants' sense of connection with each other was assessed with the same items as Studies 2-3b ($\alpha = .82$).

Meaningfulness. Participants' sense of meaning was assessed with a 3-item scale of meaningfulness adapted from Van Tilburg & Igou (2012). Items include: "How meaningful was the experience?", "How significant was the experience?", and "How worthwhile was the experience?". Responses were on a 5-point scale (1 = *not at all*, 5 = *Extremely*) and averaged to form a composite ($\alpha = .82$).

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Experience partner characteristics. Because participants were allowed to share their activity with someone of their choosing, and because it is reasonable that certain factors concerning a participant's relationship with their experience partner could contribute to how connected they feel about this person, it was important to account for possible differences between conditions in these factors. For example, it is possible that individuals who were told to share an awe-inspiring activity may more prone to seek out a positive, fun experience like awe with someone with whom they are close (e.g., a significant other). In contrast, given that participants in the control condition were able to share any sort of activity of their choosing, it is possible that they could choose to share an activity with an experience to whom they are less close out of convenience (e.g., eating lunch with a co-worker). Thus, in order to later identify whether such differences between conditions existed, participants indicated the category that best described their relationship with their experience partner (e.g., Family member, Significant other, Friend, Co-worker, Acquaintance, Stranger), how many years they had known this person (slider scale, 0-20 *years or more*), and this person's gender.

Experience duration. To account for possible differences between conditions in the duration of participants' activities, participants indicate the number of minutes their activity lasted via a slider scale (0-100 *minutes or more*).

Exploratory measures

Text-based assessments of connectedness. To supplement the self-report measures of connectedness and explore other means of assessing changes in connection as a result of shared awe, I examined participants' descriptions of their experiences for linguistic cues of sociality. Using a custom R script, each participants' activity description was coded for total number of words it contained from the affiliation, prosocial, and first-person plural pronouns Linguistic

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Inquiry and Word Count dictionaries (LIWC; Pennebaker et al., 2015; Tausczik & Pennebaker, 2010). The prosocial dictionary captures words reflecting an orientation to help other people (e.g., “care,” “volunteer”) devised by Frimer et al. (2014). The affiliation dictionary contains affiliation-related terms that reflect an orientation towards others (e.g., “ally,” “friend,” “togetherness”; Pennebaker et al., 2015; Vaughn, 2018, 2019). Finally, the first-person plural pronouns dictionary (hereafter referred to as “we” words; e.g., “we,” “our,” “us”) indicates a general orientation to refer to oneself in cohesive terms that suggest a collective focus (Fitzsimons & Kay, 2004; Pennebaker & Chung, 2007; Tausczik & Pennebaker, 2010).

Psychological richness. To explore shared awe’s effects on a measure of well-being related to, but distinct from, meaning, I assessed the extent to which shared awe experiences increased psychological richness. Emerging work suggests that the perception that one's life has been psychologically rich—filled with experiences that are perspective-changing, atypical, thought-provoking, and interesting—is a core component of what defines a "good" or ideal life, alongside meaning in life and happiness (Oishi & Westgate, 2021). Given that the qualities of psychologically rich experiences overlap with those of awe-inspiring moments, awe may increase this important aspect of well-being. To measure shifts in psychological richness, participants indicated the degree to which their experience was “interesting”, “boring” (reverse-coded), “intriguing”, “psychologically rich”, “complex”, “fresh”, “unique”, “unusual”, “typical”, “simple”, and “surprising” on a 5-point scale (1 = *Not at all*, 5 = *Extremely*; Oishi & Westgate, 2021).

Participant selfies. To provide an additional qualitative component to the data collected, participants were given the opportunity to submit selfies taken with their experience partner. Given that participants may have been reluctant to take and submit pictures of themselves, this

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was an optional task. Overall, 48 participants submitted photos, with 21 selfies from the awe condition and 27 selfies from the control condition. These photos depicted participants with their experience partners in a variety of locations, ranging from sitting together at home to hiking on a mountaintop. Due to small sample size, statistical analyses were not conducted.

Results

Experience partner characteristics. There were no differences in the number of years participants had known their experience partners between the awe ($M = 10.36$, $SD = 6.99$) and control conditions ($M = 11.56$, $SD = 7.22$; $t(288.06) = 1.44$, $p = .15$). Similarly, there were no differences between conditions in experience partner gender ($X^2 = 0.79$, $p = .41$) or type of relationship ($X^2 = 0.83$, $p = .66$).

Experience duration. There were no differences in the duration of participants' activities between the awe ($M = 70.51$, $SD = 29.14$) and control conditions ($M = 73.49$, $SD = 28.50$; $W = 11,160$ $p = .4$).

Manipulation check. Participants in the awe condition ($M = 3.50$, $SD = 1.23$) reported feeling greater awe in the awe condition than participants in the control condition ($M = 2.38$, $SD = 1.26$; $t(287.91) = 7.71$, $p < .001$, $d = 0.91$). Interestingly, participants in the awe condition also reported feeling greater gratitude ($M = 4.13$, $SD = 0.92$) compared to the control condition ($M = 3.84$, $SD = 1.06$; $t(288.03) = 2.48$, $p = .01$, $d = 0.29$). Paralleling Piff et al. (2015), I found that the difference between conditions in gratitude became nonsignificant when controlling for awe ($b = -0.02$, $t(288) = -0.17$, $p = .86$), whereas the effect of condition on awe was unchanged when controlling for gratitude ($b = 1.01$, $t(288) = 7.21$, $p < .001$). These analyses indicate that the differences between conditions in gratitude were driven by condition differences in awe. There were no other significant differences in emotions between the two conditions. These findings cohere

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with prior work finding that awe-inspiring experiences can elicit gratitude and happiness, among other positive emotions, in addition to awe (Nelson-Coffey et al., 2019). Table 5 presents descriptive statistics for each emotion variable.

Does sharing an awe-inspiring experience elicit greater connectedness? Ratings of connectedness in the awe condition ($M = 6.26, SD = 0.75$) were not significantly greater than those in the control condition ($M = 6.21, SD = 0.87; t(287.74) = 0.58, p = .28, d = 0.07$). As connectedness was strongly negatively skewed, I compared the above results (from a Welch's independent samples t-test) to those of a non-parametric Mann-Whitney-Wilcoxon test, which also did not indicate a significant difference between the two conditions ($W = 10,266, p = .34$). Figure 7 depicts connectedness by condition.

Does sharing an awe-inspiring experience elicit greater meaningfulness? Ratings of meaningfulness in the awe condition ($M = 4.02, SD = 0.74$) were significantly greater than those in the control condition ($M = 3.86, SD = 0.80; t(288.98) = 1.84, p = .03, d = 0.22$). Figure 8 depicts meaningfulness by condition.

Mediation analysis. Because the awe condition did not evoke significantly greater social connection than the control condition, I did not test whether increased social connection would mediate the relationship between awe and meaningfulness. However, as indirect effects can still exist in the absence of a significant total effect (Hayes, 2022), I examined whether the effect of awe on social connection was mediated by increased meaningfulness. The 95% confidence interval for the indirect effect included zero ($b = 0.09, 95\% CI[-0.007, 0.21]$), suggesting that an indirect effect of meaningfulness did not exist.

Exploratory analyses. To assess changes in linguistic markers of connectedness, I fit a series of Poisson regressions for each diction, in which a count of the number of words in a

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participant's description from a particular dictionary (e.g., affiliation words) was regressed onto 2-level categorical variable for condition (i.e., shared awe vs. control), controlling for the total number of words in each description. The number of prosocial words in participants' descriptions did not significantly differ between conditions (RR = 0.87, 95% CI[0.89, 1.25], $p = .56$). Interestingly, participants in the shared awe condition were significantly less likely to use affiliation and we words in their descriptions of the experience (affiliation: RR = 1.05, 95% CI[0.80, 0.95], $p = .003$; we words: RR = 0.87, 95% CI[0.77, 0.98], $p = .025$).

Regarding differences in psychological richness, participants who shared an awe-inspiring activity reported that their experience was significantly psychologically richer than those in the control condition ($t(288.56) = 4.02, p < .001, d = 0.47$), suggesting that participants found shared moments of awe more intriguing, unique, and interesting than those who did not share an awe-inspiring moment.

Additionally, different characteristics about the people with whom individuals share experiences could shape how connecting and meaningful certain experiences feel. For instance, insofar as people feel more connected to their significant others than to their friends, sharing an awe experience with one's friend other may draw greater shifts in connection relative to sharing awe with a significant other, in that connection levels with a significant other may already be high prior to an awe experience. To explore whether certain experience partner characteristics might moderate the impact of condition on connectedness or meaning, I tested separate interaction effects between condition and partner gender (connectedness: $b = 0.31, SE = 0.19, p = .11$; meaning: $b = 0.01, SE = 0.19, p = .95$), type of relationship with one's partner, and number of years known (connectedness: $b = 0.07, SE = 0.10, p = .47$; meaning: $b = -0.003, SE = 0.10, p =$

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.97). There were no significant interactions between condition and partner gender, relationship type, or number of years known when predicting connection or meaning.

Discussion

In Study 4, I built on Studies 1-3b by testing whether instructing participants to seek out and share an awe-inspiring experience would lead to increased social connection and meaningfulness, relative to a control condition in which participants sought out a shared activity of their choosing. The results of this study provided mixed support for my hypotheses. Although participants who sought out and shared an awe-inspiring experience with another person indicated that the experience was more meaningful compared to participants in the control condition, they did not indicate that they felt more connected to their experience partner. Thus, increased social connection could not mediate the relationship between shared awe and meaningfulness.

There are myriad reasons for why social connection did not differ between Study 4's two conditions. First, the control condition served as conservative comparison of shared awe's effects, in that participants were able to pick any sort of activity of their choosing to do with someone else. Although this control condition helped increase Study 4's ecological validity by not constraining participants to a specific type of shared activity, this nonrestrictive framework likely contributed to noise. Perhaps unsurprisingly, participants in the control condition shared activities that were highly positive: average happiness in the control condition was 4.22 ($SD = 0.87$) out of 5. Notably, happiness was equally high in the awe condition ($M = 4.29$, $SD = 0.81$; $t(288.91) = 0.65$, $p = .52$). Given that happiness is positively related to social connection (Mogilner, 2010), this may have contributed to similar levels of connectedness in both conditions.

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Additionally, connectedness ratings in both conditions were highly negatively skewed, with 94% of ratings being 5 or higher on a 7-point scale. Such a higher clustering of values is indicative of a ceiling effect for connectedness. As participants in both conditions were allowed to share an activity with someone of their choosing, it is likely that they picked people with whom they enjoy doing activities together and are already close. Indeed, at the time of the study, participants indicated knowing their experience partners for an average of nearly 11 years, and 98% of partners were reported as either a participants' friend, family member, or significant other. Thus, given these factors, it is likely that participants were already highly connected to their experience partners prior to the study, and the 7-point scale on which connectedness was measured contributes to the observed ceiling effect. Although this study improves on Studies 2-3a's comparatively low external validity by allowing participants to pick their own experience partners rather than constraining them to acquaintances, future work should consider matching participants who do not know each other in order to better test shared awe's effects on social connection.

Additionally, measuring social connection with methods beyond self-report measures (e.g., nonverbal behavior) could help mitigate possible ceiling effects. In Study 4's exploratory analyses, I examined whether participants' descriptions of their shared experiences might hold differences in linguistic markers of connectedness. There were no differences in prosocial worlds, but, unexpectedly, participants in the shared awe condition were less likely to use affiliation and we words in their descriptions. Although prior work has linked awe-inspiring experiences to increased use of language reflecting social connection (Goldy, Jones, & Piff, 2022), this research focused on in-the-moment expressions of Twitter users, rather than individuals' recalled moments of awe. Being instructed to recall and write about one's

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experience may have prompted participants to be more inwardly-focused than if they had freely described their experience in an unsolicited manner, as one may do on Twitter. Further, insofar as words can serve as a window into people's thoughts and feelings, if participants were indeed less affiliative and collectively focused—as suggested by their word use—this could contribute to the non-significant difference in connectedness captured by self-report measures. I discuss the importance of using methods beyond self-report to measure connectedness in more detail in the general discussion, given its relevance to Studies 2-4.

General Discussion

Shared experiences are a vital component of life. As humans, we strive to interact and connect with others to satisfy our fundamental drive to be social (Baumeister & Leary, 1995; Cacioppo & Cacioppo, 2014). Thus, much of daily life is filled with interactions with others. Just as the types of people who may be a part of one's daily experiences can vary, so too can the range of experiences one can share with others. Given the central role that shared experiences serve as opportunities for fostering social connection—a core component of well-being—it is important to understand which kinds of shared experiences engender greater social connection than others. In the wide spectrum of moments one can co-experience with someone else, are there certain types of shared experience that are especially beneficial?

Across five studies with varying methodologies and samples, I tested whether shared awe-inspiring experiences elicited greater social connection and meaning than other types of shared experiences. In Study 1, I used a novel data source—reviews of Airbnb Experiences—to establish a connection between shared awe, social connection, and meaning in naturalistic examples of shared experiences. Awe conveyed in reviews of shared Airbnb Experiences was related to increased expressions of social connection and meaning. Importantly, this relationship

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held when controlling for different Experience-level factors (e.g., cost, type, location) and expressions of general positive emotion, indicating a distinct relationship between awe from a shared experience and expressions of connection and meaningfulness.

In Study 2, I demonstrated how recalled experiences of shared awe with an acquaintance were associated with greater ratings of social connection and meaningfulness relative to shared amusing and ordinary experiences. Moreover, social connection mediated the relationship between shared awe and increased meaningfulness, highlighting how shared awe-inspiring experiences increase connection to one's experience partner and, in turn, make the experience feel more meaningful.

In Studies 3a and 3b, I examined whether anticipated moments of shared awe with an unfamiliar other would elicit similar impacts on social connection and meaningfulness as observed in Studies 1 and 2, relative to anticipated shared amusing and ordinary experiences. Compared to anticipated shared ordinary experiences, participants who envisioned watching an awe-inspiring experience with an acquaintance indicated that they would feel closer to their acquaintance and that the experience would be more meaningful. Interestingly, shared amusing and shared awe-inspiring experiences evoked statistically similar increases in connection, whereas shared awe evoked the highest levels of meaningfulness.

Finally, in Study 4, I tested whether seeking out and engaging in co-experiences of awe, compared to engaging in shared experiences of one's choosing, subsequently drove reports of connection and meaning derived from the experience. Participants who shared an awe-inspiring experience reported the experience as more meaningful than participants who shared a recreational experience of their choosing. However, although participants in the awe condition reported feeling highly connected to their experience partner, social connection was not

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significantly greater than the control condition. Similarly, social connection did not mediate the relationship between shared awe and increased meaningfulness.

This work provides mixed support for my hypotheses regarding shared awe, social connection, and meaning. Across all five studies, shared awe was associated with heightened meaningfulness, but there was varying evidence for shared awe's impacts on social connection. Reviews of Airbnb experiences that conveyed awe and recalled shared awe experiences were associated with increased social connection, accounting for positive affect. Yet, although envisioning sharing an awe-inspiring moment with an acquaintance evoked greater social connection than a neutrally-valenced comparison condition, these values were not significantly greater than those elicited by envisioning sharing an amusing experience.

Why might shared awe experiences be more reliable drivers of meaningfulness than social connection? Awe is described as an epistemic emotion, in that it involves the salience of a knowledge gap, prompted by an unexpected, novel experience, that evokes a need to cognitively accommodate one's experience in order to make sense of things (Keltner & Haidt, 2003, Valdesolo, Shtulman, & Baron, 2017). Indeed, empirical research links awe to increased uncertainty (Valdesolo & Graham, 2014), awareness of knowledge gaps (McPhetres, 2019), and curiosity (Anderson, Dixson, Monroy, & Keltner, 2020), each of which can be instrumental in meaning-making. Relatedly, the Meaning Maintenance Model posits that disruptions to predictable and expected associations in the world, especially the links between the self and its surroundings, prompting compensatory meaning making in the form of reaffirmation or the creation of new frameworks meaning (Heine et al., 2006). Thus, meaning-making may be a core component of the awe experience. Whether awe's impacts on meaning are indeed stronger and

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more reliable than those on social connection will be an important avenue to consider in future research.

The present work's inconsistent effects on social connection may also be the result of issues regarding study design and social connection's measurement across the studies. Regarding study design issues, in Studies 3a and 3b, participants were instructed to imagine sharing an experience with a recent acquaintance in order to mitigate possible ceiling effects for social connection that could arise if participants had thought about sharing an experience with someone with whom they are already close. However, individuals tend to underestimate how much experience partners like them and enjoy their company (Boothby et al., 2018), which could likely reduce estimated feelings of social connection when imagining sharing an experience with an acquaintance. I sought to simultaneously address this problem and increase ecological validity by instructing participants to actually seek out and share an experience with someone of their choosing. Yet, this design likely contributed to Study 3's observed ceiling effects for social connection, in that participants shared experiences with people with whom they were already quite close.

Issues with measurement may have also contributed to the mixed social connection results. Despite boasting a set of diverse methodologies and varying samples, this collection of studies is limited in its largely singular use of self-reported measures for assessing social connection, as well as meaning. Consistent effects with validated and face-valid scales can lend credence to a phenomena's existence, but triangulating in on an effect with varying, but related, measurements would strengthen inferences, provide greater methodological rigor, and present alternatives to self-report measures that may be prone to ceiling effects. In particular, there are multiple way of assessing components of social connection that extend beyond self-report.

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Cooperative behavior during economic games or teambuilding exercises such as the Lost at Sea problem—in which participants must work together to rank items in order of their importance to survival during a hypothetical stranding at sea scenario—(Nemiroff & Pasmore, 2001) can be indicative of social cohesion (Callaway & Esser, 1984). Connection can also be approximated via individuals' nonverbal and verbal behavior during interactions. Maintenance of eye contact, body orientation toward each other, touch, use of laughter and humor, expressiveness (e.g., use of gestures, facial expressions, fluctuations in vocal pitch) can all convey motivations for affiliation and greater closeness (Schrage, Maxwell, Impett, Keltner, & MacDonald, 2020). Still, care should be taken in using behavioral measures to supplement self-report ones, as the two can be weakly related due to poor reliability of behavioral measures (Dang, King, & Inzlicht, 2020).

Nevertheless, this research provides an unprecedented examination of shared awe and its relationships with social connection and meaningfulness. Prior work on awe and its effects has predominantly focused on awe experienced in isolation (e.g., watching an awe-inspiring video in a laboratory setting: Bai et al., 2017, Gordon et al., 2017; Stellar et al., 2018; Piff et al., 2015; Valdesolo & Graham, 2014). Similarly, research on the benefits of shared experiences has largely focused on experiences that are generally positive without disentangling the different types of positive experiences can have and their emotional context. Guided by work differentiating distinct positive emotions and their different appraisals and consequences (e.g., Campos et al., 2013; Frederickson, 2001; Shiota et al., 2017), the present research contributes to and expands the literature on both shared experiences and awe, suggesting that shared awe-inspiring moments might be especially potent sources of meaning relative to other shared experiences.

Limitations and Future Directions

The present findings should be interpreted with certain caveats in mind and with suggested directions for future research.

Causality and alternative mediation pathways. It is difficult to determine with certainty whether a causal relationship exists between awe, social connection, and meaningfulness. Study 1 was a cross-sectional examination of individuals' reviews of shared experiences, limiting temporal precedent. Study 2 relied on participants' ability to recall emotions and feelings of connection and meaning of experiences in the past. Studies 3a and 3b relied on participants' anticipated emotions, connection, and meaning. Furthermore, although Study 4 had participants report on a shared experience that occurred within a day or two in the past, it still relied on recalled emotions and thoughts. Finally, Studies 2-4 asked participants to indicate feelings of connection and meaningfulness at roughly the same time on the same survey. Thus, despite best efforts to triangulate in on shared awe's outcomes with diverse methodologies and much conceptual and empirical work linking awe to social connection and social connection to awe, more work is needed to rigorously establish a causal link between these constructs.

This uncertainty regarding the causal pathway of shared awe, social connection, and meaningfulness is also highlighted in the mixed evidence for the reverse mediations in Studies 2-3b. In these studies, the indirect effect of meaningfulness on the relationship between shared awe and social connection was significant, suggesting that shared awe's impacts on social connection are in part driven by increased meaningfulness. Some evidence exists for a bidirectional path between meaning and social connection. Stavrova and Luhmann (2015) found that meaning in life measured on a baseline survey was positively associated with markers of social connection measured years later (e.g., getting married, joining volunteer associations). In another study

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using longitudinal data, connection with one's community, but not one's family or spouse, was associated with meaning in life measured ten years later, whereas meaning in life was positively associated with all three measures of social connection (e.g., connection to one's community, family, and spouse; Stavrova & Luhmann, 2015). These results cohere with the present work's dual significant indirect effects. However, as mentioned in Study 2's discussion, reverse mediation paths should be interpreted with caution when one of the variables is measured less reliably than the other (e.g., meaningfulness was measured with a single item vs. connection was measured with 3 items), which can lead to spurious indirect effects (Lemmer & Gollwitzer, 2017). To strengthen causal claims and provide stronger tests of each mediation path, experimental treatments of shared awe should strive to better establish temporal precedent for awe leading to increased social connection and, in turn, meaningfulness, and vice versa, in comparative studies. For example, after first assigning participants to share an awe-inspiring experience together in-person, researchers could then measure social connection as it unfolds during the experience via verbal and nonverbal mimicry, after which they could have participants report on how meaningful the experience felt.

Negative shared experiences and awe. Another limitation to consider is that this program of research focuses on positive emotions and, in turn, shared experiences that are positively valenced and their interpersonal and personal benefits. However, shared experiences can, of course, include a wide spectrum of events and emotions beyond overtly positive ones, with opportunities for enhancing connection. For instance, Durkheim (1912/1995) posited that shared painful experiences can act as sources of group cohesion and solidarity. Empirical work has supported this theory. A study of extreme group rituals in Mauritius—in which ritual performers underwent multiple body piercings and used hooks in their skin to drag carts over

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mountain terrain—found that the ritual evoked increased donations from ritual observers and heightened social identity (i.e., Mauritian) among both ritual performers and observers (Xygalatas et al., 2013). In related work, researchers found that undergoing painful tasks with others (e.g., insert one's hands into ice water, eating hot chili peppers) promoted connection in the form of increased feelings of bonding and greater cooperation during an economic game (Bastian, Jetten, & Ferris, 2014). Large-scale, collectively experience negative events can also promote connection. For example, in the wake of the 2008 Sichuan earthquake, residential devastation was associated with increase cooperation and willingness to volunteer among residents (Rao et al., 2011). Insofar as negative events can be powerful sources of bonding and cooperation in the wake of tragedy, future examinations of shared awe's impacts on social connection should consider a wider variety of shared experiences for comparison conditions.

Similarly, the present work solely highlights positive shared experiences of awe. Just as shared experiences can feature negative events and emotions, awe-inspiring moments are not always overtly positive ones. Emerging work on awe demonstrates the existence of threat-based awe. Stimuli that evoke a sense of vastness, need for accommodation, and appraisals of threat (e.g., tornados, terrorist attacks, wrathful gods) elicit awe, in addition to fear, uncertainty, and sympathetic autonomic arousal (Gordon et al., 2017). Although threat-based awe is related to decreased well-being (e.g., state measures of happiness, life satisfaction; Gordon et al., 2016), it can still increase prosociality (e.g., generosity in an economic game; Piff et al., 2015). Although this work suggests that threatening awe-inspiring events can continue engender concern for others, it is unknown whether this effect would arise in co-experiences of negative awe. Given the present research's focus on positive awe, future work on shared awe should consider its

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threat-based variants and whether they might differentially impact social connection and other components of well-being.

General connection versus connection to experience partners. Given that individually-experienced awe is associated with increased social connection in general, and that, in its treatment of awe, the present research investigates only shared experiences of awe, it is not possible to ascertain whether shared awe's impacts on connection to one's experience partners is not due to an increase in general connectedness. Prior work demonstrates that awe can drive feelings of connection and closeness to others in a general, global sense. Shiota and colleagues (2007) found that experimentally inducing awe—in which participants looked at a 25 feet long *Tyrannosaurus rex* skeleton—led participants to define themselves as members of large, universal groups (e.g., “a person”; “an inhabitant of earth”), suggesting a broad sense of connection. Research on awe's effects on prosocial behavior indicates that awe can increase generosity and helping behavior towards strangers (Piff et al., 2015). As the boundaries of awe's self-transcendent and other-orienting qualities remain unclear (Stellar et al., 2017), it is possible that increases in social connection toward specific targets may simply be the result of a heightened general sense of connectedness. Future studies of shared awe that assess closeness toward others in general, or targets other than one's experience partner, would help elucidate this point and identify possible limits, if there are any, to awe's effects. Although awe may appear to boost connectedness in general, there may be a yet unexplored continuum of connection, depending on the target. For instance, relative to comparison conditions, shared awe may increase connection to other people in general (e.g., strangers in the vicinity of one's shared experience or broader social identities), but individuals may feel *especially* connected to their

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experience partner, by virtue of the shared reality that they may feel (Higgins, Rossignac-Milon, Echterhoff, 2021).

Collective shared experiences. Another limitation of the present research is that it examines only individuals' shared experiences in isolation. In other words, it does not assess dyads' (or larger groups') experiences and situate the outcomes of shared experiences within a dyadic context. Given the large body of work from relationship science on the relevance of numerous factors (e.g., gender, personality) that can play a role in interpersonal feelings and behavior (e.g., Kenny, Kashy, and Cook, 2006), it will be important to consider in future endeavors how such factors may contribute to the individual and social benefits of shared awe. For example, extensions of the present work could examine the extent to which dyad members' sense of shared reality with each other—the perceived commonality of feelings and beliefs (Higgins, Rossignac-Milon, Echterhoff, 2021)—prior to a shared awe experience may shape subsequent interpersonal outcomes, insofar as shared reality can promote closeness (Rossignac-Milon, Bolger, Zee, Boothby, & Higgins, 2021). Similarly, increased shared reality—a key predictor of connection (Higgins, Rossignac-Milon, Echterhoff, 2021)—might be another outcome of shared awe-inspiring moments.

Additionally, future examinations of shared awe should consider large-scale, collectively awe-inspiring events and their role as potentially powerful sources of wide-spread connection and meaning. Emerging work establishes a relationship between awe experienced on a massive scale and components of social connection. Guided by scientific treatments of awe as an experience that helps fold individuals into collectives, my colleagues and I examined millions of tweets surrounding a collectively awe-inspiring event: the 2017 total solar eclipse. Relative to individuals residing outside the eclipse's path, individuals inside it exhibited more awe and

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expressed less self-focused and more prosocial, affiliative, humble, and collective language. Further, individuals who exhibited elevated awe surrounding the eclipse used more prosocial, affiliative, humble, and collective language relative to their pre-eclipse levels and users exhibiting less awe. Together, these findings suggest that a shared awe experience on a huge scale can promote social tendencies that help bind people to others and their groups (Goldy et al., 2022). Multiple interesting research questions regarding shared awe can stem from this work. For instance, what might be the cascading effects on social interactions and connection during and following a collectively awe-inspiring event? Do individuals who have collectively experienced awe seek out each other and find it easier to bind to one another following the event? How might collective experiences of awe fare against other collective events that evoke different positive emotions? There are ample opportunities for promising future avenues of research in this collective context.

Additional self-transcendent emotions. Future considerations of shared awe should also examine its effects alongside other self-transcendent emotions. Stellar and colleagues (2017) outlined gratitude and compassion, in addition to awe, as emotions that shift focus away from the self toward others. Although gratitude and compassion can be considered under the same overarching self-transcendent emotion category as awe, their unique appraisals and effects may proffer different impacts on social connection and overall well-being when shared. Compassion elicits concern for others in need and compels individuals to help. When people recognize that they have benefited from the kindness of others, they feel gratitude, prompting patterns of reciprocation (Stellar et al., 2017). Thus, gratitude and compassion can promote social connection, warranting a closer look at whether shared instances of these emotions might differ from those of shared awe. In comparison to awe, which can be elicited from nonhuman, abstract

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stimuli, contexts that engender compassion or gratitude typically, if not always, involve another person as the primary elicitor and as the target of one's concern or reciprocal kindness. Given these elements, it is unclear whether awe would yield different levels of social connection relative to gratitude and kindness. Future experimental work comparing shared awe to shared gratitude or compassion will need to consider how gratitude and compassion typically arise from human stimuli when constructing manipulations. For instance, a shared awe condition in which two participants feel awe in response to another person (e.g., an incredible feat of athletic prowess, a moving speech) would serve as a closer comparison to shared gratitude or compassion than shared awe elicited from a nonhuman stimulus (e.g., nature). Given their inherently socially connecting properties, shared experiences of distinct self-transcendent emotions may not differ from each other, but instead represent a host of shared experiences that are especially connecting.

Shared versus solitary awe experiences. Although the scope of the present research is focused on shared experiences and how they can differ from each other in the emotions they elicit and their subsequent benefits, this work's novel examination of shared awe poses the question of whether shared awe differs from awe experienced alone. The present collection of studies does not examine this question, but research on positive shared experiences indicates that shared experiences are more emotionally intense than solitary ones (Kahneman et al., 2004; Jaremka et al., 2011; Reis et al., 2016; Walker, 2010). Relatedly, in one of the only known examinations of awe experienced with others and social connection, Anderson and colleagues (2018) found that awe felt during a group white-water rafting trip predicted social connection—suggesting that shared awe can still evoke similar outcomes as solitary awe. Future work is indeed needed to in order to examine whether shared awe evokes different responses than awe

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experienced alone, but the present research is agnostic to the importance of such a question. In the event that shared awe evokes the same, or even less, social connection and meaning than solitary awe, shared experiences of awe would still be important experiences to consider. Much of human life is spent with others, partaking in shared experiences of one's (or each other's) choosing. Here, rather than elucidating whether it is better to partake in an awe-inspiring activity alone versus with others, the present work seeks to shed light on the question of what are the types of shared experiences worth having.

Virtually shared experiences. Additionally, there are ample future avenues to pursue concerning how shared experiences of awe may unfold in virtual contexts. New technologies like virtual reality (VR) enable individuals to immerse themselves in, and interact with, awe-inspiring environments from the comfort of their homes. Indeed, mounting evidence establishes VR as a reliable and powerful source of awe (Chirico, Ferrise, Cordella, & Gaggioli, 2018; Quesnel & Rieke, 2018). The proliferation of VR as a medium for entertainment and social interactions presents great potential for it as a potent source of shared awe experiences. Future treatments of shared awe via VR could examine not only self-reported social connection, but also nonverbal and verbal displays of connection as they unfold in virtual environments and are communicated through virtual avatars. As the COVID-19 pandemic has made abundantly clear, virtual interactions with others can be an important source of connection, especially when other methods are not feasible.

Studying shared experiences and social connection during a pandemic. The COVID-19 pandemic undoubtedly had a major impact on people's ability to physically congregate and interact with others, as individuals socially isolated themselves and restrictions on social gatherings were enacted to mitigate spread of the virus. These factors are important to consider

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in the evaluation of research centered around shared experiences and social connection. First, it is important to note that the pandemic shaped the scope of my dissertation. I had initially planned to conduct a laboratory-based experiment in which pairs of unacquainted participants would undergo a shared awe-inspiring (or control) experience together. This study design would have enabled a well-controlled examination of shared awe's effects, but, given the pandemic, it was not feasible nor ethical to ask individuals to gather in an indoor space with strangers. Thus, Study 4's present design was implemented to circumvent these issues and boost external validity.

Second, although studies 1-3b use data collected prior to the onset of the pandemic, Study 4 was conducted in March of 2022—roughly 2 years after pandemic's onset in the U.S.

Restrictions regarding mask wearing and social distancing had been partially or completely lifted in many parts of the U.S. by March 2022, but it is possible that the pandemic's impact on individuals' ability to share time with one another still lingered, potentially influencing Study 4's results. For instance, to the extent that participants had not had many opportunities to plan and seek out an activity centered around sharing it with their experience partner prior to participating in Study 4, their experiences may have been especially socially connecting, potentially contributing to the connectedness' ceiling effects. As the memories of the pandemic's darkest days hopefully continue to wane, future work on shared experiences of awe should consider how the time course of the pandemic's impact may findings.

Finally, insofar as the pandemic greatly limited people's ability to gather indoors with others, sharing moments of awe outdoors may have been an especially beneficial experience. By experiencing awe outside with others, individuals could reap not only the benefits of awe, but also the social, mental, and physical health benefits of nature (e.g., Goldy & Piff, 2020), engaging in perhaps one of the safest ways to socially gather during the pandemic. Such factors

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could contribute to shared awe in nature possibly being one of the most beneficial ways to experience awe, in that they may be especially connecting, psychologically rich, and meaningful—an important line of inquiry to consider in future work.

Conclusion

With so much of life spent in the company of others, shared experiences constitute a vital component of social life. In the panoply of activities that individuals can choose to seek out with one another, what are the types of shared experiences worth having? As my findings suggest, shared experiences of awe could be especially worth pursuing, in that they bring individuals closer together and serve as founts of meaning.

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SHARED AWE, CONNECTION, AND MEANING

Table 1

Mean Awe and Positivity for Each Airbnb Experience Category

	<i>n</i>	Mean Awe (SD)	Mean Positivity (SD)
Art and culture	1741	1.43 (0.66)	2.44 (0.74)
Entertainment	204	1.52 (0.76)	2.44 (0.80)
Food and drink	160	1.43 (0.66)	2.28 (0.61)
Nature and outdoors	227	1.90 (0.97)	2.72 (0.70)
Sports	901	1.58 (0.77)	2.64 (0.75)
Transportation activities	559	1.71 (0.95)	2.54 (0.76)
Wellness	131	1.66 (0.85)	2.50 (0.79)

SHARED AWE, CONNECTION, AND MEANING

Table 2
Regression Results of Social Connection in Study 1

<i>Predictor</i>	<i>b</i>	95% CI [LL, UL]
(Intercept)	2.33***	[2.82, 3.65]
Awe	0.06**	[0.01, 0.11]
Gen. positivity	0.34***	[0.27, 0.41]
Exp. category		
Transportation	-0.002	[-0.22, 0.21]
Nature	-0.06	[-0.36, 0.25]
Art & Culture	0.16	[-0.06, 0.38]
Entertainment	0.20	[-0.14, 0.55]
Food & Drink	0.03	[-0.29, 0.35]
Wellness	-0.03	[-0.42, 0.36]
City		
Miami	0.15	[-0.03, 0.34]
NYC	0.04	[-0.15, 0.25]
Price	0.0001	[0.00, 0.00]
Duration	0.0001	[0.00, 0.00]
Group size	-0.01	[-0.04, 0.02]

Note. Experience category and city variables were dummy coded (Experience category reference group is Sports; city reference category is Los Angeles). * indicates $p < .05$; ** indicates $p < .01$; *** indicates $p < .001$.

SHARED AWE, CONNECTION, AND MEANING

Table 3
Regression Results of Meaning in Study 1

<i>Predictor</i>	<i>b</i>	95% CI [LL, UL]
(Intercept)	0.873*	[0.77, 0.99]
Awe	1.05***	[1.02, 1.07]
Gen. positivity	1.08***	[1.06, 1.10]
Exp. category		
Transportation	1.08	[0.95, 1.23]
Nature	1.17*	[1.03, 1.33]
Art & Culture	1.06	[0.96, 1.16]
Entertainment	1.19**	[1.05, 1.35]
Food & Drink	1.04	[0.93, 1.16]
Wellness	1.21**	[1.07, 1.37]
City		
Miami	1.06	[0.97, 1.15]
NYC	1.02	[0.93, 1.11]
Price	1.00***	[1.00, 1.00]
Duration	1.00	[1.00, 1.00]
Group size	1.01	[1.00, 1.03]

Note. Results have been exponentiated to back-transform initial Gamma log-link model output. Experience category and city variables were dummy coded (Experience category reference group is Sports; city reference category is Los Angeles). * indicates $p < .05$; ** indicates $p < .01$; *** indicates $p < .001$.

Table 4
Mean Scores for Self-Reported Emotions in Studies 2-3b (SDs in Parentheses)

	Study 2			Study 3a			Study 3b		
	Awe (N= 259)	Amusement (N= 258)	Neutral (N= 258)	Awe (N= 116)	Amusement (N= 110)	Neutral (N= 114)	Awe (N= 269)	Amusement (N= 268)	Neutral (N= 265)
Amusement	3.01 (1.38)	4.03 (1.02)	2.46 (1.24)	3.43 (1.26)	3.93 (1.09)	2.66 (1.17)	2.91 (1.34)	3.87 (1.29)	2.34 (1.16)
Anger	1.47 (0.949)	1.21 (0.632)	1.31 (0.730)	1.34 (0.757)	1.19 (0.502)	1.19 (0.614)	1.12 (0.505)	1.16 (0.553)	1.08 (0.392)
Anxiety	2.09 (1.25)	1.62 (0.948)	1.93 (1.08)	1.88 (1.12)	1.27 (0.683)	1.37 (0.841)	1.42 (0.796)	1.21 (0.570)	1.26 (0.666)
Awe	4.10 (1.02)	2.13 (1.25)	1.90 (1.18)	3.96 (1.18)	2.33 (1.17)	2.27 (1.18)	3.98 (1.20)	2.13 (1.15)	2.25 (1.18)
Disgust	1.30 (0.798)	1.23 (0.643)	1.22 (0.632)	1.45 (0.804)	1.34 (0.705)	1.17 (0.555)	1.16 (0.532)	1.35 (0.800)	1.10 (0.486)
Fear	1.89 (1.14)	1.46 (0.842)	1.45 (0.872)	1.83 (1.03)	1.10 (0.326)	1.20 (0.652)	1.35 (0.737)	1.08 (0.365)	1.06 (0.304)
Happiness	3.72 (1.32)	3.70 (1.14)	2.93 (1.26)	3.56 (1.26)	3.72 (1.03)	2.33 (1.08)	3.49 (1.15)	3.41 (1.34)	2.57 (1.14)
Pride	2.53 (1.39)	1.90 (1.20)	1.88 (1.14)	2.12 (1.26)	1.36 (0.722)	1.63 (0.923)	2.15 (1.24)	1.50 (0.824)	1.85 (1.09)
Sadness	1.82 (1.20)	1.31 (0.769)	1.43 (0.951)	1.78 (1.03)	1.16 (0.521)	1.19 (0.552)	1.43 (0.799)	1.11 (0.472)	1.09 (0.452)
Surprise	3.46 (1.26)	3.10 (1.25)	2.29 (1.20)	2.73 (1.39)	2.78 (1.16)	2.26 (1.23)	2.44 (1.25)	2.69 (1.23)	1.93 (1.02)

Table 5

Mean Scores for Self-Reported Emotions in Study 4 (SDs in Parentheses)

Study 4		
	Awe (N= 139)	Control (N= 152)
Amusement	3.22 (1.18)	3.41 (1.14)
Anger	1.09 (0.408)	1.07 (0.339)
Anxiety	1.39 (0.749)	1.55 (0.934)
Awe	3.50 (1.23)	2.38 (1.26)
Compassion	3.14 (1.18)	2.91 (1.28)
Disgust	1.06 (0.263)	1.10 (0.396)
Fear	1.19 (0.475)	1.18 (0.545)
Gratitude	4.13 (0.916)	3.84 (1.06)
Happiness	4.29 (0.810)	4.22 (0.870)
Pride	2.80 (1.20)	2.71 (1.23)
Sadness	1.36 (0.772)	1.35 (0.721)
Surprise	2.19 (1.15)	2.01 (1.14)

SHARED AWE, CONNECTION, AND MEANING

Figure 1

Connectedness by Condition in Study 2 (Bars represent 95% Confidence Intervals)

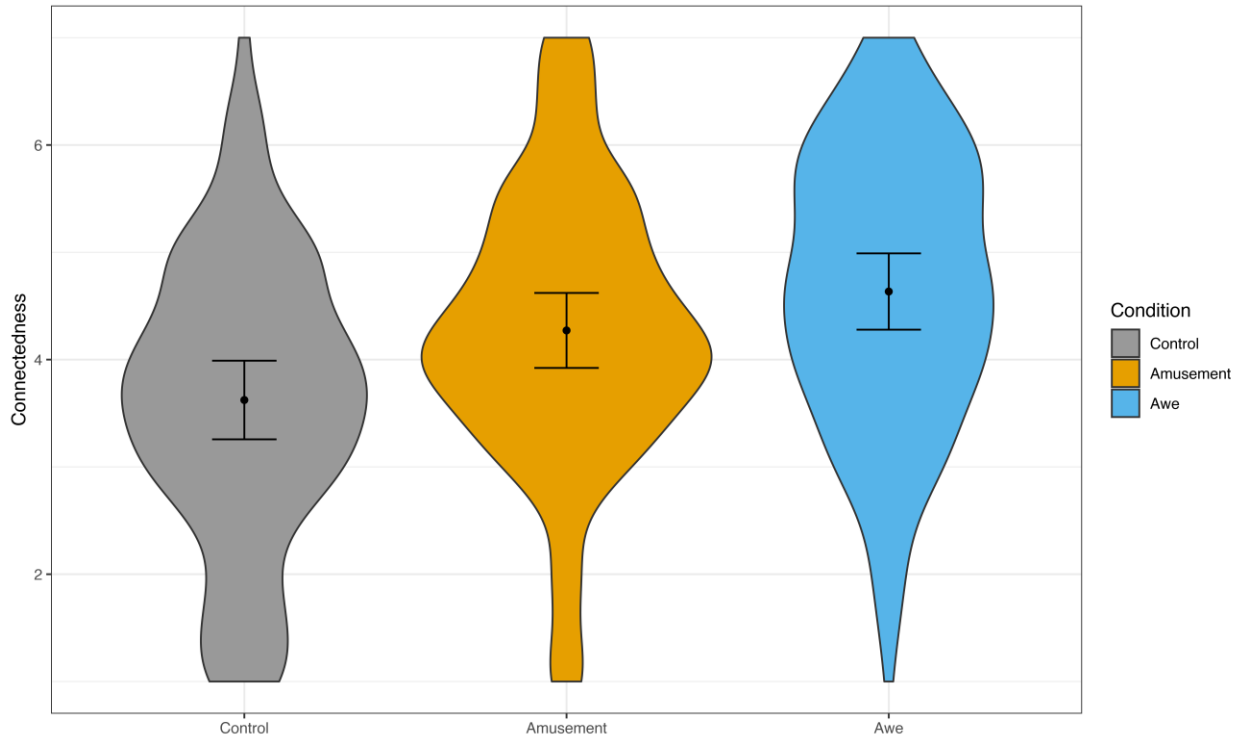


Figure 2

Meaningfulness by Condition in Study 2 (Bars represent 95% Confidence Intervals)

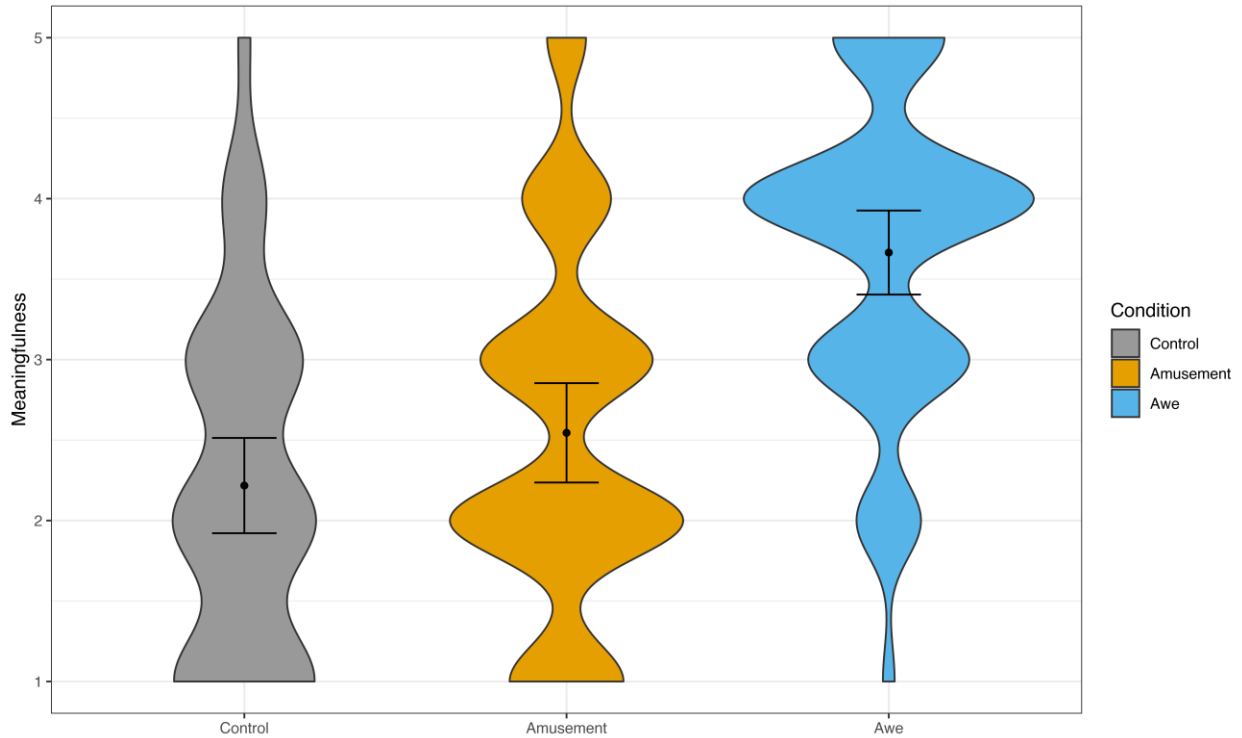


Figure 3

Connectedness by Condition in Study 3a (Bars represent 95% Confidence Intervals)

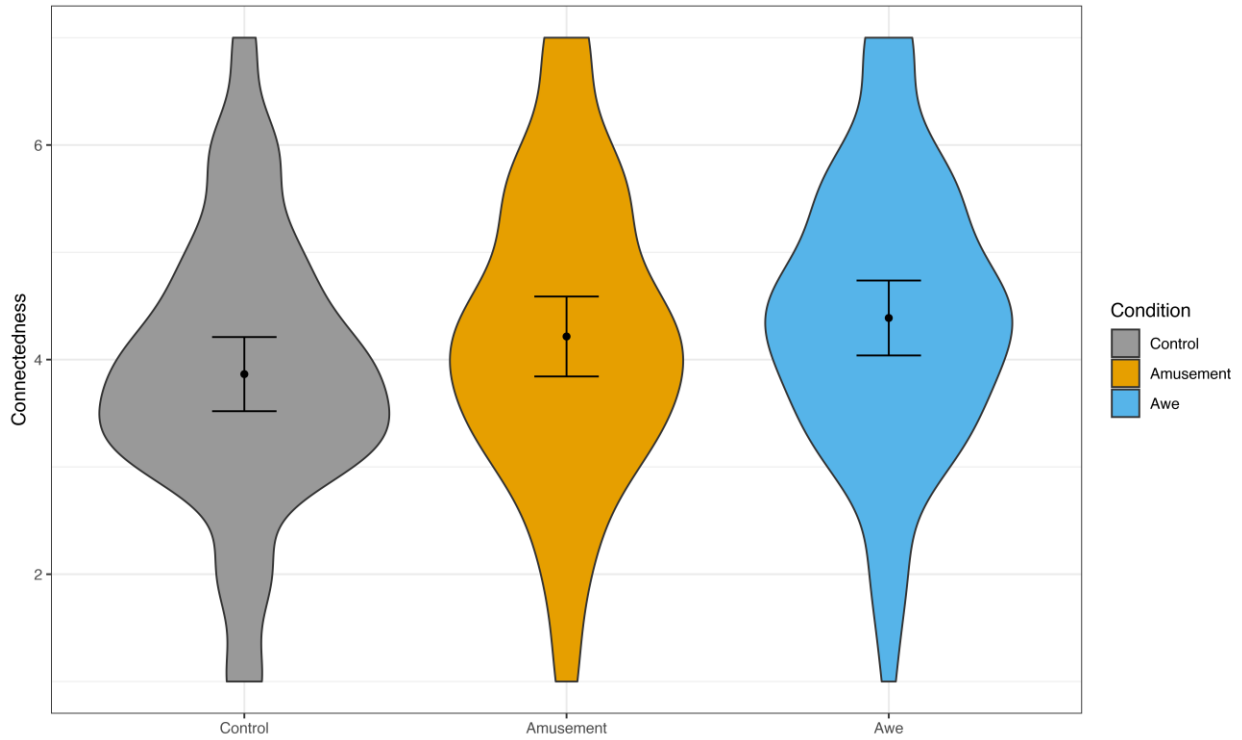
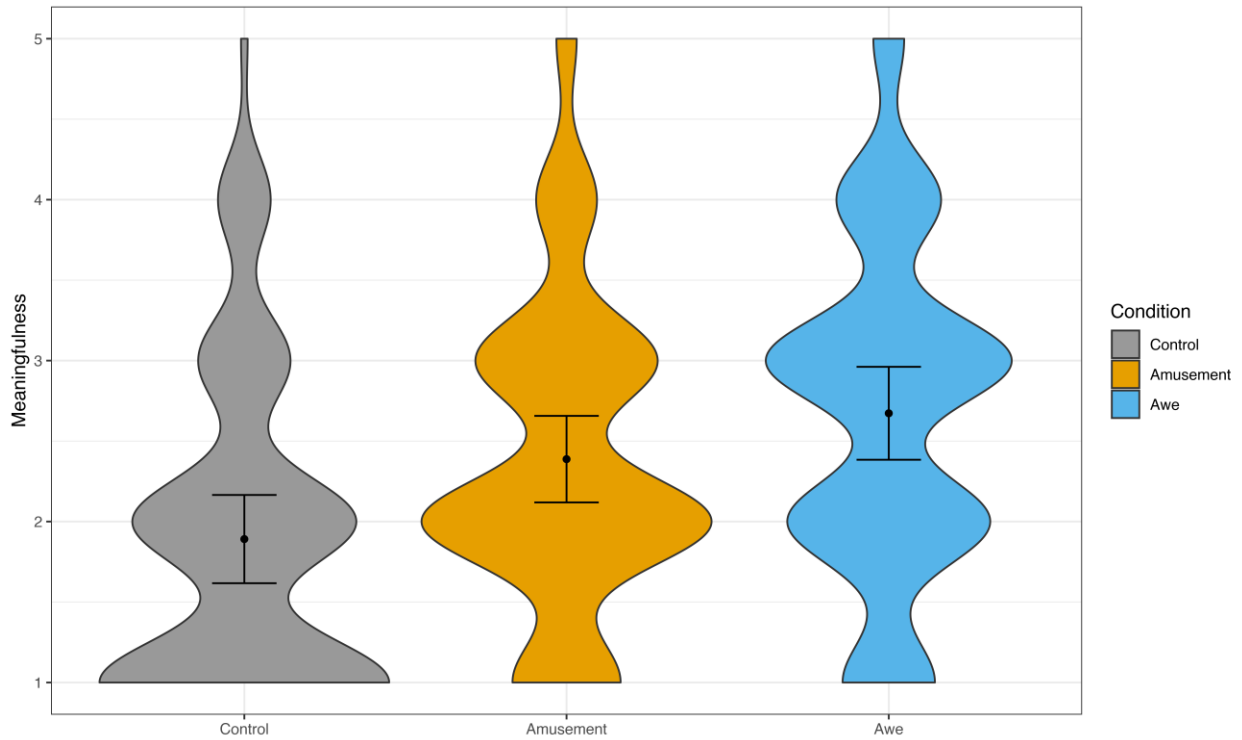


Figure 3

Meaningfulness by Condition in Study 3a (Bars represent 95% Confidence Intervals)



SHARED AWE, CONNECTION, AND MEANING

Figure 5

Connectedness by Condition in Study 3b (Bars represent 95% Confidence Intervals)

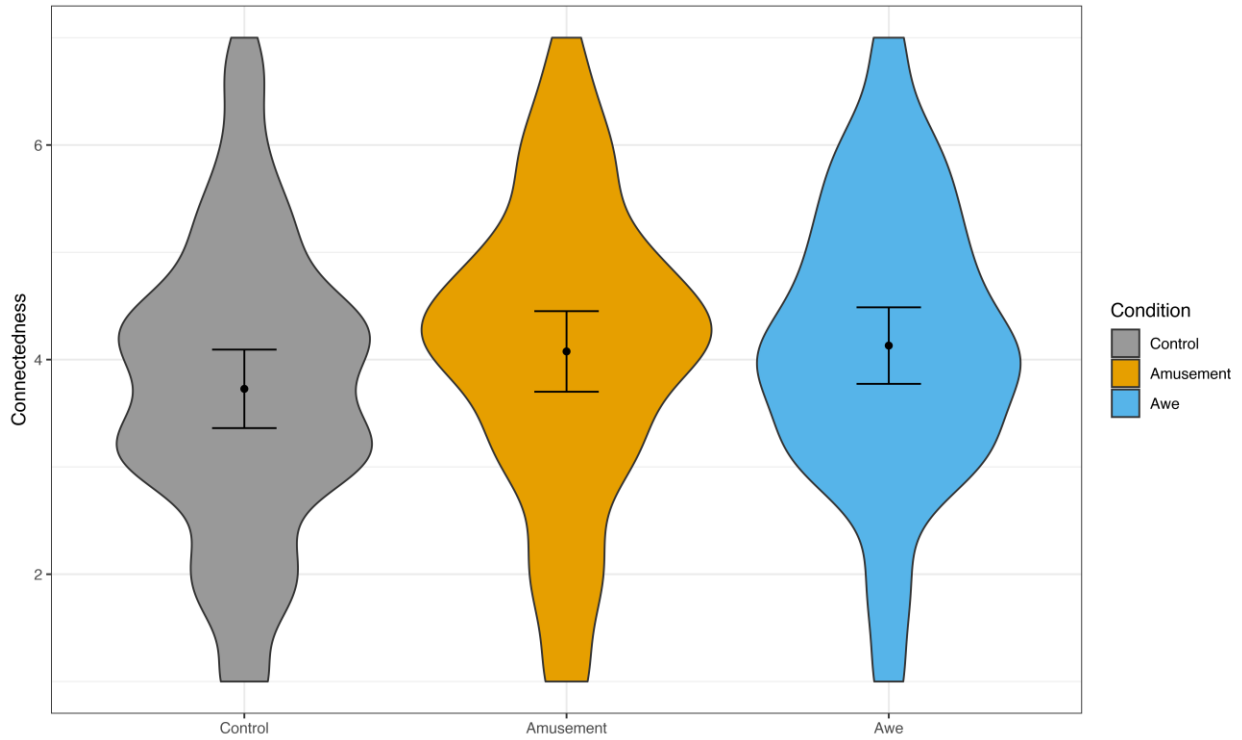
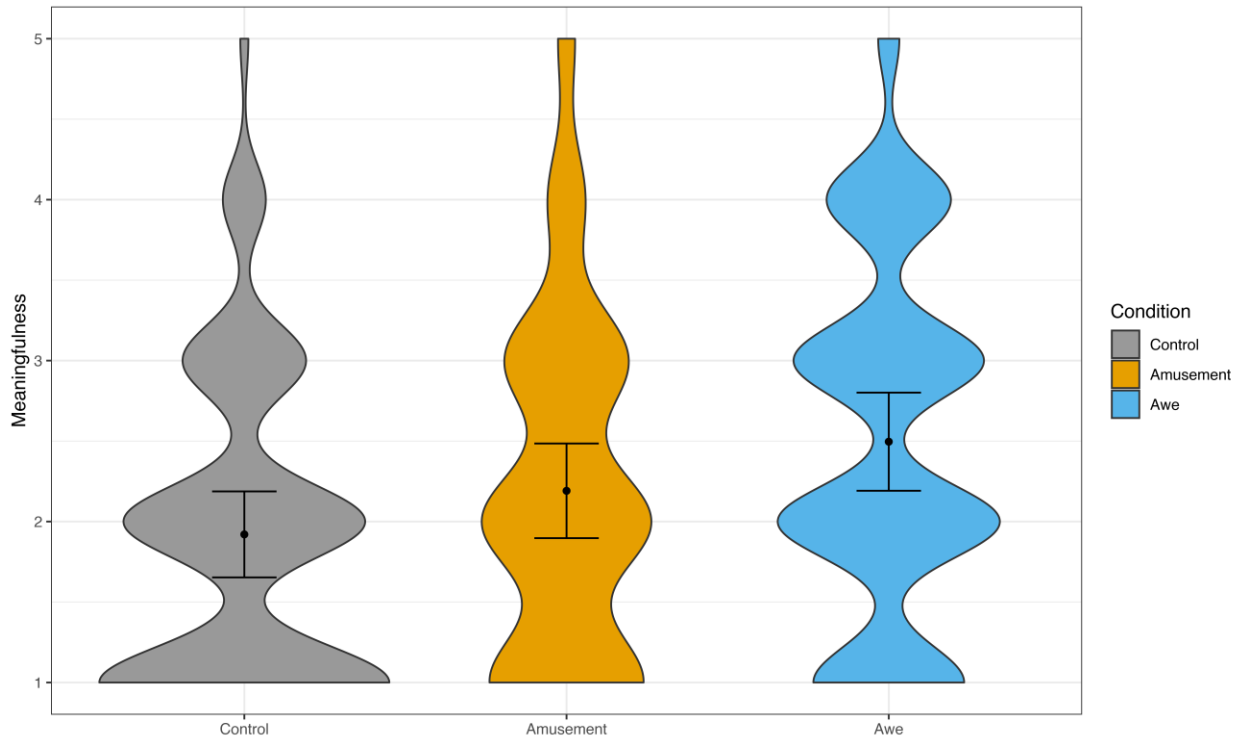


Figure 6

Meaningfulness by Condition in Study 3b (Bars represent 95% Confidence Intervals)



SHARED AWE, CONNECTION, AND MEANING

Figure 7

Connectedness by Condition in Study 4 (Bars represent 95% Confidence Intervals)

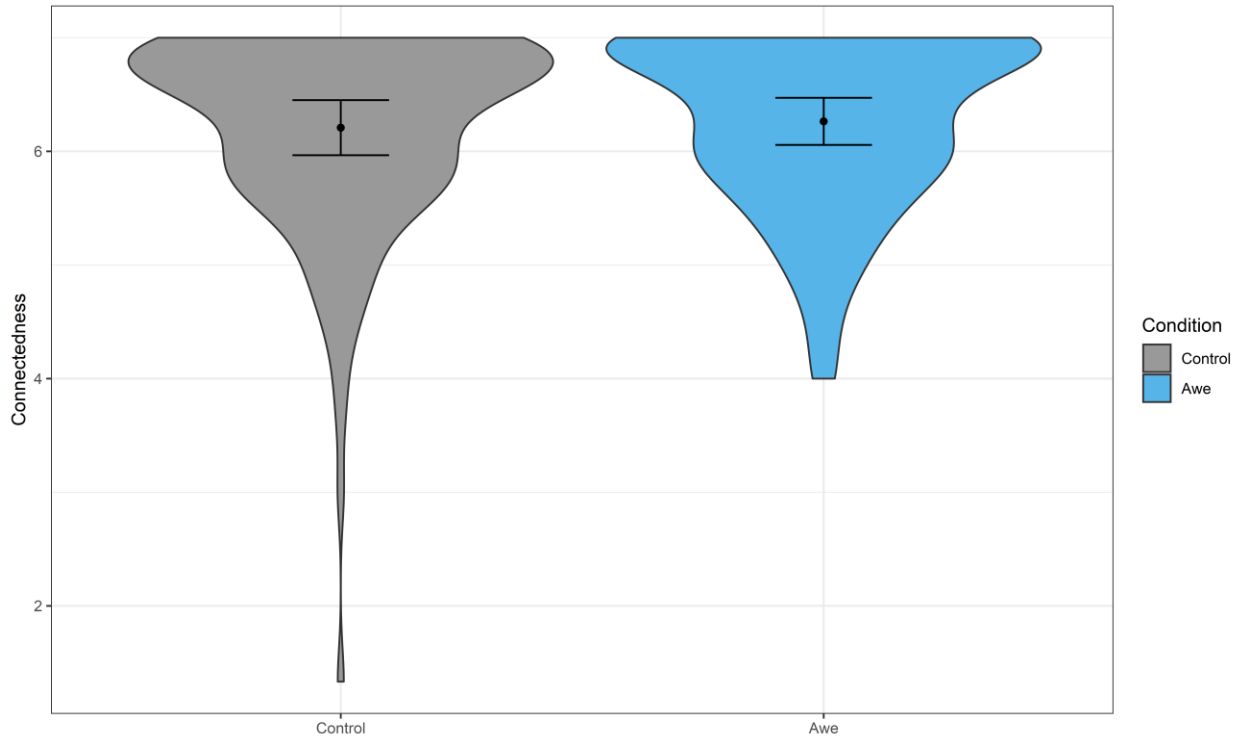
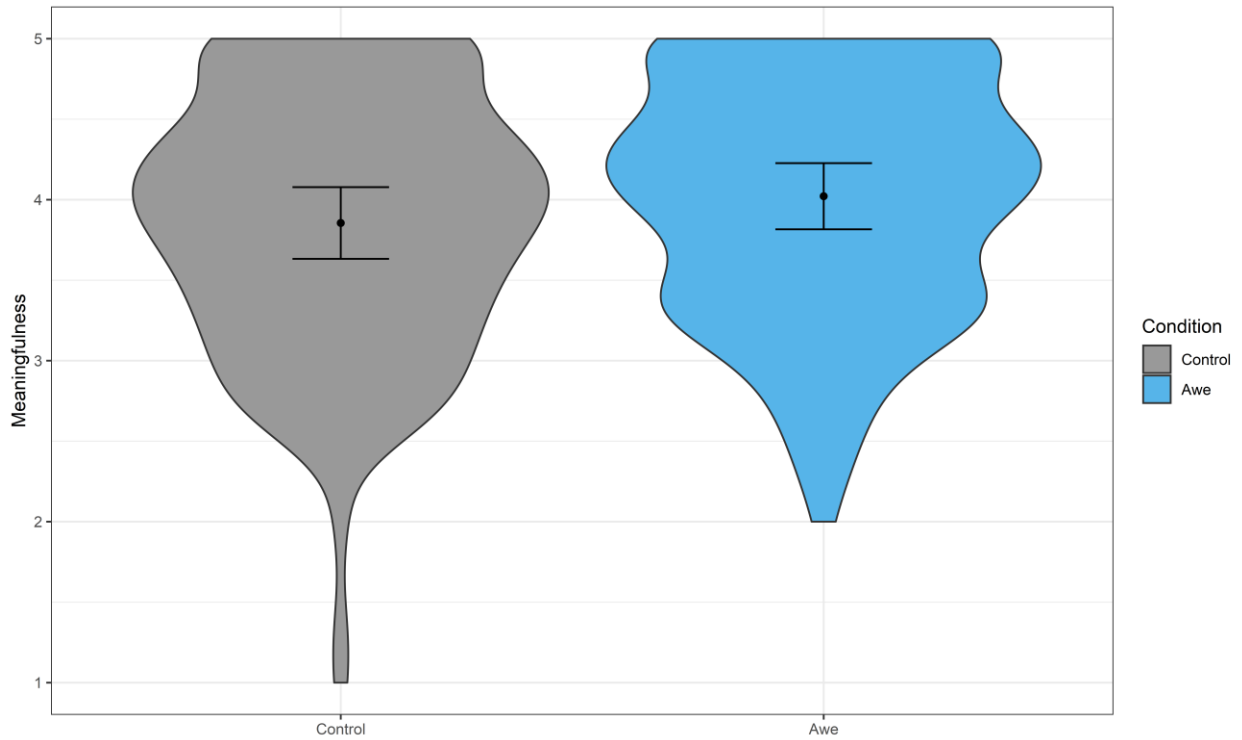


Figure 8

Meaningfulness by Condition in Study 4 (Bars represent 95% Confidence Intervals)



APPENDIX A

Study 4 Awe Condition Instructions

Awe is an emotion people feel in the presence of something vast, powerful, or beautiful that they can't easily wrap their minds around. Awe helps you to appreciate the wonders of the world around you. It's often associated with feelings of wonder or amazement. With the right outlook, awe can be found almost anywhere.

This weekend (Saturday or Sunday), take some time to get together, in person, with one other person (who is at least 18 years old) to do something that makes you feel a sense of **awe**. This could include watching an amazing sunrise or sunset, taking in a panoramic view, finding beauty in nature, watching an incredible video, listening to music that moves you, or any other activity you find awe-inspiring that you can experience with someone else.

During the activity, simply take in the experience naturally -- there aren't any objectives here other than sharing an awe-inspiring experience with someone else.

Please plan to spend at least 15-minutes on this activity with whoever is joining you.

If you are open to it, take a selfie of you and your partner *after* the activity -- you'll have the option to submit this photo in the online survey you will complete after the activity. As with all other data throughout this study, any photo that you decide to submit will be kept anonymous and will help us better understand shared activities.

This evening, you will receive an invite via Prolific for a brief survey. **After you've finished your activity this weekend**, open and complete this survey as soon as possible. You will receive your \$10 compensation after completing the survey.

In the meantime, think about the awe-inspiring activity that you'd like to do, when you'd like to do it this weekend, and who you'd like to have join you. Finally, reach out to this person to set up a time, and feel free to share these instructions with them!

Please take a picture or screenshot of these instructions now for your reference.

Click on to the next page to finish this survey.

SHARED AWE, CONNECTION, AND MEANING

Study 4 Control Condition Instructions

This weekend (Saturday or Sunday), take some time to get together, in person, with one other person (who is at least 18 years old) to do an activity of your choosing. This could include watching a sunrise or sunset, taking in a view, spending time in nature, watching a video, listening to music, or any other activity that you can experience with someone else.

During the activity, simply take in the experience naturally -- there aren't any objectives here other than sharing an experience with someone else.

Please plan to spend at least 15-minutes on this activity with whoever is joining you.

If you are open to it, take a selfie of you and your partner *after* the activity -- you'll have the option to submit this photo in the online survey you will complete after the activity. As with all other data throughout this study, any photo that you decide to submit will be kept anonymous and will help us better understand shared activities.

This evening, you will receive an invite via Prolific for a brief survey. **After you've finished your activity this weekend**, open and complete this survey as soon as possible. You will receive your \$10 compensation after completing the survey.

In the meantime, think about the activity that you'd like to do, when you'd like to do it this weekend, and who you'd like to have join you. Finally, reach out to this person to set up a time, and feel free to share these instructions with them!

Please take a picture or screenshot of these instructions now for your reference.

Click on to the next page to finish this survey.