Examining the Psychological Consequences of Experiencing Awe

by

Jennifer Ashlee Dobson

A Thesis

presented to

The University of Guelph

In partial fulfilment of the requirements

for the degree of

Doctor of Philosophy in

Psychology

Guelph, Ontario, Canada

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ABSTRACT

EXAMINING THE PSYCHOLOGICAL CONSEQUENCES OF EXPERIENCING AWE

Jennifer Ashlee Dobson
University of Guelph, 2015

Advisor: Professor Ian R. Newby-Clark

“Awe” refers to the feelings of wonder and amazement experienced when encountering vast and complex situations and environments that cannot be assimilated into existing knowledge structures (Keltner & Haidt, 2003). The purpose of this dissertation was to contribute to research on the consequences of experiencing awe. In Study 1, I interviewed 19 community members about memorable experiences of awe. I conducted a thematic analysis focusing on participants’ descriptions of the consequences of experiencing awe. Participants described many benefits of experiencing awe, including helping people reinterpret negative situations as positive. In Study 2, I tested the effects awe on distress related to an ongoing personal problem and on problem-solving effectiveness. Undergraduate students (n = 180) wrote about a personal problem and then watched a video intended to elicit awe, amusement, or neutral emotions. Participants then wrote a solution to the problem and rated problem-related distress. I found an indirect effect of condition on distress such that participants in the awe condition felt less distressed about their problem and this effect was mediated by awe experienced and reflection. Participants in the awe condition also wrote longer solutions, and this effect was mediated by awe experienced and reflection. However, for task-related problems, participants in the awe condition reported higher level of problem-related distress. Thus, experiencing awe appears to be beneficial when experiencing an ongoing personal problem, but not when the problem involves a task that must be accomplished. In Study 3, I tested the effects of an intervention designed to improve well-being through the induction of awe.
Undergraduate students \((n = 162)\) were randomly assigned to the awe, amusement, or control condition. Participants watched a short target emotion-eliciting video each day for five days. One week, two weeks, and four weeks after watching the first video, participants completed a questionnaire measuring subjective well-being. Participants in the awe condition who experienced high levels of awe had greater post-intervention well-being. Overall, the results of these studies provide evidence that the experience of awe is generally beneficial.
Acknowledgements

I would like to acknowledge the support and guidance of my thesis advisor, Dr. Ian Newby-Clark. Ian allowed me the freedom to follow my academic interests, even when they differed from his own, and provided invaluable expertise throughout the process of writing my dissertation. Ian’s enthusiasm about learning more about the way the world works inspired me to want to do the same. I would also like to thank my advisory committee members, Dr. Heidi Bailey and Dr. Andrea Breen, for sharing their expertise and for their guidance throughout the process. It was a pleasure talking about awe with you both. I would also like the acknowledge Dr. Kieran O’Doherty for challenging me to think more critically about Psychology and introducing me to the world of qualitative research beyond Braun & Clarke (2006).

I was so lucky to get to spend the last five years working alongside some of the smartest, funniest, and most caring people I’ve known. To Claire Baxter, Emily Christofides, Anne Bergen, Erin Allard, Sara Crann, and Rashelle Litchmore, I’m so happy that I got to be stuck in Blackwood Hall with you!

Thank you also to my family. To my Dad for always listening enthusiastically as I described the minute details of any and all projects, and helping me to see the forest for the trees by asking just the right questions. To my Mom for filling our house with books and offering endless support and encouragement. To my sister for endless talks and for being my biggest cheerleader. To my son Henry for providing motivation and endless experiences of awe.

Finally, thank you to my husband Brennan Reniers for supporting me through every step of this process, even when I felt like I was going backwards. Your belief that I could do this was unwavering, but without you, it wouldn’t have been possible.
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Examining the Psychological Consequences of Experiencing Awe

Canadian astronaut Chris Hadfield has experienced something that only a few hundred other people have: gazing down at the Earth from space. In his autobiography *An Astronaut’s Guide to Life on Earth*, Hadfield (2013) describes the emotions and thoughts that he had while taking in this rare view:

> The shimmering, dancing show of the northern and southern lights; the gorgeous blues of the shallow reefs fanning out around the Bahamas; the huge, angry froth stirred up around the focused eye of a hurricane – seeing the whole world shifts your perspective radically. It’s not only awe-inspiring but profoundly humbling. Certainly it drove home to me how near-sighted it would be to place too much importance on my own 53-odd years on the planet. (Hadfield, 2013, p. 278).

Hadfield describes the experience of seeing the Earth from space as awe-inspiring. Compared to the vastness of Earth, Hadfield felt small and humble. This description highlights the power of the experience of awe and offers some clues as to its function. Recent research on awe lends empirical support to Hadfield’s anecdote about the nature of awe, but more empirical research is needed to clarify the experience and consequences of awe.

Research is emerging that suggests that experiencing awe can be beneficial, for example by reducing feelings of time pressure (Rudd, Vohs, & Aaker, 2012) and fostering feelings of connection (Shiota, Keltner, & Mossman, 2007) and spirituality (Krause & Hayward, 2014). Much of this research has tested the effects of awe in the laboratory, and has focused on the short-term consequences of experiencing awe for participants in a neutral mood. Despite research on the benefits of awe, several important questions about the consequences and drawbacks of awe remain unanswered. Qualitative research is needed to examine how people describe the experience of awe. For example, little is known about the types of benefits and drawbacks that people attribute to memorable experiences of awe in their lives. Lab-based research is needed to examine the consequences of experiencing awe when undergoing stress.
Finally, longitudinal research is needed to test whether the benefits of experiencing awe extend beyond the short duration of the emotion itself. In other words, can the experience of awe lead to lasting improvements in well-being?

In three studies I examined the psychological consequences of experiencing awe. In Study 1, I interviewed community members about memorable experiences of awe, and conducted a thematic analysis focusing on the perceived benefits and drawbacks of experiencing this emotion. In Studies 2 and 3, I tested the effects of experiencing awe in the lab on social problem solving (Study 2) and psychological well-being (Study 3). My goal was to investigate the lifelong (Study 1), short-term (Study 2), and long-term (Study 3) consequences of experiencing awe.

**Theoretical Framework**

Before reviewing extant research on awe, I begin with a brief overview of the theoretical framework underlying the study of awe. Researchers define emotions (including awe) as “episodic, relatively short-term, biologically based patterns of perception, experience, physiology, action, and communication that occur in response to specific physical and social challenges and opportunities” (Keltner & Gross, 1999, p. 468). This definition highlights the multi-faceted nature of emotions, suggesting that emotions involve coordinated responses of the body and mind. The definition also suggests that emotions may be adaptive, as they arise in response to problems of physical or social survival. Although emotions can sometimes be maladaptive (e.g., excessive sadness in depression), emotion researchers now tend to agree that emotions are generally adaptive, and serve important functions in day-to-day life (Keltner & Gross, 1999). For example, many emotion researchers (e.g., Ekman, 1992; Keltner and Haidt, 1999; Lazarus, 1991) argue that physiological responses and cognitive processes that accompany
emotions prepare the individual to respond to emotion-eliciting events. For example, anger signals that an event is unfair, and the physiological and cognitive changes that accompany the feeling of anger may help the experiencer respond to the injustice (Keltner & Haidt, 1999). Lazarus (1991) argues that emotions occur in response to situations that are appraised to be personally goal-relevant. Emotions lead to specific action tendencies (Lazarus, 1991), or changes to the momentary thought-action repertoire (Fredrickson, 1998). In other words, emotions tend to be adaptive because they signal the importance of an event, and influence the type of behaviours or thoughts that occur next to facilitate optimal responding to the event.

In addition to taking a functionalist view of emotions, in this dissertation, I take a discrete, as opposed to dimensional perspective on emotions. Discrete perspectives of emotion (e.g., Ekman, 1992; Keltner & Haidt, 2003) posit that different (or discrete) emotions such as joy, anger, or awe, correspond to unique behaviours, cognitions, physiology, and experiences. In contrast, dimensional perspectives (e.g., Russell & Barrett, 1999) contend that emotions are organized on a continuum of three dimensions: valence (i.e., pleasant or unpleasant), arousal, and approach or avoidance motivation. Although these perspectives seem to be in opposition, it is possible to combine them if one understands discrete emotions as made up of unique valence, arousal, and approach/avoidance profiles (Mauss & Robinson, 2009). Researchers generally classify awe as a positive emotion (Shiota et al., 2007); however, more research is needed on the arousal and approach/avoidance dimensions of awe.

Definition of Awe

“Awe” refers to the feelings of wonder and amazement experienced when encountering novel, complex, and vast stimuli that cannot be assimilated into existing knowledge structures (Keltner & Haidt, 2003). Awe has been classified as an epistemological emotion (Simon-
Thomas, Keltner, Sauter, Sinicropi-Yao, & Abramson, 2009), which refers to an emotion that accompanies a shift in our understanding or knowledge of the world. Epistemological emotions are hypothesized to facilitate information-gathering in complex environments (Shiota, Keltner, & John, 2006). Other emotions that fall into this family include amusement and interest.

Awe has also been classified as a self-transcendent emotion (Haidt & Keltner, 2004), placing it within an emotion family with love, admiration, and elevation (i.e., the emotional response to witnessing profound virtue or moral goodness in another person, Haidt, 2003). Self-transcendent emotions, in contrast to self-oriented emotions, arise in response to stimuli that are perceived as greater than the self, whether physically larger, more important, more beautiful, or morally superior. In contrast to self-transcendent emotions, most emotions are self-focused and occur when a change in the environment affects one’s goals (Lazarus, 1991). For example, pride occurs in response to achieving a personal goal (Tracy & Matsumoto, 2008), and anger occurs when one is personally slighted or offended (Lazarus, 1991). Thus, self-transcendent emotions including awe differ markedly from most emotions because of their focus on external, disinterested elicitors.

Awe has also been placed within a third emotion family of aesthetic emotions. Aesthetic awe is elicited by immense, rare, and exceptionally beautiful art, music, or literature (Konecni, 2005). Konecni (2008) labelled the emotional and physical changes that can occur when listening to exceptionally grand and beautiful music “The Aesthetic Trinity.” This trio of responses includes awe, feeling moved, and experiencing chills. Although emotions typically occur in social settings (including imagining interacting with others, Fischer & van Kleef, 2010), aesthetic awe can occur in the absence of other people, real or imagined.
These definitions and classifications of awe highlight the important similarities and differences between awe and other emotions. Awe is a particularly cognitive emotion, focusing one’s attention on information-rich environments. Awe appears to lack the self-focused concern of other emotions such as pride or anger. Another unique feature of awe is that it can occur in response to asocial stimuli such as art or music. These differences between awe and many other emotions, especially those emotions deemed “basic” (Ekman, 1992), suggest that this complex emotion offers many avenues for empirical research.

**Elicitors of Awe**

Evidence from several studies including retrospective accounts of awe and reports of ongoing emotions experienced in response to stimuli in the lab shows that natural settings most commonly elicit awe (Keltner & Haidt, 2003; Shiota et al., 2007). For example, in a study on the elicitors of awe, participants were randomly assigned to write about a time when they had either experienced awe or happiness. Descriptions of nature, mostly involving panoramic views, were most commonly described in the awe condition (Shiota et al., 2007). Consequently, emotion researchers typically use slideshows or videos of scenes of nature in the lab (e.g., Seaton & Beaumont, 2015; Shiota, Neufeld, Yeung, Moser, & Perea, 2011; Valdesolo & Graham, 2014, Studies 1 to 4; Van Cappellen & Saroglou, 2012, Study 2) or use in-vivo awe manipulations in natural settings (Dietze, Piff, Fuhrmann, & Keltner, 2013) to elicit strong reports of awe. Nature offers the opportunity for people to encounter vast entities such as mountains, canyons, and bodies of water, and experience unexpected and powerful events such as storms. Natural objects and scenes are usually information-rich, thus requiring cognitive accommodation. Therefore, the characteristics of some natural settings seem ideal for eliciting awe.
In addition to nature, other stimuli also elicit awe, including art (Konecni, 2005, 2008; Zentner, Grandjean, & Scherer, 2008), religious experiences (Krause & Hayward, 2014; Ouellette, Kaplan, & Kaplan, 2005), and extraordinary people (Keltner & Haidt, 2003; Schurtz et al., 2012). Although these elicitors may seem dissimilar, they share two features: perceived vastness and complexity requiring cognitive accommodation (Keltner & Haidt, 2003). Vastness can refer to physically large environments or objects, such as mountains, large bodies of water, or grand architecture. Vastness can also refer to complexity, such as the metaphorical vastness of theories with overarching explanatory power. Social vastness, such as the high status and power of larger-than-life celebrities or leaders can also elicit awe.

Recent research supports the association between perceived vastness and awe. For example, Bonner and Friedman (2011) identified the theme of vastness in an Interpretative Phenomenological Analysis of interviews about the experience of awe. All participants described aspects of vastness, complexity, or infinity in their descriptions of awe. Laboratory research also demonstrates that vast stimuli, particularly panoramic views, elicit awe (e.g., Shiota et al., 2007).

The second aspect of the definition of awe, “requiring cognitive accommodation,” (Keltner & Haidt, 2003) refers to Piaget’s influential theory of cognitive development. According to Piaget (1928/2002), people use cognitive schemas to simplify complex mental representations. When new information is encountered, it can either be assimilated or accommodated. Assimilation refers to the “fusion of a new object with an already existing schema” (Piaget, 1928/2002; p. 175). Information and experiences that cannot be assimilated are dealt with through cognitive accommodation, in which schemas are modified to incorporate or adapt to the new information. According to Keltner and Haidt (2003), people experience awe
when they encounter a vast object that cannot be assimilated into an existing schema, leading them to think in a new way to accommodate this new information.

Some research has supported the proposed association between awe and cognitive accommodation, a form of deep, as opposed to surface processing of incoming information. For example, Griskevicius, Shiota, and Neufeld (2010) studied the influence of six positive emotions, including awe, on persuasion. Positive emotions generally facilitate peripheral, simple, or heuristic processing leading to persuasion by weak messages. Awe appears to operate differently than other positive emotions, however. Griskevicius et al. (2010) found that experiencing awe led to less persuasion by weak messages, indicating that awe is associated with deep processing.

Recent research by Campos, Shiota, Keltner, Gonzaga, and Goetz (2013) also provides support for the link between awe and cognitive accommodation. In this study, participants were randomly assigned to write about a time when they experienced one of eight positive emotions, including awe, and their responses were coded for the presence or absence of several themes. Participants in the awe condition were more likely than participants in the amusement, contentment, and pride conditions to describe a situation that challenged their worldview, suggesting that awe is linked to broadening of thinking. However, other research has failed to find an association between awe and cognitive accommodation. Schurtz et al. (2012) found that experiencing awe elicited by social situations was not associated with need for accommodation. Need for accommodation was measured by endorsement of statements including: “You felt confused or bewildered by the person’s qualities” and “It is difficult to understand how the person could act the way they do” (p. 211). It is possible that the failure to find a link between cognitive accommodation and awe in this study was due to the focus on awe in social situations. These items may measure a lack of empathy for others confusion as opposed to an effort to re-
evaluate some aspect of one’s life. Overall, research suggests that experiencing awe leads people to think about things in new ways, although perhaps not in social situations.

The Experience of Awe

Research shows that experiencing awe is accompanied by a unique physiological response. For example, people sometimes experience goosebumps, thrills, or chills when experiencing awe. Schurtz et al. (2012) conducted a daily diary study in which participants recorded and described instances when they felt goosebumps over four weeks. Although 60% of instances of goosebumps were attributed to cold temperatures, experiences of awe were the second most common cause of goosebumps, accounting for 14% of instances of goosebumps. Other research also demonstrates that awe causes a unique physiological response. Shiota et al. (2011) found that physiological responses to awe differ from responses to the other positive emotions (i.e., enthusiasm, amusement, nurturant love, and attachment love). Generally, experiencing positive emotions leads to increased arousal compared to baseline. In contrast, experiencing awe led to decreased arousal compared to baseline. In addition, the awe condition was associated with significantly fewer skin conductance responses than both the amusement and enthusiasm conditions, indicating that awe is associated with decreased sympathetic activation.

Keltner and Haidt’s (2003) definition of awe focuses on the characteristics of awe elicitors instead of the phenomenological experience of awe (Bonner & Friedman, 2011). This lack of attention to what awe feels like may be because “the object of awe is easier to describe than the experience” (Walter, 2004; p. 481). To fully understand what it feels like to experience awe, it is helpful to turn to qualitative research. In one of only a handful of qualitative studies on awe, Bonner and Friedman (2011) analyzed participants’ descriptions of awe. Using Interpretative Phenomenological Analysis, the authors identified ten themes in the participants’ interviews.
Several of these themes described the experience of awe (as opposed to the antecedents or consequences of experiencing awe). The most prevalent theme was labelled “profoundness,” and referred to descriptions of awe as significant or moving. Participants also described a heightening of sensations and perceptions when experiencing awe. The world seems more vivid when experiencing awe. Participants also described feeling present and fully focused on the current moment when experiencing awe. The goal of Study 1 was to add to the small body of qualitative research on the experience of awe, focusing on participants’ reports of the experience and consequences (i.e., the benefits and drawbacks) of experiencing awe.

**The Consequences of Experiencing Awe**

According to Fredrickson’s (1998) broaden-and-build theory, positive emotions broaden the scope of attention, cognition, and action, and build physical, intellectual, and social resources. These resources, such as enduring social relationships, and improved learning and mastery have been shown to last beyond the transient emotional state (Fredrickson, 1998).

Recent research suggests that experiencing awe is psychologically beneficial, and these benefits differ from, and in some cases extend beyond, the benefits associated with experiencing other positive emotions such as happiness and pride. In this section, I review research on the consequences of experiencing awe, and link this research to the current studies.

**Awe and the self.** Experiencing awe has been shown to lead to important consequences for the self. Perhaps in contrast to the perceived vastness of the elicitor, experiencing awe is associated with a diminished sense of self. Both qualitative and experimental research on awe provides evidence of this self-diminishing effect. For example, Shiota et al., (2007) found that participants who were instructed to write about a time when they had encountered a beautiful natural setting were more likely than participants who were instructed to write about a time when
they felt pride to endorse statements related to a diminished sense of self. Importantly, participants in the nature condition reported stronger reports of awe, and were more likely than those in the pride condition to agree with the statements: “I felt small or insignificant” and “I felt the presence of something greater than myself” (p. 954). Both of these statements convey a sense of smallness in comparison to the larger world. Bonner and Friedman (2011) also identified a similar theme in their analysis of participants’ accounts of experiencing awe. Specifically, they found that several participants expressed a sense of existential awareness. Participants indicated that when they experienced awe, they realized that they were part of something larger than themselves.

In addition to causing a diminished sense of self, the experience of awe has also been shown to be associated with decreased self-focused attention. In the study by Shiota and colleagues (2007) cited above, participants in the nature condition were more likely than those in the pride condition to endorse the statement: “I was unaware of my day-to-day concerns” (p. 954) suggesting a lack of attention on the self. Bonner and Friedman (2011) also identified a similar consequence of awe which they labeled “presence.” Participants described feeling fully present when experiencing awe, their minds cleared of focus on the self to focus instead on the environment. Because of these effects on self-concept and self-focused attention, Shiota and colleagues (2007) argue that the function of awe may be to direct attention away from the self and toward the complex and novel environment to facilitate information-gathering.

Despite research demonstrating that experiencing awe is related to a diminished sense of self and decreased self-focused attention, Sundararajan (2002) highlights the importance of self-reflexivity when experiencing awe. Self-reflexivity can be defined as a state similar to absorption, in which one pays attention to one’s affect, contemplates one’s sensory or emotional
experience, and attends to one’s internal state (Sundararajan, 2002). Thus, research suggests that experiencing awe may diminish certain forms of self-focused attention (i.e., concern with one’s day-to-day problems), while heightening other aspects of self-focused attention (i.e., awareness of immediate sensory or emotional experience). These divergent consequences for self (i.e., decreased self-focus and increased self-reflection) are both associated with benefits for well-being, as described below.

Two types of self-focus. A popular belief holds that mindfulness and self-knowledge will lead to benefits for psychological well-being. However, research shows that increased self-focus is consistently associated with a variety of negative consequences including negative affect and depression (Mor & Winquist, 2002). To address this “self-absorption paradox,” Trapnell and Campbell (1999) proposed two distinct forms of private self-consciousness (i.e., consciousness about one’s inner thoughts and feelings) which they labelled rumination and reflection. Rumination concerns a form of neurotic self-attentiveness in which one attends “compulsively to perceived threats, losses, and injustices to the self” (Trapnell & Campbell, 1999, p. 290). Rumination is strongly positively associated with neuroticism, depression, negative affect, and anxiety. In contrast, reflection refers to a form of self-attentiveness associated with positive motives of learning more about oneself. This form of self-focus is strongly positively associated with openness to experience, need for cognition and absorption. Thus, people can have very different motives when focusing on themselves. People may engage in ruminative self-focus in which they worry about their past behaviours and focus on negative aspects of self, or they may philosophize about themselves in an attempt to learn more about themselves.

These two forms of self-focus have divergent consequences for well-being, and research also suggests that they may be differentially related to awe. Specifically, because experiencing
awe causes a decrease in self-focused attention to turn attention to the environment, awe may be associated with decreased ruminative self-focus. However, fully experiencing awe also involves contemplating one’s emotional experience, which may increase self-reflection. These proposed relationships between awe and self-focus will be explored in the context of social problem solving in Study 2.

**Awe and connection.** Another important consequence of experiencing awe is a sense of connection. People report feeling connected to others, the universe, or the world around them when they experience awe (Bonner & Friedman, 2011; Shiota et al., 2007). Shiota and colleagues (2007) found that people who were asked to write about an awe-inducing experience (a time when they saw something beautiful in nature) tended to agree with the statement “I felt connected with the world around me” (p. 954). In an experimental test of the consequences of experiencing awe, Shiota et al. (2007) found that participants in the awe condition (induced through standing under a life-sized replica of a Tyrannosaurus rex skeleton) were more likely than participants in the control condition to describe themselves as connected to a universal whole greater than themselves. Experimentally-elicited awe has also been shown to lead to increases in spirituality (Saroglou, Buxant, & Tilquin, 2008), and feelings of oneness with friends and with people in general for religious and spiritual people (Van Cappellen & Saroglou, 2012). Qualitative reports of the experience of awe also highlight the theme of connectedness (Bonner & Friedman, 2011). Awe appears to be associated with a tendency to see oneself as a smaller part connected to a larger whole. Social connections are important for overall well-being (Antonucci, 2001), so the tendency for awe to elicit a sense of connection suggests that experiencing awe may be beneficial.
**Awe and time.** Experiencing awe also appears to make time feel more plentiful (Rudd et al., 2012). Rudd et al. found that participants who experienced awe (induced through viewing a video or by writing about an experience of awe) perceived time to be more plentiful and felt less impatient than did participants in the control (i.e., happiness or neutral) conditions. The perception of increased time availability (and decreased impatience) caused by experiencing awe was associated with increased willingness to volunteer one’s time, to choose experiences over material goods, and an increase in momentary life satisfaction. The sense of being pressed for time is associated with negative consequences for well-being. This research suggests that the one of the benefits of experiencing awe is expanding one’s sense of time.

**Awe and well-being.** Philosophers and psychologists have long speculated that experiencing awe is beneficial for well-being. For example, Pearsall (2007) argues that awe is an important component of a fulfilling and meaningful life. Awe may improve well-being through several different mechanisms, including changes to self-concept, self-focused attention, feelings of connection, and perceptions of time availability. To date, a small body of empirical research has tested the connection between awe and well-being. Two studies have shown that experiencing awe is associated with momentary increases in satisfaction with life (Krause & Hayward, 2012; Rudd et al., 2012). Seaton and Beaumont (2015) found that experimentally-induced awe led participants to set personal growth goals for themselves; however, the awe manipulation was not related to well-being four weeks later. Taken together, research on awe suggests that experiencing awe is beneficial for well-being. Despite this research, to date, no study has demonstrated that awe can lead to prolonged improvements in well-being. Study 3 will test an intervention designed to lead to increases in well-being through the experimental induction of awe.
Overview of Studies

I conducted three studies of the psychological and cognitive consequences of experiencing awe. Study 1 was a qualitative interview study designed to provide a rich and detailed account of participants’ day-to-day experiences of awe. Specifically, I intended to gather qualitative information about the perceived benefits and drawbacks of experiencing awe. Study 2 was a laboratory experiment testing whether experiencing awe leads to better social problem solving ability and decreased distress about an ongoing personal problem, and whether self-focus mediates the proposed relations between awe and social problem solving. In Study 3, I tested a social psychological intervention using awe designed to lead to improvements in psychological well-being. Overall, these studies contribute to the growing body of research on awe, and help to clarify whether it is beneficial to seek out awe-inducing experiences.

Study 1

With the exception of a handful of qualitative studies on the experience of awe (e.g., Agate, 2012; Bonner & Friedman, 2011), the majority of research on awe is experimental (e.g., Griskevicius et al., 2010; Rudd et al., 2012; Saroglou et al., 2008; Shiota et al., 2007) or correlational (Shiota et al., 2006; Shiota et al., 2007 Study 3; Silvia & Nusbaum, 2011). Although experimental and correlational research on awe has contributed greatly to the understanding of the antecedents and consequences of experiences of awe, this type of research provides little insight about the subjective experience of awe. Further study, especially qualitative research on what it feels like to experience awe, is still needed.

Qualitative research on awe is rare, and limitations to existing research warrant further qualitative analysis. One of the only peer-reviewed qualitative studies of the experience of awe was conducted by Bonner and Friedman (2011) with the goal of providing a conceptual
clarification of the experience of awe. They used Interpretative Phenomenological Analysis to analyze interviews with six participants about the experience of awe. Bonner and Friedman identified ten key aspects of awe, including profoundness, existential awareness, openness and acceptance, and ineffable wonder.

Although this study contributed to literature on the subjective experience of awe, the data source limited the usefulness of the contribution somewhat. Bonner and Friedman conducted a secondary analysis of transcribed interviews taken from the book *Awakening to Awe: Personal Stores of Profound Transformation* (Schneider, 2009). Schneider (2009) used purposive sampling to recruit close friends who had engaged in “awe-based recovery” from major life problems including drug addiction, chronic illness, and depression. Although qualitative research is typically not intended to be generalizable, this unique sample of “remarkable people” (Schneider, 2009, p. 21) suggests that future research with a more diverse sample is warranted.

An additional limitation of the data source analyzed by Bonner and Friedman (2011) concerns the interview transcripts. Schneider (2009) conducted semi-structured interviews both face-to-face and via email. The transcripts of the interviews that appear in *Awakening to Awe* (2009), and which are quoted by Bonner and Friedman (2011) appear to be sanitized or edited for clarity. For example, one participant describes a feeling that Bonner and Friedman labelled “ineffable wonder” in the following quotation: “The full-bodied richness of awe eludes cerebral definition; it simply bursts the seams of intellectualization” (Schneider, 2009, p. 63 as cited in Bonner & Friedman, 2006, p. 229). Although Schneider argues that his participants are “all mature, highly developed individuals who, by the very nature of their interest in awe, have pronounced capacities both to question and discern” (pp. 21 – 22), the consistently eloquent language throughout the interviews calls into question the veracity of the transcripts. At times,
participants seemed to be describing their thoughts on the experience of awe in general, as opposed to describing specific experiences of awe. Therefore, it may be more accurate to describe the interviews analyzed by Bonner and Friedman (2011) as participants’ lay theories of awe, as opposed to descriptions of the experience of awe.

Given these limitations, it is perhaps not surprising that Bonner and Friedman suggest that more research is needed to determine whether the themes they identified are replicated in other samples. They also suggest a need for qualitative research on the elicitors of awe, the consequences of awe, and the functions of awe. The study reported here attempts to fill this gap in the literature, focusing specifically on the consequences of experiencing awe.

Despite calls for qualitative research on awe, research on the subjective experience of emotions in general is lacking in psychology. This dearth of research may be because feelings are embodied experiences that seem individualistic or asocial, and difficult to study (Cromby, 2007; Djikic, Oatley, Zoeterman, & Peterson, 2009). Despite these difficulties, it is important to understand the subjective experience of awe because it is through feelings that people engage with the world (Cromby, 2007). Therefore, in addition to examining the benefits of awe through experimental paradigms (Studies 2 and 3), I also conducted a qualitative interview study with participants from the community. Results from this study will add to the growing literature on awe, and can serve as an important test of theories of awe generated from experimental paradigms. The purpose of Study 1 was to describe, interpret and understand community members’ experiences of awe and their reports of the perceived benefits or drawbacks of feeling awe.

I used purposive sampling to recruit participants who estimated that they reported awe at least monthly. Researchers have yet to identify how frequently people experience awe in their
daily lives. Because awe is often elicited by novel stimuli (Keltner & Haidt, 2003), it may be experienced less frequently than other emotions. However, people differ in the frequency with which they experience awe, with some people experiencing awe relatively frequently (Shiota et al., 2006). Campos et al. (2013, p. 41) found that participants who were instructed to write about a recent experience of awe indicated that the experience had occurred on average within the “previous few months.” Therefore, I reasoned that people who experience awe at least monthly could be considered “experts” on the experience of awe, making them appropriate participants for this study. Although frequency is a crude measure of emotional experience, and it could be argued that people who have rare but powerful experiences of awe would make equally appropriate participants, I chose to include this eligibility criterion to ensure that participants would have many experiences of awe to draw upon in the interviews.

In addition to recruiting participants who experience awe at least monthly, I also used a brief self-report questionnaire to measure dispositional awe proneness (i.e., the extent to which people experience awe in their daily lives; Dispositional Positive Emotions Scale - Awe Subscale; Shiota, Keltner, & John, 2006). I included this questionnaire to gather descriptive information about the participants’ tendency to experience awe. Participants were not included or excluded from the study based on their score on the scale.

I chose to conduct a qualitative study to further explore the experience of awe for several reasons. Qualitative analyses are well-suited for exploratory topics such as awe, which has so far received little research attention. Additionally, qualitative research can help researchers understand the subjective meaning of experiences in context. In contrast to traditional social psychological research, qualitative research can “capture the experiences and perspectives of the people whose lives, thoughts and feelings are being explored” (Holloway & Todres, 2003, p.
Because awe is a complex emotion that occurs across diverse contexts, and elicits profound emotional and cognitive reactions, it is important to preserve the richness of this emotional experience through the use of a qualitative research method.

**Research Questions**

Specifically, Study 1 aimed to address the following research questions: How do participants describe the experience of awe? Do participants report benefitting from experiencing awe, and if so, what specific benefits do they experience? Do participants report any negative consequences associated with experiencing awe, and if so, what drawbacks do they experience?

**Study 1 Method**

**Participants**

In qualitative research, the goal is not to recruit a sample large enough to be statistically “representative.” Rather, researchers often seek to recruit a small number of people chosen based on certain attributes (Yardley, 2000). Accordingly, I recruited 12 female and 7 male adults from the Guelph community. Participants were recruited via an advertisement on an online message board (www.kijiji.ca) seeking adults who experience awe at least once a month to participate in a semi-structured interview about their experiences of awe (Appendix A).

The mean age of participants was 37 years ($SD = 13$ years), and participants ranged in age from 19 to 69 years. Seventy-nine percent of participants ($n = 15$) self-identified as White, the other participants self-identified as South Asian ($n = 2$, 10%), Black/African/Caribbean ($n = 1$; 5%), and Canadian ($n = 1$, 5%). Approximately one third of participants were single ($n = 6$, 32%), one third were married or living common-law ($n = 6$, 32%), one participant was divorced or separated (5%), and one participant was widowed (5%) (data on marital status were missing for the other 5 participants). Participants were generally highly educated. Three participants
(16%) had completed graduate education; 53% (n = 12) had completed college or university, and 32% had completed high school (n = 6). All but two of the participants completed interviews individually. The other two participants (a mother and her adult son) chose to be interviewed together, resulting in 18 interviews of 19 participants. I chose to interview these participants together because I felt that the method of data collection would not negatively impact the data gained from the participants. Because my aim was not to gain a “correct” definition of awe or description of the experience, I was not concerned that interviewing participants together would negatively influence their responses.

**Procedure**

Interested participants contacted me by email or telephone to arrange an interview. Interviews were conducted in private and semi-private locations including a lab at the University (n = 7), quiet coffee shops (n = 7), and participants’ homes (n = 4). First, I explained that the purpose of the study was to interview community members about their experience of awe. Participants read and signed an informed consent form, and chose a pseudonym to be used for this document. Interviews were audio-recorded with the participant’s consent.

I interviewed participants about awe using a semi-structured interview guide (See Appendix B). First, I asked participants to talk about a recent or memorable experience of awe, including describing where they were and what they felt when experiencing awe. Most participants described at least two or three experiences of awe throughout the course of the interview, and I aimed to gather examples of experiences of awe across multiple types of elicitors. For example, if participants described two experiences of awe in nature, I asked if they had ever had an experience of awe that was not in nature, and if so, to describe that experience. I also asked participants to define awe, and to provide synonyms for awe. I also asked participants
about the perceived benefits and possible drawbacks of experiencing awe. However, much of the analysis of the benefits and drawbacks of experiencing awe came from participants’ spontaneous descriptions of a time when they experienced awe, and not from their responses to the direct question of their perceptions of the benefits and drawbacks.

Near the end of the interview, I read the following definition of awe to participants and asked for their thoughts on this definition: “awe refers to the emotion experienced upon encountering something vast that causes you to think about things in new ways” (Keltner & Haidt, 2003). I chose not to define awe at the outset of the interview (or in the advertisement for the study) because the purpose of the study was to examine how participants describe the experience of awe. Defining awe at the beginning of the interview may have influenced participants’ descriptions, for example, by focusing their responses on the ideas of vastness and accommodation. However, the decision to allow participants to define awe for themselves carries the risk that my understanding of awe might not match participants’ understandings of awe. To mitigate this risk, in the interview I aimed to gather enough detailed information from participants about the experience of awe to gain an in-depth understanding of their definition of awe. In instances where participants’ understandings of awe did not appear to match my own (or that of other researchers, e.g., Keltner & Haidt, 2003), I spent time discussing these differences with participants in an attempt to understand them.

In addition, because I used a social constructionist approach to understanding awe in this study (see Data Analysis section below), the concern that participants would not describe the “correct” emotion was minimized. Beyond ensuring that participants spoke English (ascertained through their initial contact to arrange the interview) to avoid any major miscommunication, it was not necessary to ensure that participants shared my definition of the word awe. Because my
interest was in identifying participants’ subjective experiences of awe, and their perceptions of the benefits and drawbacks of awe, these differences and similarities in defining awe were key to the study.

I revised the interview guide several times throughout the study based on patterns I noticed after conducting the first few interviews. For example, participants seemed to speak in more detail about specific personal experiences of awe than about awe as an abstract concept. Therefore, after the first four interviews, I decided to begin the interview by asking participants to describe a recent experience of awe, instead of asking them to define awe (although I asked participants to define awe later in the interview). I did not follow the questions in the interview guide in order. Instead, my goal was to have a conversation about the experience of awe, using the interview questions to guide the conversation. Interviews ranged in length from approximately 15 minutes to approximately one hour ($M$ length = 28 minutes, $SD$ = 7 minutes). After the interview, participants completed a brief demographic questionnaire (Appendix C) and the Dispositional Positive Emotions Scale – Awe Subscale (Shiota et al., 2006; Appendix D). This six-item scale measures the extent to which participants experience awe in their daily lives. Sample items include: “I often feel awe” and “I feel beauty all around me.” The scale ranged from 1 (strongly disagree) to 7 (strongly agree). The scale has been shown to have good construct validity (Shiota et al., 2006) and had adequate reliability in the current sample ($\alpha = .75$). Participants received a $20 gift card as compensation.

**Study 1 Data Analysis**

**Analytic Strategy and Assumptions of Data Analysis**

I used thematic analysis (Braun & Clarke, 2006) to analyze participants’ descriptions of the experience of awe. Thematic analysis allows a researcher to describe, analyze, and interpret
patterns or themes within data (Braun & Clarke, 2006). In addition to gaining a more thorough understanding of the experience of awe than can be gained through quantitative research, the purpose of the study was to identify perceived benefits and drawbacks of experiencing awe. Thematic analysis allows the researcher to generate a set of themes to help describe people’s experiences of a phenomenon, such as awe. Therefore, I chose to use thematic analysis to organize and interpret the consequences that participants attribute to experiencing awe. To my knowledge this study was the first to examine the experience of awe using thematic analysis.

An important part of conducting a thematic analysis is making one’s assumptions explicit. Although I initially approached this research from a realist perspective (in which the researcher attempts to report the experiences, meanings, and reality of participants; Braun & Clarke, 2006), through further reading and consultation, I eventually took a constructionist framework. Therefore, I designed the study and interpreted the data using a constructionist framework, which rests on the assumption that people construct their experiences, including emotions, through language (e.g., Burr, 2003).

Emotion researchers who take a constructionist stance argue that the assumption that emotions are “natural kinds” (i.e., present in nature independent of people’s perception) is problematic. Instead, constructionists argue that emotions are “abstract, theoretical constructs” (Barrett, 2006, p. 48). Therefore, on the surface, research that examines the consequences of experiencing an emotion may not seem to be suited to a constructionist framework, because it appears to assume that emotions are real psychological phenomena that exist, can be accurately measured, and can have real effects. However, by examining people’s perceptions of the consequences of experiencing awe, I was able to take a constructionist framework.
Several aspects of this study were influenced by the constructionist framework. First, the interview was structured as a conversation, suggesting that I participated in constructing participants’ descriptions of awe. The decision to encourage participants to define awe for themselves also stemmed from my constructionist framework, as did the decision to allow two participants to be interviewed together. Finally, when analyzing the transcripts, I coded the transcripts at both semantic and latent levels of analysis. In semantic coding, themes are taken from the surface or explicit meaning of participant’s words. In addition, I examined the latent content of participants’ descriptions of awe by attempting to identify the “underlying ideas, assumptions, and conceptualizations – and ideologies – that are theorizes as shaping or informing the semantic content of the data” (Braun & Clarke, 2006, p. 84).

Throughout the analysis, I have attempted to provide a sense of the relative frequency of each theme. Note however, that in most instances, indications of frequency reflect broad trends in the data instead of strict content coding or counting of themes. It was not always possible to provide meaningful “counts” of the themes due to the nature of the interview and participants’ responses. Participants’ nuanced descriptions of the experience of awe could not always be easily placed within one category or another. Themes sometimes overlapped and were not mutually exclusive. In addition, participants often spoke about similar concepts in many different ways. For example, consistent with other research on awe, many participants discussed the idea of size in relation to awe. However, the theme of size was identified in many different ways throughout the interview including descriptions of specific experiences that elicited awe (e.g., the Grand Canyon, the ocean), explicit references to size (e.g., physical size, metaphorical importance, loudness, etc.) and accounts of feelings of smallness and insignificance when experiencing awe. These diverse references to size make it difficult to objectively “count” the number of
participants who referred to size in their interviews. As Martin, Marsh, Williamson, and Debus (2003) argue, “In the context of qualitative research, summary statements such as ‘more likely,’ ‘less likely,’ ‘most,’ ‘least,’ and ‘less’ are not quantitatively derived nor statistically testable with confidence. Rather, they tend to reflect trends, nuances, and profiles” (p. 620). Accordingly, I provide counts of themes where possible, but often rely on broader statements to describe the frequency of themes.

**Description of Analysis**

To conduct the thematic analysis, interviews were transcribed verbatim and a transcript of each interview was created. One transcript was generated for the joint interview of the mother and son. The nature of the joint interview, in which the participants contributed to the conversation together, would have made it impossible to create separate transcripts for these participants. I first read the transcripts closely several times to become familiar with them and look for patterns across the data. I made notes of initial ideas and possible codes. Next, I generated a list of initial codes and began the process of “coding” the interviews. I used a qualitative analysis software program, NVivo 10, to aid in the coding process. To code the interviews, I read each interview carefully and assigned a code or codes to any extracts that seemed to fit that code. At this point, I aimed to be overly inclusive, preferring to code too much instead of missing an important extract. During the coding stage, I continuously revised my coding scheme by adding codes as I identified a pattern that I had missed, and combining certain codes as I identified similarities across codes.

After coding all 18 transcripts, I read the collated excerpts that made up the codes, and searched for themes. I generated an initial set of themes to represent the data. Next, I reviewed these themes to see if they worked in relation to both the extracts themselves and the dataset as a
whole. I found that I could group the data into themes in several ways, and I experimented with many groupings until I found themes that best represented the dataset as a whole. Finally, I defined and named the themes.

**Trustworthiness**

In qualitative analysis, reliability is not determined by a statistical test. Instead, researchers must demonstrate the rigor or trustworthiness of their analysis in other ways. Sparkes (1998) describes several strategies to ensure that conclusions drawn from qualitative research will reliably represent the data. One important aspect of trustworthiness involves conducting extensive interviews to ensure that participants have ample opportunity to describe their experience and that the researcher has enough information to understand the participant’s description (Sparkes, 1998). I conducted in-depth interviews with participants and asked participants to describe several experiences of awe. I asked participants to clarify anything that was surprising given my understanding of awe from the literature and from my personal experience. By using in-depth interviews (as opposed to a structured interview schedule or an open-ended question at the end of a survey), I gained a nuanced understanding of participants’ perceptions of the experience of awe.

Another important aspect of trustworthiness is transparency. Transparent thematic analysis means that themes are supported with excerpts from the raw data so that the reader can see that the themes are directly linked to participants’ own words (Fereday & Muir-Cochrane, 2006). Throughout the analysis reported here, I provide quotations to support the themes that I identified. Where participants’ descriptions of the experience of awe differed from research or from each other, I include excerpts from the data to demonstrate this disagreement. Through my
use of in-depth interviews and the transparency of my data, I provide a trustworthy description of participants’ perceptions of the experience of awe.

**Study 1 Results**

I identified several themes across the 18 interviews. These themes could be roughly divided into three superordinate themes: *Definitions of Awe, Antecedents of Awe* (i.e., circumstances or experiences that elicit awe) and *Experience and Consequences of Awe* (including physiological, cognitive, and emotional changes that accompany the awe experience). Of course, there was considerable overlap between the themes and the way in which they were divided. For example, participants described openness as both an antecedent of awe (i.e., one must be open to experience awe) and a consequence of experiencing awe (i.e., feeling awe makes one feel more open). This type of difficulty in subdividing the experience of awe is a necessary feature of applying labels to psychological phenomena.

Participants’ accounts of the experience of awe were sometimes contradictory. For example, some participants described experiencing a desire to share the experience of awe with others, whereas other participants preferred to keep the experience to themselves. These contradictions and inconsistencies are common in qualitative research (Braun & Clarke, 2006) and it was not my intention to artificially eliminate differences in participants’ experiences for the sake of analytical simplicity. Therefore, I have presented the dominant themes that I identified across the dataset, but have also noted where participants departed from these themes. Dominant themes did not necessarily the most prevalent themes in the dataset, although they often occurred frequently. Instead, in accordance with Braun and Clarke (2006), dominant themes were themes that captured something important to the research question. In this case, dominant themes helped describe the experience and consequences of awe. Braun and Clarke
(2006) recommend focusing either on providing “a rich description of the dataset, or a detailed account of one particular aspect” (p. 83). Because my interest in this dissertation is on the consequences of experiencing awe, I have focused my analysis on the themes that describe the experience of awe and its consequences. However, I begin with a brief description of the types of experiences that participants described as eliciting awe.

**Analysis of Dispositional Awe Scores**

Participants reported experiencing awe relatively frequently in their daily lives ($M = 5.05, SD = 1.03$; scale range: 1 - 7), Therefore, consistent with the recruitment strategy, participants could be considered “awe experts” as they indicated that they experienced awe relatively frequently in their daily lives.

**Thematic Analysis**

**Theme 1. Elicitors of awe.** Participants’ descriptions of situations, events, and experiences that elicited awe were quite varied. In contrast to other research on the elicitors of awe (e.g., Shiota et al., 2007), social experiences of awe were reported slightly more frequently than physical elicitors such as nature. Participants described an incredible range of experiences that made them feel awe, from the prototypical experience of seeing the Grand Canyon for the first time, to the idiosyncratic experience of realizing that chickens instinctively know where to lay their eggs. Following the framework of Keltner and Haidt (2003) and through inductive coding based on the data, I classified the elicitors into three overarching categories: physical, social, and cognitive. Physical elicitors consisted of feeling awe in response to nature, including animals or physical objects or settings, architecture or urban environments such as Times Square in New York City, and viewing the Earth from above. Social elicitors included a feeling of intense admiration for another person such as meeting a celebrity, a collective experience such as
attending a concert, witnessing or giving birth, or witnessing someone pass away. Finally, cognitive experiences included having an epiphany or sudden realization, feelings of intense disbelief, or spiritual or religious experiences.

Participants’ descriptions of experiences that caused them to feel awe were often quite complex and could involve elicitors that fell into multiple categories. For example, Chelsey (female, 23) described experiencing awe when looking at the ocean out her window. At first glance, this example appears to describe an experience of awe elicited by nature. However, upon further reflection, the description seems to highlight the cognitive, as opposed to physical aspects of the experience:

P: We had high tide and there was kind of like a lightning storm so it was kind of like seeing all that water and just uhh, it kind of makes you feel, for a minute like, you know, there's a whole other world under there. There's something else we don't even recognize or see, or understand but it's there. And it's just that’s what I would consider to be, you know, awe. So much left to find.

Table 1 lists all of the elicitors of awe that participants described in the interviews, organized by type of elicitor (i.e., physical, cognitive, or social).
Table 1

List of Experiences that Elicited Awe.

<table>
<thead>
<tr>
<th>Elicitor Type</th>
<th>Elicitor</th>
<th>Participant(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature</td>
<td>visiting Africa and seeing wildlife</td>
<td>Chelsey</td>
</tr>
<tr>
<td></td>
<td>viewing beautiful natural scenery</td>
<td>Tanya, Jeff</td>
</tr>
<tr>
<td></td>
<td>watching a video of a rare, dangerous animal</td>
<td>Chelsey</td>
</tr>
<tr>
<td></td>
<td>seeing the ocean from a cruise ship</td>
<td>Sanjay</td>
</tr>
<tr>
<td></td>
<td>seeing the Rocky Mountains</td>
<td>Heather, Ash, Chris</td>
</tr>
<tr>
<td></td>
<td>seeing the Grand Canyon</td>
<td>Anne, Sanjay, Maria</td>
</tr>
<tr>
<td></td>
<td>seeing Niagara Falls</td>
<td>Nathan</td>
</tr>
<tr>
<td>Architecture or</td>
<td>visiting capital city in India</td>
<td>Anne</td>
</tr>
<tr>
<td>urban environment</td>
<td>visiting New York City</td>
<td>Chris</td>
</tr>
<tr>
<td></td>
<td>visiting Roswell, New Mexico</td>
<td>Maria</td>
</tr>
<tr>
<td></td>
<td>standing on an ice road in northern Canada</td>
<td>Zachary</td>
</tr>
<tr>
<td></td>
<td>viewing ancient stone circles</td>
<td>Tanya</td>
</tr>
<tr>
<td></td>
<td>entering Maple Leaf Gardens (arena) for the first time</td>
<td>Jeff</td>
</tr>
<tr>
<td></td>
<td>immigrating to Canada and having new experiences (e.g., driving on a highway)</td>
<td>Anne</td>
</tr>
<tr>
<td>View of Earth from</td>
<td>looking down on Earth from an airplane</td>
<td>Jane, Ash</td>
</tr>
<tr>
<td>above</td>
<td>viewing Paris from the top of the Eiffel tower</td>
<td>Nathan</td>
</tr>
<tr>
<td><strong>Social</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admiration of</td>
<td>visiting Elvis's grave at Graceland</td>
<td>Maria</td>
</tr>
<tr>
<td>important person</td>
<td>meeting a high-ranking person or celebrity</td>
<td>Anne, Zachary</td>
</tr>
<tr>
<td></td>
<td>admiring something about another person (e.g., one's child)</td>
<td>Alison, Tanya, Amie</td>
</tr>
<tr>
<td></td>
<td>meeting grandfather in Ireland for the first time at age 18</td>
<td>Chris</td>
</tr>
<tr>
<td></td>
<td>listening to daughter tell her to leave an abusive relationship</td>
<td>Amie</td>
</tr>
<tr>
<td>Collective experience</td>
<td>attending a First Nations drum circle</td>
<td>Tanya</td>
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<td></td>
<td>attending a concert</td>
<td>Nathan, Maria</td>
</tr>
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<td></td>
<td>attending a Blue Jays game (baseball team)</td>
<td>Nathan</td>
</tr>
<tr>
<td></td>
<td>participating in a Pride celebration</td>
<td>Amie</td>
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<tr>
<td></td>
<td></td>
<td>Anne, Jennifer, Alison, Tanya, Amie</td>
</tr>
<tr>
<td>Birth or death</td>
<td>giving birth, or witnessing a birth</td>
<td>Jeff, Terri, Steve, Jillian, Amie</td>
</tr>
<tr>
<td></td>
<td>witnessing a loved one pass away from a long illness</td>
<td>Jane</td>
</tr>
<tr>
<td>Extreme kindness</td>
<td>receiving an important kind gesture from a friend or stranger</td>
<td>Jane, Jennifer, Amie</td>
</tr>
<tr>
<td><strong>Cognitive</strong></td>
<td></td>
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<tr>
<td>Realization</td>
<td>realizing that everything has worked out</td>
<td>Terri, Zachary, Amie</td>
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<tr>
<td></td>
<td>realizing the vastness of the physical world</td>
<td>Chelsey</td>
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<td>realizing that chickens instinctively know where to lay eggs</td>
<td>Alison</td>
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<td></td>
<td>realizing that other people are complex and real</td>
<td>Maria</td>
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<tr>
<td>Disbelief</td>
<td>attempting to understand others' business decisions</td>
<td>Sanjay</td>
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<tr>
<td></td>
<td>learning of a school shooting</td>
<td>Heather</td>
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<tr>
<td>Spiritual/religious</td>
<td>hearing the voice of a loved one who has died</td>
<td>Jillian</td>
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<tr>
<td></td>
<td>realizing that God exists</td>
<td>Phoebe</td>
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**Theme 2: Experience of awe.** The Experience and Consequences of Awe theme was divided into three subthemes: Cognitive Experience, Emotional Experience, and Physiological Experience. Each of these themes was further divided into several subthemes. Table 2 depicts the three themes and the subthemes that I identified in participants’ descriptions of the experience.
and consequences of awe. Each theme is discussed in detail below, including excerpts from the interviews to illustrate the themes.
### Theme 1: Cognitive experience

**Subtheme 1: Active Re-evaluation**
Changes in thinking, attention, or memory when experiencing awe

*Shift from negative to positive*
- It shifted, from negative to positive quickly, like level-wise
  
*Seeking answers, patterns, and meaning*
- I think it's it's still the same feeling of of how can this be?  
  
*Seeing the self as small*
- Making me feel, like small, but connected at the same time

**Participant**
- Jane
- Alison
- Ash

**Subtheme 2: Detached Observation**
Simply experiencing the moment without analysis or explanation

- You're just experiencing that moment um and it kind of stops you thinking about other noise

**Participant**
- Jeff

**Subtheme 3: Connection**
Feeling connected with close others or humanity and wanting to share the experience despite the limitations of language

*Feeling connected to others*
- I suddenly realized that it brought me in more. It's just, I'm not alone anymore

*Wanting to share with others*
- You want to share and tell people that it's interesting and worth doing

**Participant**
- Jill
- Nathan

### Theme 2: Emotional experience

**Subtheme 1: Experiencing positive emotions**
Experiencing other positive emotions including joy, amazement, and calm

- And just joy, a feeling of joy and having peace, peaceful and content

**Participant**
- Amie

**Subtheme 2: Experiencing negative and mixed emotions**
Experiencing negative or mixed emotions including anxiety

- Something bigger is taking you over, a little scary, you know but also exciting at the same time

**Participant**
- Ash

### Theme 3: Physical experience

**Subtheme 1: Experiencing overwhelming physical sensations**
Feeling overwhelmed by the intensity of bodily response to awe

- Just such a rush of emotion that it almost overcomes you

**Participant**
- Tanya
Cognitive experience. All participants described changes in their thinking, attention, or memory when experiencing awe. Many participants described actively re-evaluating some aspect of their lives when experiencing awe, but others described a feeling of detached observation. Another cognitive change described by some participants was a sense of connection. These cognitive experiences of awe are discussed in the next section.

Subtheme 1: Active re-evaluation. Consistent with experimental research on awe (e.g., Keltner & Haidt, 2003), all participants described how experiencing awe led them to re-examine or re-evaluate some aspect of their lives in some way. For many participants, a significant or life-changing event elicited awe and changed their world view, sometimes suddenly. It is important to note that these descriptions of re-evaluation occurred before participants heard Keltner and Haidt’s definition of awe, although after hearing this definition, most participants agreed with the definition and expanded upon it by linking it to their own experiences of awe. For example, upon hearing Keltner and Haidt’s (2003) definition of awe highlighting vastness and cognitive accommodation, one participant agreed, and an experience of awe she had while canoeing in a provincial park with her family:

P: It's something that that really does make you stop and take a look at, you know so when I'm in the park, what's life like back at home and why is this moment so, like why is it touching me so deeply? And maybe, you know maybe what I'm doing back at home isn't really what I should be. You know it just really makes you evaluate and the same with the birth of your children, it's just suddenly like wow, you know this this I mean incredible joy and then responsibility, and just the change in your life, and everything it's like in that moment, right? (Tanya, female, 39).

In this excerpt, Tanya’s reaction to the definition of awe focuses on her perception that experiencing awe led her to re-evaluate aspects of her daily life. The contrast between the deeply moving moments of awe experienced in the park or after the birth of her child and everyday life seems to cause a shift in priorities. Later in the interview, Tanya again describes this active re-evaluation that occurs when experiencing awe:
P: It's just taking that time to really think about what is important and I think that that's really when you have those moments it can, can really allow you to take stock and what, what could my purpose be and how can I make it better?

The process of actively re-evaluating some aspect of life took different forms for different participants. These changes to thinking included a transition from negative to positive, seeing the self as small, and searching for answers, patterns, or meaning in events.

*Shift from negative to positive.* For many 10 of the 19 participants, the re-evaluation or new way of seeing the world when experiencing awe involved a transformation from a negative mood or mindset into a positive mood. For example, Jane (female, 69 years old) described a time when she was having a bad day and a friend rented a plane and flew her over Toronto. Jane described the consequences of feeling awe when looking down on Toronto:

P: If I hadn't have gone on that plane ride I probably would have, for several days, had my mindset dwelling on an issue that was focused into a black pit, and it, it and it brought me out of it. It shifted, from negative to positive quickly, like level-wise.

In this excerpt, Jane describes how feeling awe changed her thinking from a negative focus to a positive focus. This experience appeared to be quite powerful and long-lasting, as she estimated that if she had not experienced awe, she would have focused on the negative experience for several days. This shift from negative to positive also occurred quickly, and was quite dramatic, as Jane constructs her mood before experiencing awe as very negative ("a black pit"). Later in the interview, Jane elaborates on this dramatic shift from negative to positive when she describes how her mood changed:

P: I was crying, when he picked me up, and when I came home I was laughing like crazy, so it fixed whatever I had!

These excerpts demonstrate that for Jane, one of the benefits of experiencing awe is that it leads to a re-evaluation of a problem, which manifests in a shift from a negative mindset or mood to a positive mindset.
Other participants described a similar sudden change from negative to positive when experiencing awe after the birth of their child. For example, Jennifer (female, 48 years old), a single mother, described feeling afraid during her pregnancy because she had no support from her family. When asked to describe a time in her life when she felt awe, she described the birth of her daughter:

P: I can go back, a long, long way and that was uhm, when my daughter was born. I was super young, and again it was really scary because I didn't have family beh-behind me so I was doing it all alone. But the day she was born everything was like perfect it was like, you know she came at like 5 o'clock at night it wasn't the middle of the night and my labour wasn't especially long, she looked healthy she was healthy, had the normal number of fingers all that stuff and again, I went God loves me, and you know this wonderful, because, he didn't give me the challenge of, you know having a child that was less than perfect, I might not have a family that's supportive but, everything else is great. And then watching her wake up every day, and you know, making all the, the normal baby sounds, and everything else, that
I: So, so was that sort of multiple experiences of awe?
P: Oh constant it was like a constant, yah
I: Okay
P: Yah, it's just again th-the, a peace like wow I did something, and even though initially it seemed bad it turned out to be good.

In this excerpt, Jennifer highlights the peace that she felt after the awe-inducing experience of the birth of her daughter, in contrast to the fear that she felt leading up to the birth. This transformation from negative to positive seemed to occur as a result of the experience of awe. Jennifer’s description of the birth of her daughter includes several details emphasizing the normalcy of her daughter’s birth and early days. For Jennifer, her short labour, and healthy, normal daughter signalled a positive outcome, and contrasted with the negative situation leading up to the birth.

Another example of the experience of awe occurring in the midst of a negative situation was described by Jeff (male, 40 years old):

P: I remember vividly [my wife] holding [my daughter] when we were living in a rental place in Ottawa and we were both exhausted and we had no idea what being a parent was about. But it was more me seeing her in this dodgy little apartment and [my daughter] was there and just kinda like ‘oh my gosh’ and ‘look where we are’ but at the same time,
no worry, no fear, no, just, ‘look what we have’ so you know it’s just kind of all this around us is, is worry but right in the middle it’s not really that overwhelming.

This description compares the experience of awe to feeling calm in the middle of a storm. Jeff suggests that although life may have been difficult at the time, seeing his wife with his new daughter gave him a moment of clarity and peace that decreased his worry and fear and made him appreciate what he had. These three excerpts highlight the power of awe to transform a negative or stressful situation to a positive situation. The latter two excerpts describe the positive shift as a shift toward peace. Thus, experiencing awe seems to quiet the mind from a focus on stress and anxiety to a peaceful and calm state.

*Seeking answers, patterns, and meaning.* In response to a vast, novel, and inexplicable environment, participants described searching for answers, patterns, or meaning to help them understand what they were encountering, or their lives as a whole. This search for meaning has been described as “agency detection” and has been found to be associated with awe (Valdesolo & Graham, 2014). Several participants described experiencing awe in response to the realization that everything was working out. This sense that everything had fallen into place led to feelings of awe and amazement, and a sense of wonder at why and how life had led to this moment. For example, Zachary (male, 22 years old) described a recent move from Prince Edward Island to Ontario to attend school. He felt awe when he thought about the many small decisions in his life that had led him to his present situation. He described this feeling in the following excerpt:

P: Looking at trees I thought I would have never experienced this tree had I not come here, so seeing that tree and thinking, you know, what else is there that I can be experiencing and what else is there that, you know it's just a tree, but, I don't know, it's weird.
I: Yeah, it's a tree in Guelph
P: Exactly! As opposed to anywhere else, it's a tree with this view from this room in this house, in this place, with these people and…
I: Wow, so, uhmm, and you said it was a strange feeling so can you describe what you were thinking at the time? Can you describe what you were feeling at the time when you experienced that?
P: Kind of, uhmm, like amazement and appreciation and I guess wonder just how did end up here, what, you know, how everything, like I said, added up to getting here and being at this point in time and seeing the, seeing things the way I do.

In this excerpt, Zachary describes his amazement that the series of decisions he had made had brought him to his present point in life. This sense of awe at the course of his life occurred in response to thinking about the meaning of his life, and led him to search for answers as to why his life ended up the way it did.

Another participant, Terri (female, 44 years old) also experienced awe when thinking about the way that her life had turned out. In the following excerpt, taken from two parts of the interview, Terri describes the circumstances that caused her to experience awe and her description of her understanding of the experience:

P: I would think the last time I felt awe was in a situation where everything seemed to be going right, well. So, I think, the last time, believe it or not would have been about two years ago I guess, right I would actually say experiencing that kind of feeling and that's when we were moving from where we were before to Guelph. And everything just fell together as if it was so painless and it went so well and so smoothly that there was no way that we thought it would ever work out that well. And I just remember having this overwhelming sense of being awed by the whole thing that it, that everything could work out, everything fell into place there was so much to fall in to place, so just an overwhelming sense of, of everything working out, well

I: Did you try to explain why that would happen or did you try to sort of, understand it or was it just?

P: Well uhm, I guess we have a faith so we believe in God, so there has to be an element of awe if you believe in God, right the two are mutually inclusive you can't have one without the other, so there was a sense of that.

Here, Terri contrasts the reality of a smooth and successful move with her expectation that the move would not work out. This expectation of difficulty contrasted with a positive reality causes Terri to feel awe, which she links to her belief in God. In both of these situations, the participants felt awe when they contemplated the course of their lives. Both participants highlight the important contrast between the way life could have been, and the way life is now. This
realization caused both participants to feel awe, and also to seek answers, patterns, and meaning in their experiences

*Seeing the self as small.* For some participants, the experience of awe was accompanied by a feeling of being small. Many participants described experiencing awe when encountering something physically vast, such as the Grand Canyon, or when experiencing a very significant event, such as childbirth. Participants described feeling small in contrast to these vast elicitors. One participant described experiencing awe when looking out the window on a commercial flight over North America:

P: I think the most recent one was probably a couple of weeks ago travelling back from the Bahamas and looking out the window on the plane, and uhh, kind of trying to figure out where I was and realized that I was flying over top of Lake Erie and a river and then I saw Niagara falls and then we continued to fly up along the shore of Lake Ontario, and my home town. And it was, yeah it was just one of those moments where you can kind of see your whole life all at once, you know? And you realize there are so many people down there that you'll never know, so many little lives going on and the world's kind of almost, you see it all at once.
I: So was it sort of a reflective feeling for you in that moment?
P: Yeah, and making me feel, like small, but connected at the same time (Ash, male, 36 years old).

The experience of seeing his hometown from the air caused this participant to literally see his life in a new way. In this example, the participant sees himself as small in contrast to the vastness of his hometown. Ash attributes his change in thinking to seeing the juxtaposition of the familiar scenes (e.g., Lake Erie, Niagara Falls, his hometown) and the unfamiliar vantage point. In these examples, participants actively re-evaluated some aspect of their lives, and this re-evaluation often led to a change in thinking, for example from negative to positive, or to seek answers, or to see the self as small.

*Subtheme 2: Detached observation.* In contrast to descriptions of awe in which participants described actively re-evaluating some aspect of their lives during or after the experience of awe, other participants described wanting to simply experience awe, without
analysis or explanation. Some participants described feeling like detached observers of the awe-inducing experience. For example, Ash (male, 36 years old) described this feeling of detached observation in the following excerpt:

P: It's kind of one of those moments where you stop directing yourself, and thinking like, not asking questions or analyzing, those kind of things aren't coming up right now naturally.

Here, Ash describes how the experience of awe causes him to stop analyzing and just experience the moment. He contrasts the experience of awe with the typical flow of questions, self-direction, thinking and analysis. Similarly, Jeff (male, 40 years old) described the quieting of his inner monologue when experiencing awe:

P: Um, something that you realize when you're in that moment, um, where you're not really using words, you're just experiencing that moment um and it kind of stops you thinking about other noise that might be going on at that moment in time.

Ash’s and Jeff’s descriptions of the experience of awe share similar features. Both men described the experience of awe as leading to an inhibition of the active thought or analysis. The experience of awe is brief (both descriptions refer to “moments” of awe) but powerful enough to direct attention away from the self. Bonner and Friedman (2011) identified a similar theme in their qualitative analysis of the experience of awe. They labeled this sense of detached observation as “presence.”

In contrast to Keltner and Haidt’s (2003) cognitive model of awe, which highlights the function of awe to generate new ideas and re-evaluate situations, these quotations instead show that for some people, experiencing awe is accompanied by a lack of analytic thought. These descriptions provide some support for research by Shiota et al. (2007) who suggest that the function of awe is to turn one’s focus from the self to the information-rich environment. In the excerpts quoted above, participants described decreasing their focus on the self in order to experience the awe-inducing moment.
**Subtheme 3: Connectedness.** Another important consequence of awe that was described by most participants was a sense of connectedness. Consistent with experimental research on awe (Shiota et al., 2007), participants described feeling like a small part of a larger whole. Connections involved other people, the universe as a whole, or a higher power. Many participants also described wanting to share the awe-inducing experience with others, indicating a desire to connect with others when experiencing awe. In contrast, some participants wanted to keep the experience of awe private, or felt that words were not adequate to describe the experience of awe.

*Feeling connected to others.* The theme of connectedness was identified in 15 of the 18 interviews. Participants described how experiencing awe made them feel connected to others, including close family members or friends, and also humanity and the universe. Many participants described experiencing awe after the birth of a child. One participant linked the experience of awe upon meeting her new son with the idea of connection:

P: Umm, I think uhh, one of the most remarkable things about when he was born was that I suddenly realized that it brought me in more. It's just, I'm not alone anymore. (Jillian, female, 59 years old).

This description demonstrates the power of awe to make people feel like part of a larger group. Jillian describes how she felt alone before the birth of her son, but the birth, and the experience of awe, made her feel more connected and part of an inner circle. For Jillian, this experience was sudden and remarkable.

Another participant, Tanya (female, 39 years old) described feeling awe when she participated in a traditional ceremony within an Indigenous community in Ontario:

P: It just hits you and then when they start the drum and the singing and I think too because that's just such an ancient ceremony it's, it's just so connected to the earth it's so, yeah

...  
P: Yeah because you don't I mean I know some people probably do experience it in a church setting and definitely I've had moments in church where I've been deeply touched but when
you hear that drum and that talk about that being the heartbeat of mother earth and when you're sitting, like you're in a lodge you're still, like you can touch the earth, right, and then just the singing and everything too it just, I don't know, I don't think people can go there and not feel something to really bring it back and they talk about that you know all, all races had those original ceremonies so I don't know for me that it, it just brings something back to even when our people had that because the White people did at one point.

I: Yeah, yeah like that idea of connection can be important as well
P: And I think for so many people it's often with that connection to um to the earth, like nature's such a big one because we've lost that you know.

In this excerpt, Tanya highlights several aspects of the ceremony that caused her to experience awe, and led to a sense of connection. These characteristics included an aesthetic element (i.e., the drum and the singing), a spiritual or cognitive element (i.e., the realization that the ceremony was ancient), and a physical or tactile element (i.e., touching the earth). Tanya contrasts the experience of awe that she experienced during the drum ceremony with a less intense experience of feeling “deeply touched” in church. The experience of the drum ceremony is constructed as being more intense than a touching experience in church because in the drum ceremony, several elements come together to elicit awe. The feeling of touching the earth, hearing the music, seeing the dancing, and understanding the importance of the ceremony for people of all races through history led to a strong feeling of connection. This sense of connection was not directed at any person in particular, but instead was a feeling of connection with the earth and with humanity as a whole. For many participants, experiencing awe was associated with a sense of connection with others.

Desire to share with others. Another aspect of the theme of connection was the desire to share the experience of awe with others. Some participants described feeling motivated to describe the circumstances that made them feel awe to others, thus extending the connection that they felt. For example, Nathan (male, 32 years old) described experiencing awe when travelling to Paris and viewing the city from the top of the Eiffel Tower. He discussed the desire to tell others about these types of experiences:
P: When you get those chances, you want to tell people about it, or you'll come back when you travel and want to experience it again, like those kind of things you want to share and tell people that it's interesting and worth doing.

Nathan describes a desire to tell others about the experience of awe, perhaps as a way of prolonging or reliving the experience. Another participant, Heather (female, 22 years old), also described an experience of awe that occurred while travelling. She experienced awe when she viewed the Rocky Mountains for the first time at the end of a cross-country drive from Ontario to Alberta. She described immediately attempting to share this feeling with a friend:

P: I quickly did phone my friend, but she’d seen it plenty of times. ‘Yeah, well what did you expect?’ But I think when you’re with someone and you see something inspires awe I guess, you almost feel the need to put flowery adjectives, that’s what it is.

This desire to share awe-inducing experiences with others has been demonstrated in quantitative research as well. Berger and Milkman (2012) analyzed approximately 7000 New York Times articles published online over a three month period to determine which types of articles were most likely to be shared with others via email. Articles were coded on several dimensions, including valence (the ratio of positive to negative words in the article), arousal (the degree to which the article elicited an emotion that generated arousal) and emotion elicited (anger, anxiety, awe, and sadness). Positive articles, and articles that generate arousal, both characteristics of awe, were most likely to be shared with others. In fact, a one-standard-deviation increase in the amount of awe generated by an article increased the odds of the article making the most-emailed list by 30%. These results suggest that experiencing awe leads people to seek connection with others, or to share the awe-inducing experience with others, through sharing a newspaper article.

However, not every participant wanted to share the experience of awe. Instead, some participants described awe as a private and personal emotion, and expressed the desire to keep the experience to themselves. For example, Steve (male, 29 years old) described experiencing
awe when witnessing the birth of his son. He talked about wanting to keep this experience to himself in the following excerpt:

I: Do you think when your son is older, you will tell him about how you felt when he was born or?
P: Umm, maybe when I'm like really older and if he were to ask, but other than that it's just sometimes that I want to hold on close and tight to.

Some participants described a frustration with the inadequacy of words to express the experience of awe. For example, Chelsey (female, 23 years old) explains that words can never do justice to the experience of awe:

P: And so for me anyways you keep the image in your mind, and you know okay you may use it as an analogy like if you're talking to somebody, uhm or you know you may use that to try to describe that you know if you're trying to explain something to somebody but, I think even in the description you're never going to be able to get, kind of the emotions, that went through you because words are not going to get be able to do it justice.

In this example, Chelsey describes a desire to share the experience of awe with others, but a feeling that it is impossible to do so. For Chris (male, 27 years old), it is the fact that experiences of awe are so difficult to put into words that makes them elicit awe.

P: It's still a personal thing, you know, you do share it in a sense, cause it's still not exactly the way you experienced that exact event, so.
P: Yeah that makes sense. So even if you're trying to talk to, to someone else
P: Yeah, they're still not a part of it. I think that's why you have that, that feeling in the first place. If you could explain it fully, then it's something interesting you saw, or something interesting that happened but it's not really a, big, big, big deal compared to something you can't really explain.

This excerpt calls to mind Keltner and Haidt’s (2003) definition of awe which highlights the importance of vastness and cognitive accommodation. Chris suggests that situations that elicit awe are inexplicable. He argues that if you could explain the situation fully, then it is interesting but it is not awe inducing. This description of awe as something that is beyond explanation resembles the idea of cognitive accommodation.
Feeling awe seems to be associated with a desire to share the experience with others. However, the inadequacy of words to explain the strong physiological, psychological, and cognitive consequences of awe sometimes makes people hesitant to talk about the experience.

**Theme 2: Emotional experience.** Participants also described the emotional experience of awe, and they often used other emotion words to describe what awe felt like. Participants described the positive and negative aspects of the emotional experience of awe. However, consistent with previous research, the majority of participants saw awe as a positive emotion.

**Experiencing positive emotions.** For many participants, the experience of awe was accompanied by other positive feelings. For example, participants described feeling joy, love, amazement, and calmness or peace while experiencing awe. Most participants described the feeling of awe as a powerful positive emotion. Although participants used other emotion words to describe awe, some participants were careful to distinguish awe from other feelings. For example, Jennifer (female, 48 years old) described awe as more powerful and rare than happiness:

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I: How often do you, would you say you experience this emotion?
P: Not very often, I think it's like a, a reserved emotion that obviously shows up just whenever it feels like it, it's a random one.
I: Okay
P: I think people in general have like happy days or happy moments, and their happiness is a very common emotion whereas the awe is a few stages above that.
I: Okay, yeah.
P: It's really, because there's like happiness, and then there's ecstasy, and then awe is probably as strong as ecstasy but sort of, lateral.
I: Okay. So-
P: Ecstasy to me has a lot more excitement in it, whereas awe is more calm.
```

In this excerpt, Jennifer describes awe as positively-valenced but low arousal. Amie (female, 37 years old) also echoed this idea that awe is made up of joy and calmness in the following description of awe:
P: Warm. A tingly feeling all right in here. And just joy, a feeling of joy and having peace, peaceful and content it felt physically relaxing. Um I have post-traumatic stress disorder so when I express like relaxing, that’s a
I: That’s a big thing for you?
P: It’s a big thing, a big thing, to feel relaxed and calm and to have that so, um. And a lot of tear, a lot of tears.

These excerpts support research that classifies awe as a positive emotion (e.g., Shiota et al. 2007). However, the inclusion of tears in Amie’s description shows that awe is not uniformly positive.

*Experiencing negative and mixed emotions.* Participants described mostly positive consequences of experiencing awe including a sense of peace, a new perspective, and positive emotions including love and joy. No participant described the negative aspects of awe until directly prompted by the interviewer, and some said that awe does not have any negative consequences. Twelve participants, however, described experiences of awe that were not purely positive. These experiences primarily involved negative feelings including uncertainty, fear, and anxiety. When prompted, three participants generated examples of negative situations that elicited an awe-like emotion (e.g., the Sandy Hook school shooting).

When asked whether there are any drawbacks to experiencing awe, some participants cited fear. For example, Maria (female, 28 years old) described the experience of visiting the Grand Canyon for the first time with a friend as both awe-inspiring and potentially frightening:

I: Was there any aspects of like fear? Like is it scary at all?
P: Well she [friend] sat on the edge. I was not, ((laugh)) I didn’t like it at all. Um definitely, like you see pictures of it you see it in movies, but nothing prepares you for like, like looking over, it is like the biggest thing ever I can’t even, I can’t even explain it to you. I didn’t, um people die in the Grand Canyon like every year right? They do [unintelligible] where they try and hike, so I just try to stay on the observation deck, it’s also like the desert, very eerie very, so quiet there, just huge oh I can’t even. I wouldn’t say I was scared when I was there, but there were definitely scary aspect that I stayed away from.

This excerpt involves several elements of the definition of awe-inducing experiences, and many of these elements can elicit feelings of fear. Maria describes the Grand Canyon as vast,
unexpected (“nothing prepares you”), and potentially dangerous. Together, these characteristics can lead to feelings of awe, fear or both.

Other participants described the feeling of awe as unsettling or anxiety producing. These negative emotions seemed to be linked to the sheer size of the event or experience that elicited awe. For example, in the following excerpts taken from three parts of the interview, Ash (male, 36 years old) described feeling a sense of existential anxiety when he contemplated his importance:

P: Umm, I guess maybe I felt like a little bit, of, you know, almost anxiety a little bit, you know, when you feel like, you know, you can't pull away from something, it's drawing you in and maybe you feel a little powerless to kind of stop the experience.

... 
P: When I said that, not feeling like anxiety, but kind of creating, responsive anxiety when you realize you are losing the direction of your thoughts or something bigger is taking you over, a little scary, you know but also exciting at the same time.

... 
P: I definitely, think about experiences of awe is when you just realize when you're just like a drop in a bucket, you know?
I: Yep.
P: And that feeling is just a little unsettling.

In this excerpt, the feeling of awe can be anxiety-producing because it can lead to feelings of powerlessness. This powerlessness relates to the characteristics of the situations that elicit awe: they are large, and they draw attention automatically. Ash feels captured by the experience of awe, and this feeling of being captured is anxiety-producing. When facing something large and fascinating, Ash describes the mixture of anxiety and excitement that can occur.

Other participants also described mixed emotions that can occur when experiencing awe. For example, Tanya (female, 39 years old) described feeling a mixture of joy and fear when her daughter was born:

P: So, when the, when the, with the children, especially with [oldest daughter], especially with your first, it's just this overwhelming sense of joy but there and awe and also mixed
with you know a little bit of fear and uncertainty and that's again where you're hit with really raw emotion, you're overwhelmed with it really.

In this excerpt, Tanya explains how a mix of positive and negative emotions can occur simultaneously. For Tanya, feelings of anxiety stemmed from the unknown that accompanied her new role as a parent. Although emotion researchers tend to label emotions as positive or negative, based on the types of experiences that elicit them and whether the subjective experience of the emotion is positive or negative, some researchers have argued that a simple division of emotions based on valence is problematic (Solomon, 2001). In this study, most participants described the experience of awe in positive terms. Awe tended to be elicited by positive situations, and it was usually accompanied by positive emotions. This finding is consistent with the classification of awe as a positive emotion (e.g., Shiota et al., 2006). Research on the elicitors of awe shows that awe is typically elicited by positive events. Shiota et al. (2007) found that all participants wrote about a positive experience when they were asked to describe a recent time they felt awe. However, in the current study, some participants spoke about negative or mixed feelings that can occur when experiencing awe, and three participants described experiencing a feeling that they labelled as awe when thinking about objectively negative situations (e.g., a school shooting), problematizing the notion of awe as purely positive.

**Theme 3: Physiological experience.** Although emotions involve cognitive aspects, such as changes to thinking or attention, they are experienced in the body. Accordingly, many participants described experiencing strong physical sensations when feeling awe. Descriptions of the embodied feeling of awe are not just used to represent some aspect of awe. Instead, the feelings of awe create the experience of awe (Cromby, 2011). Thus, it is important for a qualitative analysis of the experience of awe to include descriptions of the physiological experience of awe. For this reason, if participants did not describe the bodily experience of awe,
I asked whether they experienced any physiological sensations when experiencing awe. In two cases, participants described the experience of awe as lacking any physical or embodied component. However, in the majority of interviews, participants described awe in terms of physical sensations, although the extent to which participants described these sensations varied from a brief reference to the body, to several detailed descriptions of the body.

**Experiencing overwhelming physical sensations.** Many participants described feeling overwhelmed by the intensity of the experience of awe. For many, but not all participants, awe was a strongly embodied experience. Participants reported several physical sensations including goosebumps, tears, warmth, and a feeling of lightness when describing awe. Many participants described having no control over these sensations. For example, Steve (male, 29 years old) described experiencing a strong sense of awe when his son was born, despite trying to maintain a stoic exterior. He describes tears when feeling awe, demonstrating that the experience of awe can manifest in the body through the experience of crying:

P: Yeah it changed my feelings. Basically, as much as you try to be, try to have a barrier, it breaks you down. It makes you cry, makes you show that like state of happiness, kind of like the wedding day kind of thing. It just kind of just, it breaks you down and you have no control over it.

In this excerpt, the experience of awe was so overpowering that the participant felt taken over by it. He describes feeling happy and crying in response to his son’s birth, despite efforts to put up a barrier against his feelings. Other participants also described the experience of awe as physically and emotionally overpowering. For example, Amie (female, 37 years old) described an overwhelming sense of warmth that she experienced when feeling awe the first time that she attended Pride Toronto (i.e., a festival celebrating “the history, courage, diversity and future of Toronto’s Lesbian, Gay, Bisexual, Transsexual, Transgender, Intersex, Queer/Questioning, 2 Spirited, Allies communities;” Pride Toronto, 2015) with her brother:
P: I think another awe moment was going to Pride...I was proud of him, I was proud of myself for finally coming out, um I was proud of my girls for supporting everything and being like ‘rah rah mom! Go girl!’ And I was proud of the community. I was really proud of being part of that community. It was, oh yeah I can’t go to Pride without crying [laughs]. Um yeah, and so it was a similar like physical feeling as well with the warmth yeah yeah was very, very overwhelming, I ended up having to sit down for a bit because it was just I was feeling so much. It was a lot, a lot to take in.

In this excerpt, Amie describes feeling so physically overwhelmed by the experience of awe that she had to sit down. This description of feeling overwhelmed seems to involve the physical (warmth and tears) but also the cognitive (complex feelings of pride for herself, her brother, and her daughters) and emotional aspects of awe (“I was feeling so much”).

In addition to accounts of warmth, some participants described feeling as though a burden had been lifted or feeling a sense of release when experiencing awe. Both Jennifer and Terri described experiences of awe that occurred in the midst of negative or stressful situations, and their experiences of awe were accompanied by a feeling of lightness:

P: It was probably a gradual and I would say that I did feel lighter, like a burden was lifted even though what I went through wasn't a burden it was just something negative that was transforming into something positive, and I think when it got to the tail end of that transformation, that's when the awe hit because I had the peak, and that's when I got the really good sleep. (Jennifer, female, 48 years old)

I: Does anything happen to you physiologically or physically to your body when you experience that or?
P: I think that I, you know, again, I would say that I'm feeling, light-hearted, umm, emotionally-feeling, content, umm so probably some sort of release of some sort I'm guessing, just by being in that state of mind. (Terri, female, 44 years old)

Here, both women describe the experience of awe as a feeling of physical lightness. This relief or lifting of a burden accompanied the experience of awe was associated with a feeling of peace. Although Jennifer and Terri could be using the term “lightness” as a metaphor to describe the experience of awe, it is clear that the experience of release was physically powerful for both
women. Jennifer especially associates the experience of awe with finally being able to sleep after a long period of insomnia.

Most participants reported overwhelming bodily sensations when they experienced awe, but this was not the case for all participants. Some participants reported that the experience of awe was emotional and cognitive, but not physical. For example, when asked to describe a recent time that she felt awe, Anne (female, 43 years old) talked about meeting a well-known and powerful person at work. She felt astonished and pleased that this person took the time to speak to her, but for Anne, the experience of awe is “just a feeling that went through my mind, thought crossed my mind” not a physical sensation.

**Study 1 Discussion**

In Study 1, I conducted a thematic analysis of interviews with 19 community members about memorable experiences of awe. Participants also completed a six-item survey measure of the extent to which they experience awe in their day-to-day lives. Participants’ scores on the dispositional awe scale were above the scale midpoint, indicating that participants experienced awe relatively frequently in their day-to-day lives. Thus, the insights about awe gained from participants in this study must be situated within the context of people who report feeling awe with relative frequency. One advantage of interviewing people who often feel awe is that most participants were able to draw upon several instances of awe throughout their lives in the interview, allowing them to compare these experiences and describe them in detail.

Generally, participants’ descriptions of the experience of awe supported existing research on awe and theories about the function of awe. Participants described re-evaluating some aspect of their lives either while experiencing awe, or soon after the experience. Other participants described a less active process, in which awe was accompanied by a feeling of detached
observation and an outward focus on the environment. The experience of awe was accompanied by other positive emotions including joy and peace, some negative emotions such as anxiety, and strong physical sensations.

Participants’ vivid descriptions of the experience of awe provide rich and detailed qualitative evidence to support Keltner and Haidt’s (2003) cognitive model of awe. Specifically, people reported experiencing awe in response to vast and complex elicitors. The experience of awe made them think about some aspect of their lives in a new way, sometimes because they felt small in response to the elicitor, or sometimes because they stopped thinking about their personal stressors and begin to focus instead on the environment. This experience may cause people to feel connected (perhaps because they see themselves as a small part of a larger whole) and many people were motivated to share the experience with others, despite the inadequacy of using words to do so. Awe is not a subtle emotion; instead, participants described feeling amazement, joy, wonder, and sometimes anxiety while experiencing awe. Awe is also strongly embodied and the physical sensations that accompany awe include tears, warmth, and a feeling of peace or lightness.

This thematic analysis of participants’ experiences of awe suggests several ways in which experiencing awe can be beneficial. As posited by Shiota et al. (2007), awe appears to direct attention away from the self and to the environment, and to make the person experiencing awe feel small in comparison to the elicitor. These consequences of awe may reduce the relative importance of an ongoing personal problem. This hypothesis was tested in Study 2. Awe also appears to make people feel connected and motivates people to reach out to others. Research shows that strong social connections and social support contribute to psychological well-being (Antonucci, 2001). Awe also seems to feel (mostly) good. People report positive emotions such
as joy and calmness and pleasurable, and overwhelming and pleasurable bodily sensations such as warmth and lightness when experiencing awe. However, the experience of awe was not uniformly positive. A few participants described an uncomfortable feeling of uncertainty or anxiety associated with awe that seemed to occur when thinking about one’s insignificance in contrast to the vastness of the world. These cognitive, psychological, and physiological consequences suggest that experiencing awe may influence well-being. This hypothesis was tested in Study 3.

The results of this study add to the small body of qualitative research on awe. Many of the themes that I identified in the data were also identified by Bonner and Friedman (2011). For example, many participants in this study described feeling a deep sense of connection when experiencing awe. Connection was also identified as an important aspect of awe by Bonner and Friedman (2011). Therefore, the current study provides a much-needed replication of research on the subjective experience of awe. This research also extends beyond previous qualitative research on awe by recruiting a relatively diverse sample, and studying participants’ memories of specific awe experiences, not simply their theories of the function of awe.

Limitations and Directions for Future Research

This study of the experience of awe involved a small sample of participants from a single city in Ontario, Canada. Therefore, the results must be understood as situated within the cultural and social context of these participants, and may not be generalizable to all experiences of awe. Although participants were asked to describe the experience and consequences of awe in their own words, they may have relied somewhat on cultural scripts about the role of awe in their descriptions. Therefore, if beliefs about the experience and consequences of awe vary in different cultures or social contexts, interviews with participants from different locations might vary as
well. However, researchers know little about whether culture influences the experience of awe. With the exception of a handful of studies investigating emotional experiences similar to awe (e.g., Zentner, Grandjean, & Scherer, 2008 conducted a study in Switzerland investigating the emotions experienced when listening to music) very little research has examined the experience of awe outside of North America, and to date, no research has examined differences in the experience or expression of awe cross-culturally.

Another limitation involved the analysis of retrospective accounts of awe. Although many participants described the experience of awe as highly memorable, it is likely that some details were lost when trying to describe an experience that had occurred in the past. A recent mixed-methods study by Gallagher, Reinerman-Jones, Sollins and Janz (2014) suggests that written retrospective accounts of awe differ from accounts of awe written immediately after the experience of awe. Gallagher et al. (2014) analyzed astronauts’ descriptions of viewing the Earth from space and compared journal entries written in space to writings recorded after the astronaut had returned to Earth. In both types of writings, the authors found descriptions of awe and wonder, including references to the overwhelming aesthetic beauty of Earth and space, the sense of scale gained from viewing the Earth from above, and the feeling of being captured by the view and wanting to see more. However, the entries written in space were more perception-based (i.e., they included more causal verbs) and more concrete than post-flight writings. Therefore, future qualitative research could examine people’s perceptions of the emotional, cognitive, and physiological changes that accompany awe as it occurs, or shortly thereafter, in order to gain a deeper understanding of the emotion. For example, researchers could conduct interviews with people experiencing an awe-inducing situation for the first time, such as viewing the Grand Canyon. This type of in-vivo awe research might yield more detailed and concrete accounts of
the experience of awe, unbiased by problems with recall. However, it is also possible that understanding the consequences of experiences of awe requires reflection, and interviews that occur after a memorable experience of awe may allow participants time to reflect on the meaning of the experience.

Awe is a difficult emotion to articulate, and many participants described feeling that words were inadequate to describe the experience. For example, Tanya (female, 39 years old) spoke about her struggle to describe awe to others:

P: It's almost you can't put often words to it, you can't explain to someone what it is but just, it's that deep, deep emotion that kind of washes over you.

This difficulty in articulating the experience of awe demonstrates the complexity and profoundness of the experience of awe, making it a good candidate for qualitative analysis. Although participants felt that words were inadequate for describing the experience of awe, it could be argued that survey measures of awe would be even more inadequate to describe what it feels like to experience awe. By using thematic analysis to study the experience of awe, I was able to preserve the richness of participants’ own words to awe, instead of reducing the experience to numbers on a questionnaire. These descriptions provided rich detail about the experience of awe to complement theories and research on awe from experimental social psychology.

**Study 2**

Research on awe and the results of Study 1 suggest that one of the consequences of experiencing awe is to turn one’s focus from the self (including ongoing personal problems) to the environment. This research suggests that experiencing awe may be beneficial when thinking about an ongoing social problem, but this effect has not been tested. Social problem solving refers to a “general coping strategy by which a person attempts to develop effective coping
responses for specific problematic situations in everyday living” (D’Zurilla, Maydeu-Olivares, & Gallardo-Pujol, 2011, p. 142). These types of problems include problems in relationships (e.g., friendships, family relationships, work relationships), and problems at work or at school. The goal of Study 2 was to test whether experiencing awe lessens the distress felt in response to an ongoing social problem, and whether experiencing awe improves the ability to generate solutions to the problem. A secondary goal was to test whether self-focus mediates the hypothesized relations between awe and problem-related distress and solution generation.

**Awe and Problem-Related Distress**

As suggested by Shiota et al., (2007) awe may be beneficial because it re-directs attentional focus from the self to the environment. Experiencing awe when thinking about a personal problem may shift focus from the problem, making it seem less important. This decrease in importance may lessen the distress a person feels when thinking about the problem. When people experience awe, they direct attention to the environment, thus decreasing focus on themselves (Shiota et al., 2007). Other research suggests that experiencing awe is associated with an increase in self-reflexivity (Sundararajan, 2002). This decreased ruminative self-focus and concurrent increase in self-reflection may be an important mechanism mediating the relation between awe and problem-related distress.

**Awe and Social Problem-Solving Effectiveness**

People tend to have specific problem solving orientations and styles which influence how they attempt to solve social problems. For example, D’Zurilla et al. (2011) found that people with more “positive” personality and affective orientations (i.e., conscientious, extraverted, open, and high in positive affect) tend to use constructive problem solving styles, whereas those with more “negative” personality and affective orientations (i.e., neuroticism, psychoticism, and high
in negative affect) tend to engage in more dysfunctional problem solving. Research shows that people who tend to experience awe relatively frequently in their day-to-day lives also tend to be highly open to experience (Shiota et al., 2006; Stellar et al., 2015) and moderately extraverted (Shiota et al., 2006). Therefore, the dispositional tendency to experience awe resembles the “positive” personality orientation, suggesting that awe-prone individuals may be more effective problem-solvers.

Other research shows that problem solving ability can vary depending on mood. For example, Anderson, Goddard, and Powell (2009) found that participants with symptoms of depression and anxiety used less effective problem solving strategies than did participants who did not exhibit symptoms of depression or anxiety. Because of the cross-sectional nature of the study, it is impossible to determine whether symptoms of depression and anxiety led to difficulties with social problem solving, or whether social problem solving difficulties led to symptoms of depression and anxiety. However, these results suggest that dysphoric mood may impair problem solving ability. Awe, as a positive emotion, may be related to more positive problem solving orientations and styles, and more effective problem solving ability overall.

Finally, awe may also lead to more effective problem solving ability through its effects on cognitive processing. Keltner and Haidt (2003) suggest that experiencing awe leads people to engage in cognitive accommodation, which refers to the process of revising mental schemas to incorporate new information. Research by Griskevicius et al. (2010) demonstrated support for this theory. Experimentally-induced awe led participants to reject weak arguments in a persuasive message, suggesting that awe leads to deep, as opposed to surface or heuristic processing. If awe leads to increased self-reflection (as proposed by Sundararajan, 2002),
reflection may be an important component of the deep processing that occurs when experiencing awe. For these reasons, the experience of awe may lead to more effective social problem solving.

**Comparing the Effects of Awe and Amusement**

To test whether the proposed benefits of awe for social problem solving extend beyond the benefits of experiencing any positive mood, I compared the effects of experiencing awe to amusement. Amusement is the positive emotion experienced in response to humor (Herring, Burleson, Roberts, & Devine, 2011). As a positive emotion, experiencing amusement is expected to be beneficial when thinking about an ongoing personal problem. For example, Tugade and Fredrickson (2004) found that highly resilient people experienced more positive emotions when thinking about an ongoing personal problem, and the experience of positive emotions led participants to find more positive meaning in the negative life event. However, experiencing amusement is expected to be less beneficial than experiencing awe when thinking about an ongoing personal problem. Amusement differs from awe in terms of its effects on cognitive processing. Griskevicius et al. (2010) found that experimentally-induced amusement led to simple, heuristic processing (as measured by persuasion by weak messages) compared to awe which led to deep processing. Deep processing may be necessary to help generate solutions to a difficult ongoing personal problem. Because of the cognitive consequences associated with experiencing awe (i.e., decreased rumination and increased reflection), I hypothesize that the benefits of awe will be greater than the benefits of experiencing amusement.

**Hypotheses**

I hypothesize that participants in the awe condition will report less problem-related distress and will generate more effective solutions to their problems than participants in the amusement and control conditions. Further, I hypothesize that experiencing awe will decrease
rumination, but increase reflection. I hypothesize that these consequences for self-focused attention (i.e., decreased rumination and increased reflection) will mediate the proposed relations between awe and problem-related distress and awe and social problem solving effectiveness.

**Study 2 Method**

**Participants**

Participants were 180 undergraduate students recruited from the Psychology Department participant pool. Participants ranged in age from 17 to 24 years ($M = 19$ years, $SD = 1$ year) and 83% of participants were female. The majority of participants (79%) self-identified as White/European, and the remaining participants self-identified as “other”, Southeast Asian, South Asian, Black/African/Caribbean, West Asian, or Aboriginal/First Nations.

**Materials and Procedure**

Participants completed the study in groups of two to seven ($M = 4.99$, $SD = 1.31$). All participants in the same session were randomly assigned to the same condition, of three conditions: awe, amusement, or control. Approximately one third of participants were assigned to each of the three conditions (Awe $N = 59$, 32.8%, Amusement $N = 59$, 32.8%, Control $N = 62$, 34.4%). Upon arrival at the laboratory, the researcher explained the study procedure and participants signed a written consent form. As a cover story, participants were told that they would be completing two unrelated tasks: a problem solving task and pilot-testing a video for another study.

**Description of personal problem.** First, participants read two sample social problems adapted from the Means-End Problem-Solving procedure (MEPS; Platt & Spivack, 1975). The MEPS procedure is a “measure of the ability to conceptualize, in interpersonal problem situations, appropriate and effective means to reach a specified goal in order to satisfy an aroused
need” (Platt & Spivack, 1975, p. 15). The original measure describes 10 hypothetical social problems and their solutions in areas such as relationships, work, and school. Two problems were adapted from the MEPS to be used as sample problems for this study. The sample problems were presented in the second person to heighten the personal relevance for participants. Unlike the original MEPS, a solution to the problem was not included. For example, one sample problem was:

You have a midterm coming up next week and you’re worried that you won’t have enough time to study properly. You promised a co-worker that you would take an extra shift, but now you are feeling overwhelmed with school and work obligations.

After reading the two sample problems, participants wrote about an ongoing problem from their own life. The researcher emphasized to the participants that the problem they described should be ongoing, not a problem that they had already solved, and the problem should be a disagreement, hassle, or small life problem, not an overwhelming lifelong difficulty (Appendix E). Participants spent about 5 to 8 minutes writing about their problem. After participants had finished writing about their problems, they placed the written description in an envelope and set it aside to ensure that the written descriptions remained private and to strengthen the cover story that the two parts of the study were unrelated.

**Emotion manipulation.** Next, the researcher explained that participants would now watch a five minute video which was ostensibly being pilot-tested for use in another study. Using a high definition projector, the video was projected on screen approximately 8 feet away from the participant and the projected image was approximately 60 inches in diameter.

Depending on condition, participants watched a video intended to elicit awe, amusement, or neutral emotions. The awe video depicted panoramic views of nature from the nature documentary *Planet Earth* (Fothergill, 2006). The video included footage of waterfalls, mountains, immense trees, and a sandstorm so large that was visible from space. The video
depicted only natural scenery and did not include footage of people, animals, or anything artificial. The original narration from the documentary was removed and stirring instrumental music was used as a soundtrack to accompany the visual images. Videos and slideshows depicting panoramic views of nature have been used successfully in laboratory research to elicit moderately strong reports of awe (e.g., Shiota et al., 2011; Van Cappellen & Saroglou, 2012).

The neutral emotion (control) video showed footage of a stream in winter. The video showed a close-up shot of a small section of the stream, in which a small amount of water flows over rocks downstream past snowy banks. The camera angle does not change throughout the five-minute video. In contrast to the video chosen to induce awe, the natural scene depicted in the control video was neither vast nor particularly complex. The original audio of the stream flowing was removed and soothing instrumental music was used as a soundtrack to accompany the visual images. The video was chosen because it elicited very low levels of emotion during a pilot test, and it depicts natural scenery, making its content comparable to the awe video.

The amusement video was a compilation of clips from the comedy show *Walk on the Wild Side* (BBC, 2009). This clips combined footage of wild animals in their natural environments with humorous voiceovers by British comedians. I chose this video because it depicts natural scenery (similar to the awe and control videos) but in an amusing way. Further supporting the use of this video to elicit amusement, Valdesolo and Graham (2014) also used clips from *Walk on the Wild Side* in a study comparing the effects of awe to amusement on agency detection.

**Questionnaire measures of emotional response and self-focus.** Immediately following the video, participants completed the Emotions Experienced Questionnaire (EEQ; Appendix F) and the modified Reflection-Rumination Questionnaire (RRQ; Appendix G). The EEQ assesses the extent to which participants experienced 11 different emotions (including awe and
amusement) on a 9-point scale anchored at 0 (*did not experience that emotion at all*) to 8 (*strongest experience of that emotion ever*; Shiota et al., 2011). Only the two items measuring how strongly the participants experience awe and amusement were analyzed. The RRQ (Trapnell & Campbell, 1999) is a 24-item self-report scale used to measure state rumination and reflection. The Rumination and Reflection subscales each contain twelve items measured on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). A sample item from the Reflection subscale is “People often say I’m a ‘deep’ introspective type of person” and a sample item from the Rumination scale is “I tend to ‘ruminate’ or dwell over things that happen to me for a very long time afterward.” The original RRQ is a trait measure of rumination and reflection; therefore, I modified the scale wording to reflect a state measure of rumination and reflection. The phrase “right now” was added to the beginning of each item, and wording suggesting dispositional rumination or reflection (e.g., “tend to”, “often”, “by nature”) was removed or modified. For example, item 2 from the Rumination subscale, “I always seem to be rehashing in my mind recent things I’ve said or done” was changed to “Right now, I am rehashing in my mind recent things I’ve said or done.” Item 21 from the Reflection subscale “I’m very self-inquisitive by nature” was modified to “Right now, I’m very self-inquisitive”. The revised Rumination and Reflection scales were reliable (Rumination scale: \( \alpha = .88 \); Reflection scale: \( \alpha = .88 \)).

**Measures of problem-related distress and problem solving effectiveness.** Next, the researcher thanked the participants for helping to pilot test the video, collected the EEQ and RRQ questionnaires and told the participants that they would now return to the problem solving study. Participants were asked to think about the problem that they wrote about at the beginning of the study. They then completed a 5 item questionnaire rating their distress regarding the
problem, and the subjective importance of the problem in the “grand scheme of things” (Appendix H). A composite problem distress variable was computed by averaging the mean of the five items ($\alpha = .85$). Participants were then instructed to write out the steps that they could take to reach an ideal resolution to the problem. Next, participants completed a demographics questionnaire (Appendix I) and a Free Thought Listing (Appendix J). The Free Thought Listing instructed participants to describe what they were currently thinking about, and to write as much or as little as they wanted. The instructions did not include any reference to the participant’s original problem, so participants could choose to continue to write about their problem or not. Participants were instructed to place these questionnaires in the envelope with the written problem description. The researcher then collected all study materials, debriefed, and thanked the participants. Participants received one credit toward the psychology department participant pool assignment as compensation. Participants also received a list of contact information for counselling services (on-campus and in the community).

**Coding of Problem Type and Severity**

First, two aspects of the problem description were coded: the type of problem and the severity of the problem described by the participant. Two coders coded whether the problem described by the participant was *interpersonal* or *task-related*. Interpersonal problems involved disagreements or conflicts with romantic partners, friends, family members, co-workers, roommates, or acquaintances. An excerpt from an interpersonal problem is: “My floor mate has been telling other girls in my tower that she thinks I’m weird” (Participant 103). Task-related problems revolved around a problem in which the participant had to actively complete a task in order to solve. Task-related problems involved upcoming exams and assignments, financial difficulties, household responsibilities, and difficulty achieving work-life balance. An excerpt
from a task-related problem is: “In the next 2 weeks, I have a total of 3 midterms and 2 assignments due” (Participant 23). Although some problem descriptions were complex and contained multiple issues, coders were trained to identify the main problem and code accordingly. Coders were highly reliable (kappa = .75). In the event of a disagreement, the primary coders’ codes were used.

Next, two coders coded the subjective severity of the problem based on the degree of distress indicating by participants’ written descriptions. Coders used a five-point Likert scale ranging from 1 (Participant describes the problem with no emotional language or no indication of severity) to 5 (Participant describes the problem as very severe. Description includes several mentions of feeling distressed including “very stressed,” “very worried,” “a major problem”). Coders were quite reliable (ICC = .54, p < .001). Again, in the case of a disagreement between coders, the primary coders’ codes were used.

**Coding of Free Thought Listing Responses**

To further examine the effect of condition on problem-related distress, I analyzed participants’ responses on the free thought listing measure. Although the instructions did not refer to the problem, in some cases, participants chose to write about their problem. Some participants described feeling less distressed about the problem and better able to solve the problem than they were at the beginning of the study, whereas in other cases participants described still feeling distressed about their problem. Therefore, two coders (blind to condition) coded the contents of the Free Thought Listing. Coders coded whether the participants response on the free thought listing referenced the problem in a negative way. Responses that did not mention the problem at all, or mentioned the problem in a neutral or positive way were coded 0, and responses that mentioned the problem in a negative way were coded 1. Coders were quite
reliable (kappa = .59). An example of a response where the participant expressed continued worry about the problem:

As I reflect back on this situation, it bothered me a lot at the beginning and then I went through a phase where I didn't care anymore. I was even debating on moving out but I didn't want to leave my other friends and they might not understand why, as we didn't really discuss the situation. However, discussing/writing out this situation made me care again. It's upsetting to see tension and negative feelings towards one of your best friends from high school.

An example of a response where the participant was no longer worried about the problem:

I'm feeling motivated, I want to walk out the door, go to the library or home and enact those plans. I want to write down my plan on paper I can keep before I forget. I forgot to write the good advice my mom gave me on the other sheet, sit and think about what and why you are avoiding and then let yourself know that you are safe.

Coding of Solution Effectiveness

Next, participants’ written solutions to the problems were coded. I consulted research that used the MEPS Task (Anderson et al., 2009; Platt & Spivack, 1975; Yoman & Edelstein, 1993) to develop a coding scheme to measure the subjective effectiveness of the solutions. Coders were instructed to consider the entire set of solutions or steps provided by the participant. Following Yoman and Edelstein (1993), coders considered a solution to be effective if they judged that it would change “the environment in the desired fashion with no untoward social consequences” (p. 410) and “maximize the number, value, and probability of positive consequences (benefits) and minimize the number, value, and probability of negative consequences (costs)” (p. 415). Solutions were rated on a Likert scale ranging from 1 (Not at all effective) to 5 (Very effective). Unfortunately, coders were unable to achieve adequate reliability on this measure of effectiveness. In addition, effectiveness was strongly positively correlated with number of steps in the solution ($r = .64, p < .001$) and moderately positively correlated with solution word count ($r = .16, p = .035$). Therefore, I chose not to use this subjective measure of effectiveness.
I measured effectiveness using two objective measures: solution word count and number of steps in the solution. Microsoft Word’s word count feature was used to obtain word counts for each solution. Following Anderson et al., (2011) coders also coded the number of “relevant means” or discrete steps judged to be relevant to solving the problem. Coders were highly reliable at coding the number of steps listed in the participant’s problem solution (ICC = 94, $p < .001$). The primary coders’ codes were used for all analyses.

**Study 2 Results**

**Missing Data and Exploratory Data Analysis**

First, I conducted exploratory data analyses including examining the descriptive statistics for each of the major independent (i.e., awe experienced, reflection, rumination) and dependent variables (i.e., distress, solution word count, steps in the solution). All major independent and dependent variables were normally distributed (skewness and kurtosis < ± 3.00) with the exception of number of steps in solution which was leptokurtic (kurtosis = 4.76). I also examined all of the major independent and dependent variables for univariate outliers. I identified one outlier on the number of steps in solution variable (number of steps in solution = 13). Removing the outlier reduced the kurtosis value to 0.62 which is acceptable. I chose to remove the outlier from the dataset for all analyses involving the steps in solution variable because tests of variability are generally not robust to deviations from normality involving problems with kurtosis (DeCarlo, 1997).

Next, I examined scatterplots of the major independent and dependent variables to determine whether they met the assumption of linearity. All variables appeared to be related to one another in a linear fashion. I also conducted a missing data analysis. Less than 1% of
responses were missing on each of the independent and dependent variables, with the majority of variables having 100% response rates. I used listwise deletion for all analyses.

Table 3 displays the means, standard deviations, and correlations for each major independent and dependent variable.

Table 3

Means, Standard Deviations, and Correlations for Key Variables

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<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Awe experienced</td>
<td>3.53</td>
<td>2.26</td>
<td>--</td>
<td>0.05</td>
<td>0.20**</td>
<td>0.09</td>
<td>-0.06</td>
<td>-0.02</td>
<td>0.22**</td>
</tr>
<tr>
<td>2. Rumination</td>
<td>2.77</td>
<td>0.78</td>
<td>--</td>
<td>0.19*</td>
<td>0.40***</td>
<td>0.21**</td>
<td>0.01</td>
<td>0.18*</td>
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</tr>
<tr>
<td>3. Reflection</td>
<td>3.00</td>
<td>0.69</td>
<td>--</td>
<td>-0.09</td>
<td>-0.09</td>
<td>-0.04</td>
<td>0.21**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Distress</td>
<td>4.85</td>
<td>1.20</td>
<td>--</td>
<td>0.38**</td>
<td>0.18*</td>
<td>0.15*</td>
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<td></td>
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</tr>
<tr>
<td>5. Problem severity</td>
<td>3.09</td>
<td>0.90</td>
<td>--</td>
<td>0.21*</td>
<td>0.23**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Steps in solution</td>
<td>3.51</td>
<td>1.64</td>
<td>--</td>
<td>0.12</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
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<td>7. Solution length</td>
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</tr>
</tbody>
</table>

Note. M, SD, and correlations with Steps in solution variable based on n = 179 (outlier removed)
* p < .05, **p < .01, ***p < .001

In the dataset as a whole, the extent to which participants experienced awe was positively correlated with reflection and solution length, but awe experienced was unrelated to rumination, problem-related distress, and the number of steps in the solution. Next, I examined the means and standard deviations for each major independent and dependent variable by condition (see Table 4).
Table 4

Means, Standard Deviations, and Correlations for Key Variables by Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awe</td>
<td>1. Awe experienced</td>
<td>5.58</td>
<td>1.60</td>
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<td>-.07</td>
<td>.12</td>
<td>.04</td>
<td>-.22</td>
<td>-.02</td>
<td>.06</td>
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<tr>
<td></td>
<td>(n = 59)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>2. Ruminination</td>
<td>2.83</td>
<td>0.80</td>
<td>--</td>
<td>.25</td>
<td>.34**</td>
<td>.21</td>
<td>.15</td>
<td>.29*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Reflection</td>
<td>3.12</td>
<td>0.66</td>
<td>--</td>
<td>-.08</td>
<td>-.11</td>
<td>-.06</td>
<td>.26*</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>4. Distress</td>
<td>4.95</td>
<td>1.18</td>
<td>--</td>
<td>.34**</td>
<td>.24</td>
<td>.29*</td>
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<tr>
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<td>5. Problem severity</td>
<td>3.07</td>
<td>0.91</td>
<td>--</td>
<td>.30*</td>
<td>.18</td>
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<td>6. Steps in the solution</td>
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<td>7. Solution length</td>
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<tr>
<td>Amusement</td>
<td>1. Awe experienced</td>
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<td>1.64</td>
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<td>-.04</td>
<td>.02</td>
<td>.07</td>
<td>.10</td>
<td>.01</td>
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<td>(n = 59)</td>
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<td>2. Ruminination</td>
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<tr>
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<td>.26*</td>
<td>-.03</td>
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<tr>
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<td>4. Distress</td>
<td>4.71</td>
<td>1.22</td>
<td>--</td>
<td>.51***</td>
<td>.08</td>
<td>.10</td>
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<tr>
<td></td>
<td>5. Problem severity</td>
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<td>0.81</td>
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<td>-.00</td>
<td>.39**</td>
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</tr>
<tr>
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<td></td>
<td>7. Solution length</td>
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<tr>
<td>Control</td>
<td>1. Awe experienced</td>
<td>2.60</td>
<td>1.97</td>
<td>--</td>
<td>.12</td>
<td>.29*</td>
<td>.08</td>
<td>-.05</td>
<td>-.07</td>
<td>.14</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>2. Ruminination</td>
<td>2.86</td>
<td>0.78</td>
<td>--</td>
<td>-.03</td>
<td>.63***</td>
<td>.28*</td>
<td>-.05</td>
<td>.06</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Reflection</td>
<td>3.00</td>
<td>0.65</td>
<td>--</td>
<td>-.19</td>
<td>.05</td>
<td>-.03</td>
<td>.21</td>
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</tr>
<tr>
<td></td>
<td>4. Distress</td>
<td>4.89</td>
<td>1.19</td>
<td>--</td>
<td>.30*</td>
<td>.22</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Problem severity</td>
<td>3.27</td>
<td>0.96</td>
<td>--</td>
<td>.28*</td>
<td>.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Steps in the solution</td>
<td>3.60</td>
<td>1.52</td>
<td>--</td>
<td>.25*</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Solution length</td>
<td>69.79</td>
<td>23.73</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. M’s, SD’s, and correlations with Steps in solution variable n = 179 (outlier removed)
*p < .05, ** p < .01, ***p < .001

Manipulation Checks

To confirm that participants in the awe condition experienced more awe while watching the video than participants in the control and amusement conditions did, a one-way analysis of variance (ANOVA) was conducted with awe experienced as the dependent variable and condition (i.e., awe, amusement, and control) as the independent variable. The ANOVA was significant ($F(2, 177) = 60.24, p < .001, \eta^2 = .40$) indicating that awe experienced did vary by condition. Post-hoc tests revealed that participants in the awe condition reported experiencing significantly more awe ($M = 5.58, SD = 1.60$) than participants in the amusement ($M = 2.46, SD = 1.64$) or control ($M = 2.60, SD = 1.97$) conditions did.
To confirm that participants in the amusement condition experienced more amusement while watching the video than those in the control and awe conditions, a one-way ANOVA was conducted with amusement experienced as the dependent variable and condition (i.e., awe, amusement, and control) as the independent variable. The ANOVA was significant \((F (2, 176) = 42.64, p < .001, \eta^2 = .48)\) indicating that amusement experience varied by condition. Post-hoc tests indicated that participants in the amusement condition experienced significantly more amusement \((M = 5.14, SD = 1.22)\) than those in the awe \((M = 3.91, SD = 1.90)\) or control \((M = 2.39, SD = 1.72)\) conditions did. Thus, the manipulations to elicit awe and amusement were effective.

**Analysis of Problem Type**

Slightly more than half of participants wrote about task-related problems \((N = 95, 53\%)\) and just under half of participants wrote about interpersonal problems \((N= 85, 47\%)\). An independent samples \(t\)-test comparing the severity of interpersonal and task-related problems revealed that task-related problems \((M = 3.35, SD = .83)\) were rated as more severe than interpersonal problems \((M = 2.81, SD = .89; t (178) = 4.19, p < .001)\).

**Main Analyses**

**Awe and problem-related distress.** To determine whether participants in the awe condition experienced less problem-related distress than participants in the amusement or control conditions did, I conducted a one-way ANOVA comparing mean problem-related distress (as measured by the five-item distress scale; \(\alpha = .85\)) for participants in each of the three conditions. The ANOVA was not significant \((F (2, 177) = .65, p = .525, \eta^2 = .01)\) indicating that, contrary to hypothesis, participants in the awe condition did not experience less problem-related distress \((M\)
than those in the amusement (M = 4.71, SD = 1.22) or control (M = 4.89, SD = 1.95) conditions did.

Next, I tested whether condition, awe experienced, and self-focus (i.e., rumination and reflection) predicted problem-related distress. Because the independent variable, condition, was multi-categorical (i.e., it had more than two levels), I created two dummy codes to represent the three conditions. Table 5 displays the dummy codes used for this analysis.

Table 5

<table>
<thead>
<tr>
<th>Dummy Coding of Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awe</td>
</tr>
<tr>
<td>D1</td>
</tr>
<tr>
<td>D2</td>
</tr>
</tbody>
</table>

I included severity as a covariate in the analysis because severity was moderately positively correlated with distress (r = .38, p < .001) in the dataset as a whole. I conducted a hierarchical multiple regression analysis in which I regressed mean problem-related distress onto subjective problem severity (Step 1), the dummy codes representing condition, awe experienced, mean rumination, and mean reflection (Step 2). First, I examined the residuals to determine whether they met the assumptions of multiple regression. Residuals were independent and homoscedastic. Residuals also appeared to be normally distributed.

The first step of the regression was significant (R² = .14, F (1, 177) = 29.67, p < .001). Problem severity alone accounted for approximately 14% of variability in problem-related distress. The second step of the regression was also significant (ΔR² = .14, ΔF (5, 172) = 6.68, p < .001). Table 6 displays the unstandardized coefficients, significance levels and semi-partial correlations for the regression analysis. Severity, rumination, and reflection were significant predictors of problem-related distress. Participants whose problems were rated as more severe by
coders reported feeling more distressed at the end of the study. In addition, as hypothesized, reflection was negatively associated with distress and rumination was positively associated with distress. However, contrary to hypothesis, neither condition nor awe experienced significantly predicted problem-related distress.

Table 6

Results of Hierarchical Multiple Regression Analysis of Severity, Condition, Awe Experienced, Rumination, and Reflection on Problem-Related Distress

<table>
<thead>
<tr>
<th>Model</th>
<th>b</th>
<th>SE-b</th>
<th>p</th>
<th>sr²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>3.29</td>
<td>.30</td>
<td>&lt;.001</td>
<td>.14</td>
</tr>
<tr>
<td>Severity</td>
<td>.51</td>
<td>.09</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>2.57</td>
<td>.52</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Severity</td>
<td>.40</td>
<td>.09</td>
<td>&lt;.001</td>
<td>.08</td>
</tr>
<tr>
<td>Amusement condition</td>
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<td>.19</td>
<td>.709</td>
<td>.00</td>
</tr>
<tr>
<td>Awe condition</td>
<td>-.02</td>
<td>.23</td>
<td>.935</td>
<td>.00</td>
</tr>
<tr>
<td>Awe experienced</td>
<td>.07</td>
<td>.05</td>
<td>.127</td>
<td>.01</td>
</tr>
<tr>
<td>Reflection mean</td>
<td>-.27</td>
<td>.12</td>
<td>.026</td>
<td>.02</td>
</tr>
<tr>
<td>Rumination mean</td>
<td>.57</td>
<td>.11</td>
<td>&lt;.001</td>
<td>.12</td>
</tr>
</tbody>
</table>

Next, I tested whether there was an indirect effect of awe experienced and self-focus on problem-related distress. I tested the proposed serial multiple mediation model depicted in Figure 1 using PROCESS Version 2.13 (Hayes, 2013), regression-based path analysis software designed for use with SPSS. In serial multiple mediation analysis, the assumption that mediators are not causally associated with one another is rejected and a model is tested in which X (Condition) causes M1 (Awe Experienced) which in turn causes M2 (Reflection) which in turn causes Y (Problem-related distress). I reasoned that for participants in the awe condition, awe experienced
would predict reflection, which in turn would predict distress (Figure 1 shows the proposed model with the paths labelled).

![Diagram of the proposed path model testing the indirect effect of awe experienced and self-focus on distress.](image)

**Figure 1.** Proposed path model testing the indirect effect of awe experienced and self-focus on distress.

To test serial multiple mediation models using the PROCESS macro for SPSS, the independent variable must be continuous or dichotomous and cannot be multicategorical (Hayes, 2013). Therefore, I could not include all three conditions (i.e., awe, amusement and control) in my model. I chose to analyze participants in the awe condition compared to the control condition for this analysis, resulting in a sample of 121 participants. I entered condition, coded with 1 for awe and 0 for control, as the independent variable, awe experienced and reflection as the mediators, and distress as the dependent variable. I entered severity as a covariate. To test the significance of these effects, I used 95% bias-corrected bootstrap confidence intervals based on 10,000 bootstrap samples. Figure 2 and Table 7 depict the results of the serial multiple mediation analysis.
Figure 2. Path model of the indirect effect of awe experienced and reflection on distress.

Table 7

Regression Coefficients, Standard Errors, and Model Information for the Path Model Depicted in Figure 2

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Awe Experienced</th>
<th>Condition</th>
<th>95% CI</th>
<th>Awe Experienced</th>
<th>Reflection</th>
<th>Distress</th>
<th>95% CI</th>
<th>Coefficient (SE)</th>
<th>Coefficient (SE)</th>
<th>95% CI</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient (SE)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>i_1</td>
<td>3.37 (.62)</td>
<td>2.14</td>
<td>4.59</td>
<td>i_2</td>
<td>2.79 (.25)</td>
<td>2.30</td>
<td>3.28</td>
<td>i_3</td>
<td>4.13 (.62)</td>
</tr>
<tr>
<td>Condition</td>
<td>a_1</td>
<td>2.93 (.33)</td>
<td>2.28</td>
<td>3.58</td>
<td>a_2</td>
<td>-11 (.15)</td>
<td>-.41</td>
<td>.19</td>
<td>c'_1</td>
<td>-.09 (.27)</td>
</tr>
<tr>
<td>Awe Experienced</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>d_1</td>
<td>.08 (.03)</td>
<td>.01</td>
<td>.14</td>
<td>b_1</td>
<td>.09 (.06)</td>
</tr>
<tr>
<td>Reflection</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>b_2</td>
<td>-.29 (.16)</td>
<td>-.61</td>
<td>.03</td>
</tr>
<tr>
<td>Severity</td>
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<td>-.58</td>
<td>.11</td>
<td>.00 (.06)</td>
<td>-.13</td>
<td>.13</td>
<td>.42 (.11)</td>
<td>.20</td>
<td>.64</td>
<td></td>
</tr>
</tbody>
</table>

Consistent with the results of the multiple regression analysis above, I did not find evidence of a direct effect of condition on distress ($c' = -.09$; LCI = -.62, UCI = .44). Thus, contrary to my prediction, participants in the awe condition did not experience lower problem-related distress than participants in the control condition. Condition was a strong predictor of awe experienced, however. Participants in the awe condition reported significantly more awe than those in the control condition did, as indicated by the confidence intervals above zero. Awe experienced was also a positive predictor of reflection, and reflection was marginally negatively associated with distress (although the confidence interval straddled zero). The indirect effect
from condition to distress through awe experienced and reflection was significant (-.07; LCI = -.21, UCI = -.003). Thus, awe experienced and reflection mediated the relation between condition and distress, such that participants in the awe condition who experienced more awe and were more self-reflective experienced less problem-related distress.

Next, I tested the same serial multiple mediation model, except that I substituted mean rumination for mean reflection as one of the mediators. To test the significance of the direct effect of condition on distress and indirect effects through awe experienced and rumination, I used 95% bias-corrected bootstrap confidence intervals based on 10,000 bootstrap samples. Figure 3 and Table 8 depict the results of the serial multiple mediation analysis.

† p < .10, * p < .05, ** p < .01, *** p < .001

*Figure 3. Path model of the indirect effect of awe experienced and rumination on distress.*
The direct effect of condition on distress was not significant \( (c' = -0.02; \text{LCI} = -0.49, \text{UCI} = 0.46)\).

Thus, condition did not predict distress independent of the effect of awe experienced and rumination. Although rumination was a strong negative predictor of distress, where participants who ruminated more were more distressed, the indirect effect of condition on distress through awe experienced and rumination was not significant \( (.06; \text{LCI} = -0.07, \text{UCI} = 0.23)\). Thus, for participants in the awe condition relative to the control condition, awe experienced and rumination did not mediate the effect of condition on distress.

**Does the effect of experiencing awe differ depending on the type of problem?** Next, I tested whether the effect of condition (i.e., awe, amusement, or control) on distress differed depending on the type of problem the participant chose to write about. To test whether it is beneficial to experience awe when contemplating certain types of problems, I conducted a two-way factorial analysis of variance testing distress for participants who wrote about interpersonal or task-related problems in the awe, amusement, and control conditions. For this analysis, I used the four personal distress-related items (e.g., “how bothered are you about the problem you described?”) from the distress scale as the dependent variable and did not include the item

### Table 8

**Regression Coefficients, Standard Errors, and Model Information for the Path Model Depicted in Figure 3**

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Awe Experienced</th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient (SE)</td>
<td>LL</td>
<td>UL</td>
<td>Coefficient (SE)</td>
<td>LL</td>
<td>UL</td>
<td>Coefficient (SE)</td>
<td>LL</td>
</tr>
<tr>
<td>Constant</td>
<td>( i_1 )</td>
<td>3.37 (.62)</td>
<td>2.14</td>
<td>4.59</td>
<td>( i_2 )</td>
<td>2.08 (.30)</td>
<td>1.49</td>
</tr>
<tr>
<td>Condition</td>
<td>( a_1 )</td>
<td>2.93 (.33)</td>
<td>2.28</td>
<td>3.58</td>
<td>( a_2 )</td>
<td>-0.07 (.18)</td>
<td>-0.43</td>
</tr>
<tr>
<td>Awe Experienced</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>( d_1 )</td>
<td>0.03 (.04)</td>
<td>-0.04</td>
<td>0.11</td>
</tr>
<tr>
<td>Rumination</td>
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<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Severity</td>
<td>.21 (.08)</td>
<td>.06</td>
<td>.36</td>
<td>.21 (.08)</td>
<td>.06</td>
<td>.36</td>
<td>.29 (.10)</td>
</tr>
</tbody>
</table>

\( R^2 = .42 \) \hspace{1cm} \( R^2 = .06 \) \hspace{1cm} \( R^2 = .29 \)

\( F(2, 118) = 42.61, p < .001 \) \hspace{1cm} \( F(3, 117) = 2.66, p = .051 \) \hspace{1cm} \( F(4, 116) = 11.59, p < .001 \)
measuring perceived problem importance ($\alpha = .87$). The data met the assumption of homogeneity of variance. Participants who wrote about task-related problems were significantly more distressed than participants who wrote about interpersonal problem ($F(1, 174) = 10.47, p = .001, \eta^2 = .06$). The main effect of condition was not significant, indicating that participants in the three conditions felt equally distressed about their problem ($F(2, 174) = .58, p = .561, \eta^2 = .01$). The interaction between condition and problem type was also marginally significant ($F(2, 174) = 2.68, p = .072, \eta^2 = .03$) (See Table 9).

Table 9

Means and Standard Deviations of Problem-Related Distress by Condition and Problem Type

<table>
<thead>
<tr>
<th>Problem Type</th>
<th>Condition</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Awe (M (SD))</td>
<td>Amusement (M (SD))</td>
<td>Control (M (SD))</td>
<td></td>
</tr>
<tr>
<td>Interpersonal</td>
<td>4.59 (1.10)</td>
<td>4.47 (1.38)</td>
<td>4.97 (1.02)</td>
<td></td>
</tr>
<tr>
<td>Task-related</td>
<td>5.52 (.90)</td>
<td>5.19 (1.02)</td>
<td>4.98 (1.35)</td>
<td></td>
</tr>
</tbody>
</table>

I followed up the marginally significant interaction between condition and problem type by conducting pairwise comparisons using the least significant difference post-hoc test. As shown in Figure 4, among participants who wrote about interpersonal problems, distress did not differ by condition. However, among participants who wrote about task-related problems, participants in the awe condition felt marginally more distressed than participants in the control condition ($p = .062$).

---

1 I first tested the effect of condition on distress varied by problem type for the full five-item composite scale. The main effect of problem type was significant, but the effect of condition was not significant, nor was the interaction between condition and problem type. I examined the scale items separately and found that the results for the item measuring perceived importance of the problem was in the opposite direction as the results for the other four items, which measured problem-related distress. Therefore, I created a composite variable of the four distress-related items.
To further examine the unexpected finding that participants in the awe condition felt more distressed than those in the control condition when thinking about a task-related problem, I conducted a hierarchical multiple regression analysis using data from participants who wrote about task-related problems ($N = 95$). I conducted a hierarchical multiple regression analysis with problem-related distress as the dependent variable. First, I examined the variables to determine if the variables met the assumptions of multiple regression. The residuals were independent, normal, and homoscedastic.

The regression analysis was statistically significant ($F (6, 87) = 11.49, p < .001$). Taken together, the variables account for approximately 40% of variance in problem-related distress. As can be seen in Table 10, the dummy variables representing the conditions were not significant. However, for task-related problems only, awe experienced was a significant positive predictor of

---

**Figure 4.** Mean problem-related distress by problem type and condition.
distress. Participants who experienced more awe felt more distressed about their problems.

Rumination was a strong positive predictor of distress, and reflection was negatively associated with distress. For task-related problems, severity was not a significant predictor of distress, despite the strong relationship between severity and distress for interpersonal problems.

Table 10

*Multiple Regression Results for Severity, Condition, Awe Experienced, and Self-Focus*

*Predicting Distress: Task-Related Problems Only (N = 95)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>b</th>
<th>SE-b</th>
<th>p</th>
<th>sr²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>3.21</td>
<td>.64</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Severity</td>
<td>.11</td>
<td>.11</td>
<td>.305</td>
<td>.01</td>
</tr>
<tr>
<td>Amusement condition</td>
<td>.18</td>
<td>.22</td>
<td>.417</td>
<td>.00</td>
</tr>
<tr>
<td>Awe condition</td>
<td>.04</td>
<td>.25</td>
<td>.860</td>
<td>.00</td>
</tr>
<tr>
<td>Awe experienced</td>
<td>.13</td>
<td>.05</td>
<td>.007</td>
<td>.05</td>
</tr>
<tr>
<td>Reflection mean</td>
<td>-.45</td>
<td>.14</td>
<td>.002</td>
<td>.06</td>
</tr>
<tr>
<td>Rumination mean</td>
<td>.87</td>
<td>.12</td>
<td>&lt; .001</td>
<td>.31</td>
</tr>
</tbody>
</table>

*Analyzing responses on the Free Thought Listing Measure.* To test whether participants in the awe condition were less likely to write about their problem in a negative way on the Free Thought Listing measure, compared to participants in the amusement or control conditions, I conducted a logistic multiple regression analysis. Logistic regression is appropriate to use when the dependent variable is dichotomous. The dependent variable in this analysis was worry about the problem with 0 indicating that the participant did not write about being worried about their problem on the Free Thought Listing (that is, they did not write about the problem at all, they wrote about the problem in a neutral way, or they wrote about the problem in a positive way), and 1 indicating that the participant did write about being worried about their problem on the
Free Thought Listing. As displayed in Table 11, 72% of participants did not write about feeling worried about their problem on the Free Thought Listing measure, and 28% of participants did.

Table 11

*N's and Percentages of Coding Categories for Free Thought Listing*

<table>
<thead>
<tr>
<th>Mentions Problem?</th>
<th>No</th>
<th>Neutral</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>68</td>
<td>29</td>
<td>24</td>
<td>50</td>
</tr>
<tr>
<td>%</td>
<td>38</td>
<td>21</td>
<td>13</td>
<td>28</td>
</tr>
</tbody>
</table>

Next, I examined the point biserial correlations between the worry variable (with 0 indicating no worry and 1 indicating worry) and the other major independent variables (i.e., awe experienced, severity, reflection mean, and rumination mean). The worry variable was positively correlated with rumination ($r_{pb} = .25, p = .001$) and with severity ($r_{pb} = .16, p = .037$). Therefore, I chose to include severity and rumination as predictors in the logistic regression analysis, in addition to condition.

The test of the full model, including condition, severity, and rumination as predictors, against the model including the constant only was significant ($\chi^2 (2) = 17.53, p = .002$). This indicates that the predictors as a set reliably distinguish between participants who write about being worried about their problem and those who do not. Table 12 displays the results of the logistic regression analysis. The predictors explained approximately 14% of the variance in worry (Nagelkerke $R^2 = .14$) and the prediction success rate of the model was 74% (compared to 73% for the constant-only model). Rumination and being assigned to the awe condition relative to the control condition were significant predictors of continued worry about the problem. As rumination scores increased by one unit, the odds of writing about a problem in a negative way
increased. In contrast, participants in the awe condition had lower odds of writing about their problem in a negative way compared to participants in the control condition.

Table 12

Results of Logistic Regression Analysis Predicting Continued Worry About Problem

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>Wald</th>
<th>p</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-3.03</td>
<td>.93</td>
<td>10.53</td>
<td>.001</td>
<td>.048</td>
</tr>
<tr>
<td>Awe Condition</td>
<td>-.88</td>
<td>.44</td>
<td>4.04</td>
<td>.045</td>
<td>.41</td>
</tr>
<tr>
<td>Amusement Condition</td>
<td>-.61</td>
<td>.47</td>
<td>1.74</td>
<td>.187</td>
<td>.54</td>
</tr>
<tr>
<td>Severity</td>
<td>.31</td>
<td>.20</td>
<td>2.30</td>
<td>.129</td>
<td>1.36</td>
</tr>
<tr>
<td>Rumination</td>
<td>.72</td>
<td>.24</td>
<td>8.81</td>
<td>.003</td>
<td>2.05</td>
</tr>
</tbody>
</table>

Awe and problem solving effectiveness: Solution length.

Preliminary analyses. Using a one-way ANOVA, I compared the number of words that participants wrote to describe their problem across the three conditions (i.e., awe, amusement, and control). Surprisingly, the problem description word count did differ by condition ($F(2, 177) = 3.19, p = .043, \eta^2 = .03$). Specifically, participants in the control condition ($M = 89.27, SD = 28.80$) wrote significantly more words to describe their problem than did participants in the awe condition ($M = 76.68, SD = 27.90$) and marginally more words than did participants in the amusement condition ($M = 79.37, SD = 30.17$). Therefore, I controlled for problem length in all analyses of solution length.

Main analyses. A one-way ANOVA comparing solution length across conditions approached significance ($F(2, 177) = 2.68, p = .071, \eta^2 = .03$). Participants in the awe condition wrote significantly longer solutions ($M = 79.47$ words, $SD = 33.78$ words) than participants in the amusement condition did ($M = 68.68$ words, $SD = 25.44$ words; $p = .037$), and marginally longer solutions than those in the control condition did ($M = 69.79$ words, $SD = 23.73$ words; $p = .058$). Solutions written by participants in the amusement and control conditions did not differ in
length ($p = .827$). Next, I conducted mediation analyses to test whether awe experienced and self-focus (i.e., rumination and reflection) mediated this effect.

To conduct the mediation analyses, I used PROCESS Version 2.13 (Hayes, 2013), regression-based path analysis software designed for use with SPSS. As in the analyses involving problem-related distress, I used two dummy codes to represent the three conditions. D1 compares participants in the amusement condition to participants in the control condition, and D2 compares participants in the awe condition to participants in the control condition.

I conducted ordinary least squares regression analyses to test the model depicted in Figure 5 (also controlling for problem word length and problem severity). Separate models were conducted testing rumination and reflection as possible mediators.

![Diagram](image)

*Figure 5. Proposed multiple mediation model of condition predicting solution length through awe experienced and self-focus.*

To test this model, I conducted two regression analyses using solution length as the dependent variable (see Hayes & Preacher, 2014 for a discussion of testing mediation models with multicategorical independent variables). In the first analysis, I entered D1 (the dummy
coded variable comparing the amusement condition to the control condition) as the independent variable, awe experienced and reflection as mediators, and problem word count, subjective severity, and D2 (the dummy coded variable comparing the awe condition to the control condition) as control variables. In the second analysis, I entered D2 as the independent variable, awe experienced and reflection as mediators, and problem word count, subjective severity, and D1 as control variables.

As shown in Figure 6 and Table 13, the results of the mediation analysis revealed that condition indirectly influenced solution word length through its effects on awe experienced and reflection. A bias-corrected bootstrap confidence interval based on 10,000 bootstrap samples for the total indirect effect was entirely above zero (.44 to 16.01) for participants in the awe condition relative to the control condition. In other words, awe experienced and reflection mediated the relation between condition and solution word count, above-and-beyond the effect of problem severity and problem length. The relative indirect effect of condition on awe experienced was also significant for participants in the awe condition compared to the control condition. Being assigned to the awe condition caused participants to report having experienced more awe. The experience of awe, in turn, predicted the number of words written in the solution. Holding condition constant, participants who experienced more awe wrote significantly longer solutions. The indirect effect of reflection on solution length was also significant. Holding condition constant, participants who were more reflective after viewing the video wrote longer solutions. Problem severity and problem length were significant predictors of solution word count in the overall model. Specifically, participants who experienced more severe problems wrote significantly longer solutions, and participants who wrote longer problem descriptions wrote significantly longer problem solutions. However, even after controlling for the effects of
problem severity and problem length, awe experienced and reflection mediated the relation between condition and solution length for participants in the awe condition. The direct effect of condition on solution length (controlling for problem severity and problem length) was not significant. The confidence interval included zero (LCI = -2.33, UCI = 18.57) indicating that after controlling for subjective problem severity and problem word length, written solution length did not vary by condition.

* p < .05

Figure 6. Path diagram for multiple mediation analysis of the effect of condition on solution length through awe experienced and reflection.
To further investigate the effect of awe experienced and reflection on solution length, I conducted a serial multiple mediation model analysis testing whether condition predicted awe experienced, which in turn predicted reflection, which in turn predicted solution length. I hypothesized that for participants in the awe condition, awe experienced would predict reflection, which in turn would predict solution word length (Figure 7 shows the proposed model with the paths labelled).

**Figure 7. Proposed serial multiple mediation model of condition predicting solution length through awe experienced and reflection.**

Because the independent variable must be continuous or dichotomous to test a serial multiple mediation model using PROCESS (Hayes, 2013), I chose to include only participants in

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Awe Experienced</th>
<th>Reflection</th>
<th>Solution Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient (SE)</td>
<td>LL</td>
<td>UL</td>
</tr>
<tr>
<td>Constant</td>
<td>i_1 3.17*** (0.61)</td>
<td>1.96</td>
<td>4.38</td>
</tr>
<tr>
<td>D1</td>
<td>a_1 -0.23 (0.33)</td>
<td>-0.88</td>
<td>0.42</td>
</tr>
<tr>
<td>D2</td>
<td>a_2 2.93*** (0.32)</td>
<td>2.29</td>
<td>3.57</td>
</tr>
<tr>
<td>Awe Experienced</td>
<td>b_1 2.45* (1.03)</td>
<td>0.42</td>
<td>4.49</td>
</tr>
<tr>
<td>Severity</td>
<td>-0.11 (0.15)</td>
<td>-0.41</td>
<td>0.19</td>
</tr>
<tr>
<td>Problem Length</td>
<td>-0.00 (0.00)</td>
<td>-0.01</td>
<td>0.01</td>
</tr>
</tbody>
</table>

\[ R^2 = .41, ~ F(4, 174) = 30.34, p < .001 \]
\[ R^2 = .05, ~ F(4, 174) = 2.23, p = .07 \]
\[ R^2 = .33, ~ F(6, 172) = 13.82, p < .001 \]
the awe condition and the control condition for this analysis. I entered condition, coded with 1 for awe and 0 for control, as the independent variable, awe experienced and reflection as the mediators, and solution length as the dependent variable. As in the previous model, I entered problem length and problem severity as covariates. To test the significance of these effects, I used 95% bias-corrected bootstrap confidence intervals based on 10,000 bootstrap samples.

Figure 8 and Table 14 depict the results of the serial multiple mediation analysis.

Figure 8. Serial multiple mediation model for condition (awe versus control) predicting solution length through awe experienced and reflection (N = 121).

Table 14

<table>
<thead>
<tr>
<th>Regression Coefficients, Standard Errors, and Model Information for the Parallel Multiple Mediator Model Depicted in Figure 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antecedent</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>Coefficient (SE)</td>
</tr>
<tr>
<td>Constant ( i_1 )</td>
</tr>
<tr>
<td>Condition ( a_1 )</td>
</tr>
<tr>
<td>Awe Experienced ( d_1 )</td>
</tr>
<tr>
<td>Reflection ( b_2 )</td>
</tr>
<tr>
<td>Severity ( -0.19 (.01) )</td>
</tr>
<tr>
<td>Problem Length ( -0.01 (.01) )</td>
</tr>
<tr>
<td>( R^2 = .43 )</td>
</tr>
</tbody>
</table>

\( F (3, 117) = 29.04, p < .001 \) \( F (4, 116) = 2.50, p = .046 \) \( F (5, 115) = 9.22, p < .001 \)

As in the parallel multiple mediation model tested above, the direct effect of condition on solution length (excluding awe experienced and reflection) was not significant. After controlling
for problem severity and problem length, participants in the awe condition did not write longer solutions than those in the control condition \((p = .152, \text{LCL} = -3.24, \text{UCL} = 20.65)\). However, for participants in the awe condition relative to the control condition, awe experience predicted reflection, which in turn predicted solution length. The indirect effect of condition on solution length through awe experienced and reflection was significant as the confidence interval was entirely above zero \((.26 \text{ to } 4.74)\). Participants in the awe condition experienced more awe than those in the control condition did. Participants who experienced more awe were more reflective, and this increased reflection was associated with writing longer solutions.

Next, I conducted the same multiple mediation analyses substituting rumination for reflection as one of the mediators. In the first regression analysis, I entered D1 as the independent variable, awe experienced and rumination as mediators, and problem severity, problem length, and D2 as covariates. In the second analysis I, I entered D2 as the independent variable, awe experienced and rumination as mediators, and problem severity, problem length, and D1 as covariates.

![Path diagram for multiple mediation analysis of the effect of condition on solution word count through awe experienced and rumination.](image)

*Figure 9.* Path diagram for multiple mediation analysis of the effect of condition on solution word count through awe experienced and rumination.
As can be seen from Figure 9 and Table 15, for participants in the awe condition relative to the control condition, condition predicted solution length indirectly through awe experienced. Participants in the awe condition relative to the control condition experienced more awe, and those who experienced more awe wrote longer solutions, controlling for problem severity and problem length. However, rumination was not a significant mediator of the relation between condition and solution length for participants in the amusement or control conditions. Thus, rumination does not appear to be an important predictor of solution length.

**Awe and solution effectiveness: Steps in the solution.** To further examine the effectiveness of participants’ solutions, I investigated the number of discrete steps to solve the problem that the participant generated. Examining the descriptive statistics for this variable revealed an outlier. With the outlier included in the dataset, the number of steps variable was leptokurtic (kurtosis = 4.05). I removed the outlier participant’s data from the dataset for all analyses involving number of steps in solution and the kurtosis value was reduced to .619, which is acceptable. Interestingly, when the outlier was included in the analysis, the number of steps variable was positively correlated with solution word count ($r = .22$ p = .003) but when it was...
removed from the dataset, number of steps was no longer correlated with solution word count ($r = .12, p = .104$).

To examine whether experiencing awe led participants to generate more steps to solve their problems, I conducted a one-way ANOVA with condition as the independent variable and number of steps as the dependent variable. The ANOVA was not significant ($F(2, 176) = .139, p = .871, \eta^2 = .001$). Participants in the awe condition ($M = 3.50, SD = 1.86$) did not write more steps than participants in the control ($M = 3.60, SD = 1.52$) or amusement conditions ($M = 3.44, SD = 1.56$) did.

Next, I examined whether there was an indirect effect of awe experienced and self-focus on number of steps generated by participants. Figure 10 depicts the proposed indirect model. I also included severity as a covariate.

*Figure 10. Proposed multiple mediation model of the effect of condition on steps in solution through awe experienced and self-focus.*

First, I tested whether awe and reflection mediated the relationship between condition and number of steps in the solution. Using PROCESS, I regressed steps in the solution onto D1,
awe experienced, reflection, D2, and severity (covariates). Next, I re-ran the analysis with D2 as the independent variable and D1 and severity as the covariates. Table 16 displays the unstandardized coefficients, standard errors, and 95% confidence intervals for the analysis. As can be seen in Table 16 and Figure 11, neither the direct effects of condition on steps in the solution, nor the indirect effects through reflection and awe experienced were significant.

Table 16

*Multiple Mediation Model for Condition Predicting Number of Steps in Solution Through Awe Experienced and Reflection*

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Awe Experienced</th>
<th>95% CI</th>
<th>Reflection</th>
<th>95% CI</th>
<th>Steps in Solution</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>i1 3.03 (.52)</td>
<td>2.01</td>
<td>i2 3.25 (.21)</td>
<td>2.84</td>
<td>i3 2.53 (.78)</td>
<td>.99</td>
</tr>
<tr>
<td>D1</td>
<td>a1 -.21 (.32)</td>
<td>-.84</td>
<td>a3 -.16 (.13)</td>
<td>-.41</td>
<td>.09</td>
<td>c'1 -.04 (.30)</td>
</tr>
<tr>
<td>D2</td>
<td>a2 3.05 (.31)</td>
<td>2.43</td>
<td>a4 .11 (.13)</td>
<td>-.14</td>
<td>.36</td>
<td>c'2 .02 (.37)</td>
</tr>
<tr>
<td>Awe Experienced</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>b1 -.01 (.07)</td>
<td>-.16</td>
</tr>
<tr>
<td>Reflection</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>b2 -.04 (.18)</td>
<td>-.40</td>
</tr>
<tr>
<td>Severity</td>
<td>-.13 (.14)</td>
<td>-.42</td>
<td>-.08 (.13)</td>
<td>-.19</td>
<td>.04</td>
<td>.37 (.14)</td>
</tr>
</tbody>
</table>

$R^2 = .44$  
$R^2 = .03$  
$R^2 = .04$

$F (3, 174) = 45.06, p < .001$  
$F (3, 174) = 1.93, p = .127$  
$F (5, 172) = 1.58, p = .167$

*** $p < .001$

*Figure 11.* Multiple mediation model of the effect of condition on steps in solution through awe experienced and reflection.
Finally, I tested whether the negative form of self-focus (i.e., rumination) and awe experienced mediated the relationship between condition and number of steps in the solution. Using PROCESS, I regressed steps in the solution onto D1, awe experienced, rumination, D2, and severity (covariates). Next, I re-ran the analysis with D2 as the independent variable and D1 and severity as the covariates. Table 17 displays the unstandardized coefficients, standard errors, and 95% confidence intervals for the analysis. As can be seen in Table 17 and Figure 12, neither the direct effects of condition on steps in the solution, nor the indirect effects through rumination and awe experienced were significant.

Table 17

Multiple Mediation Model for Condition Predicting Number of Steps in Solution Through Awe Experienced and Rumination

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Coefficient (SE)</th>
<th>95% CI</th>
<th>Coefficient (SE)</th>
<th>95% CI</th>
<th>Coefficient (SE)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>i₁</td>
<td>3.03 (.52)</td>
<td>2.01</td>
<td>4.05</td>
<td>i₂</td>
<td>-.46 (.23)</td>
</tr>
<tr>
<td>D1</td>
<td>a₁</td>
<td>-.21 (.32)</td>
<td>-.84</td>
<td>.41</td>
<td>a₃</td>
<td>-.18 (.14)</td>
</tr>
<tr>
<td>D2</td>
<td>a₂</td>
<td>3.05 (.31)</td>
<td>2.43</td>
<td>3.67</td>
<td>a₄</td>
<td>.001 (.14)</td>
</tr>
<tr>
<td>Awe experienced</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Rumination</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Severity</td>
<td>-.13 (.14)</td>
<td>-.42</td>
<td>.15</td>
<td>.17 (.06)</td>
<td>.04</td>
<td>.29</td>
</tr>
</tbody>
</table>

F (3, 176) = 45.06, p < .001  F (3, 174) = 3.32, p = .021  F (5, 172) = 1.66, p = .159

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Figure 12. Multiple mediation model of the effect of condition on steps in solution through awe experienced and rumination.

**Study 2 Discussion**

In Study 2, I examined the effects of experiencing awe on problem-related distress and problem solving effectiveness (operationally defined as solution length and number of steps in the solution). I hypothesized that participants exposed to the awe-inducing video would experience less problem-related distress than participants exposed to the amusing or neutral videos. I also hypothesized that the proposed relations between awe and distress would be mediated by self-focus. I found some evidence that experiencing awe in a laboratory setting does decrease problem-related distress and improve problem solving ability, but only for certain types of problems. In addition to the benefits of experiencing awe documented in numerous studies, including deeper cognitive processing (Griskevicius et al., 2010), increased well-being (Van Cappellen, & Sargolou, 2012), and an increased sense of time availability (Rudd et al., 2012), under certain circumstances and for certain types of problems, experiencing awe may be beneficial when thinking about an ongoing personal problem.
Awe and Problem-Related Distress

Although condition did not directly predict distress, I did find some evidence that experiencing awe was associated with lessened distress when thinking about an ongoing personal problem. Specifically, when examining both problem types, I found that for participants in the awe condition compared to the control condition, greater feelings of awe led to deeper reflection, which in turn led to decreased problem-related distress. This indirect effect provides some support for the hypothesis that experiencing awe may decrease problem-related distress in certain circumstances. Consistent with participants’ reports of the consequences of experiencing awe in Study 1, it appears that experiencing awe may have led participants to feel more self-reflexive, which led them to feel less distressed about the problem in the grand scheme of things.

Rumination was also a strong negative predictor of distress, but this type of self-focus was unrelated to condition or the degree to which participants experienced awe when watching the video. Contrary to hypothesis, experiencing awe did not decrease rumination. Thus, any decrease in problem-related distress associated with experiencing awe was not due to a decrease in rumination. Experiencing awe does not appear to function by distracting participants from their problem, or breaking the negative cycle of rumination. Instead, experiencing awe seems to increase positive self-reflection, which may make participants think about their problem in a new way, and therefore experience less distress.

Further evidence that the experience of awe may be beneficial when thinking about an ongoing personal problem came from the analysis of participants’ responses on the free thought listing measure. On this questionnaire, participants were instructed to describe what they were thinking at the time. Even though participants were not instructed to write about their problem, almost two thirds of participants’ responses on the Free Thought Listing measure made reference
to their problem, indicating that the problem was still on their mind. Participants in the awe condition were less likely than those in the control condition to write about their problem in a negative way when given the opportunity to write about anything that was on their mind. This somewhat indirect measure of problem-related concern provides converging support for the finding that experiencing awe can be beneficial when thinking about an ongoing personal problem.

**The Importance of Problem Type**

I also examined the relationship between awe and problem-related distress for different types of problems. Approximately half of participants wrote about interpersonal problems, and half wrote about task-related problems. Interpersonal problems were less severe and less distressing than task-related problems. I found evidence that the beneficial effects of experiencing awe disappeared for participants who wrote about task-related problems. In fact, participants in the awe condition who wrote about task-related problems reported feeling marginally *more* distressed than participants in the control condition did.

For task-related problems, rumination, reflection, and awe experienced were all strong predictors of problem-related distress. As in the overall analyses, greater rumination was associated with more distress, and greater reflection was associated with less distress. Awe experienced was a significant predictor of distress for task-related problems, but in the opposite direction as predicted. Participants who experienced more awe (across all three conditions) were more distressed when thinking about their task-related problems. One possible explanation for these surprising results involves the consequences of experiencing awe. Research suggests that experiencing awe leads to feelings of insignificance in contrast to the vastness of the eliciting stimulus. Participants in Study 1 described feeling small in comparison to vast environments, and
other researchers, including Shiota and colleagues (2007) have found similar results. This feeling of insignificance may sometimes be beneficial if it puts problems into perspective. However, in some circumstances, such as when one is thinking about how to solve a difficult personal problem, feeling small may be not be beneficial. Task-related problems included worry about upcoming papers and exams, financial concerns, and anxiety about finding a summer job. For these types of problems, which required active solutions, feeling small may lead to feelings of inadequacy to conquer the difficult task at hand.

**Awe and Solution Effectiveness**

I measured problem solving effectiveness in two ways: number of steps in the solution, and number of words in the solution. I found that participants in the awe condition wrote longer solutions than participants in the control condition did. The relationship between condition and solution length was mediated by awe experienced and reflection. This indirect effect was found even after controlling for the number of words written by participants to describe their problem and the severity of the problem. Thus, it is not simply that certain participants were more verbose than others (although problem length was a significant positive predictor of solution length) or that more severe problems warranted longer solutions (although severity was also a significant positive predictor of solution length). Instead, participants who scored higher on the measure of self-reflection wrote more about their problem when instructed to try to solve it. Therefore, experiencing awe may encourage deeper reflection about an ongoing personal problem. These results support participants’ descriptions of awe leading them to “think about things in new ways” from Study 1.

The experience of awe was not associated with the generation of more steps to solve the problem, however. Therefore, participants’ longer solutions were not longer simply because they
contained more steps to solve the problem. This null finding suggests that participants in the awe condition may have reflected on their problems in writing without necessarily attempting to solve the problem. It is possible that because the experience of awe tended to lead to decreased distress (except for task-related problems), participants in the awe condition were no longer motivated to generate several solutions to the problem, because the problem now seemed less distressing. Thus, participants who experienced more awe may have reflected more deeply about their problem (as evidenced by the longer written solution) but not necessarily generated more steps to solve the problem.

**Limitations and Future Directions**

The design of the study, in which participants were instructed to record the steps they could take to solve the problem may have resulted in a limited test of the consequences of experiencing awe. In Study 1, I found that participants described benefits of experiencing awe including re-evaluating a negative situation, feeling connected to others, and feeling a sense of calm in the midst of negativity. It is possible that after watching the awe-inducing video, participants experienced similar effect of awe. However, because they were instructed to write the steps they could take to solve the problem, as opposed to simply being instructed to reflect (in writing) on the problem, it was not possible to test these consequences. Experiencing awe may reduce the perceived importance of the problem, to the extent that participants may no longer feel that the problem requires an active solution. Because of the design of the study, however, participants were not given a chance to engage in this process of reappraisal. Future research on the effects of experiencing awe on social problem solving ability and distress should include time for participants to reflect on their problem, and allow participants to make the decision about whether or not to attempt to “solve” the problem.
The measure of problem solving effectiveness was also somewhat limited. I planned to examine subjective ratings of problem effectiveness, but was unable to achieve adequate inter-rater reliability to perform these analyses. Research on social problem solving typically involves participants solving hypothetical problems. Thus, solution effectiveness can be scored using an agreed upon metric for the “best” solution to the problem. In this study, participants wrote about a real ongoing problem. These problems varied widely, and it proved impossible for coders to reliably rate the effectiveness of the solutions. Therefore, I chose to measure solution effectiveness using objective measures: word count and number of steps in the solution. It could be argued that more writing about one’s problem (whether more words or more steps), does not necessarily equate to better solutions. However, I reasoned that longer solutions and more steps in the solution may reflect deeper thinking about an issue. In addition, creativity research and social problem solving research both judge problem solving effectiveness by the number of “relevant means” or steps in the solution (e.g., Yoman & Edelstein, 1993). Future research could examine problem solving ability for hypothetical social problems, or logic-based problems with objective right or wrong answers, to allow for easier analysis of solution effectiveness.

A related limitation involved the somewhat low inter-rater reliability scores on the measures of problem severity and the measure of continued worry about the problem. This low (but still acceptable) inter-rater reliability reflects the difficulty associated with coding open-ended responses. However, the richness gained from allowing participants to write about a real problem from their own life, as opposed to trying to solve a scripted problem to facilitate easy coding, may justify the lower inter-rater reliability scores.

Another limitation concerned the sample characteristics. Participants were undergraduate university students and the study was conducted at a time when many students were preparing
for midterm exams. Not surprisingly, participants tended to describe problems associated with life for a university student, including conflicts with roommates and difficulty completing school assignments. It is possible that the links between awe and problem-related distress and problem solving effectiveness found in this study reflect the developmental stage of the participants. Future research could examine the relation between experiencing awe and social problem solving distress and problem solving ability in a more diverse sample of participants.

Despite these limitations, in Study 2, I found evidence that experiencing awe leads to greater reflection, longer solutions, and (indirectly) less problem-related distress (except for when thinking about a task-related problem). To my knowledge, this study was the first to test the effects of experiencing awe when thinking about a personally-meaningful problem. In Study 1, many participants described how experiencing awe in the midst of a difficult time lifted them out of despair and anxiety. Study 2 tested this effect in the laboratory and found evidence that experiencing awe is often, but not always, beneficial when thinking about a personal problem (especially an interpersonal problem). Study 3 expands upon these results to test the effects of experiencing awe on well-being.

**Study 3**

**Study Overview**

Study 3 tested whether a social psychological intervention designed to elicit awe would lead to sustained improvements in well-being. Although research shows that there are many benefits to experiencing awe, to date, no study has directly examined the effectiveness of inducing awe in the lab to increase well-being. Researchers have called for such an intervention, suggesting that a study that involved increasing the frequency that people experienced positive emotions on a daily basis might improve well-being (Seaton & Beaumont, 2015).
A large-scale awe intervention, examining the physical and psychological consequences of participating in a series of rafting trips, is currently underway (Sierra Club, 2015), but no data from the study are currently available. Another intervention tested the effectiveness of improving well-being by inducing positive emotions, including awe, through daily meditation (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008). In contrast to these large-scale interventions, Study 3 tested the effectiveness of an inexpensive and accessible intervention that could be used by anyone with a computer and access to the Internet. In Study 3, participants completed a questionnaire measure of well-being in the lab. Next, they viewed a five minute video intended to induce awe, amusement, or neutral emotions (depending on condition). For the next four days, participants received a link to a secure website where they watched another short emotion-inducing video (matched to condition), and reported the emotions that they experienced while watching the video. One week, two weeks, and four weeks after the lab session, participants completed a questionnaire measure of emotional, psychological, and social well-being. Because the majority of the intervention was conducted online, it allowed participants to experience a daily dose of awe in their own homes, making it appropriate for populations who cannot seek awe in nature because of health or circumstance.

**Theoretical Framework Underlying the Intervention**

Research shows that small-scale interventions such as the one reported here can effectively increase well-being. For example, gratitude interventions typically involve a simple “count your blessings” exercise in which participants think or write about things for which they are grateful. Another type of gratitude intervention involves the “gratitude visit” in which participants write a letter to someone they are grateful to and visit the person to read the letter to him or her (e.g., Froh, Kashdan, Ozimkowski, & Miller, 2009). Other positive interventions for
increasing well-being include teaching participants about their “signature strengths” and encouraging them to use their strengths in new ways (Seligman, Steen, Park, & Peterson, 2005) and instructing participants to write about three things which they found pleasurable, engaging, or meaningful each day (Giannopoulos & Vella-Brodrick, 2011). In a meta-analysis of 51 positive interventions, Sin and Lyubomirsky (2009) found that positive interventions significantly enhanced well-being in both clinical (depressed) and non-clinical samples.

The intervention reported in Study 3 was based on the logic of the broaden-and-build model of positive emotions. Fredrickson’s (1998) broaden-and-build theory posits that positive emotions function to broaden the momentary thought-action repertoire and build emotional, social, intellectual, and physical resources over the long term. There is considerable empirical support for the broaden-and-build theory of positive emotions. For example, research shows that positive emotions facilitate flexible and creating thinking (e.g., Campion & Levita, 2014). Positive emotions build physiological resources by “undoing” the negative effects of experiencing stress, such as increased heart rate (see Fredrickson, 2001 for a review). Experiencing positive emotions also leads to increased resilience by encouraging positive coping mechanisms (Fredrickson, 2001). Through these and other benefits, positive emotions accumulate and compound to lead to increases in well-being (Fredrickson, 2001). Interventions that increase the frequency with which participants experience positive emotions, including awe, have been shown to lead to improvements in well-being (Fredrickson et al., 2008). Thus, based on the broaden-and-build theory of positive emotions, and on the other benefits of awe reported in the general introduction, I hypothesized that participants in the awe condition would experience greater well-being after the intervention than participants in the amusement or control conditions.
The Moderating Role of Dispositional Awe Proneness

Not all interventions work equally well for all people. Often, positive psychology interventions work best when the type of intervention activity complements the personality characteristics of the person assigned to that intervention condition (Giannopoulos & Vella-Brodrick, 2011). For example, Giannopoulos and Vella-Brodrick (2011) measured participants’ orientations towards happiness (i.e., whether they seek life satisfaction through pleasure, meaning, or engagement) and then randomly assigned participants to interventions that drew participant’s attention to pleasure, meaning, or engagement in their daily lives. Unexpectedly, participants assigned to an intervention condition that did not match their preferred orientation toward happiness showed greater increases in well-being than those assigned to an intervention condition that did match their preferred orientation toward happiness. These results highlight the importance of designing interventions that encourage participants to engage in diverse experiences outside of their typical activities.

Other research demonstrates that personality characteristics can moderate the effectiveness of an intervention. Froh and colleagues (2009) found that a gratitude intervention was most effective for participants who were low in positive affect at pre-testing. For participants low in positive affect the gratitude visit significantly increased positive affect leading to benefits for well-being. However, for those already high in positive affect, a ceiling effect occurred so that the gratitude visit did not improve well-being. In Study 3, participants completed a measure of dispositional awe proneness (i.e., the extent to which they experience awe in their day-to-day lives) before the intervention to enable a test of the moderating effect of dispositional awe-proneness on intervention effectiveness.
The Inclusion of an Amusement Condition

Research also shows that the type of comparison group used in an intervention alters the effectiveness of the intervention. For example, Froh et al. (2009) re-examined the results of several gratitude studies and found that many of the studies which showed significant improvements in the gratitude condition used a negative (as opposed to neutral) emotion induction as a comparison group. Thus, these studies could not conclusively show that it was the gratitude condition (and not the negative emotion condition) that led to a change in well-being. Results of a meta-analysis indicate that studies in which the intervention is compared to a non-treatment control group (as opposed to another type of intervention) show the largest increases in well-being (Sin & Lyubomirsky, 2009). Therefore, in Study 3, I included another positive emotion condition in addition to the awe condition, to determine if experiencing awe is more beneficial than experiencing another positive emotion. There is evidence that interventions that involve using humour to induce amusement can lead to improved well-being (e.g., Gander, Proyer, Wyss, & Ruch, 2011; Cai, Yu, Rong, & Zhong, 2014). Thus, in Study 3, participants were randomly assigned to the awe, amusement, or neutral emotion control condition.

Hypotheses

Participants in the awe condition were expected to show the greatest increases in well-being over the course of the study. Dispositional levels of awe experienced were expected to moderate the effects of the awe intervention. The direction of the potential effect of dispositional awe proneness is not known. It may be that participants with low scores on the dispositional awe scale would show the largest improvements in the awe condition, because these participants experience the least awe in their daily lives and may benefit most from a daily dose of awe. In contrast, the intervention may be more effective for participants with high scores on the
dispositional awe scale because they may be more likely to experience awe in response to the “awesome” videos (i.e., they are more awe-prone) whereas participants with low scores may be unmoved by the videos.

**Study 3 Method**

**Participants**

One hundred and sixty-seven undergraduate students participated in this study. Five participants chose to withdraw, so analyses are based on data from 162 participants. Figure 13 depicts the flow of participants through the study, including the number of participants who completed each study component.
Participants ranged in age from 17 to 28 years ($M_{age} = 19$ years, $SD = 2$ years). Eighty-two percent of participants were female. Seventy-six percent of participants self-described as White.
The remaining participants self-identified as Southeast Asian (n = 12; 7%), Other (n = 10; 6%), Arab (n = 4; 3%), South Asian (n = 4, 3%), Aboriginal (n = 1; 1%), Black (n = 1; 1%), Latin American (n = 1; 1%), and the remaining 6 participants did not identify their ethnicity.

**Materials and Procedure**

**Pre-intervention measures.** At the beginning of the semester, participants completed the Dispositional Positive Emotions Scale (DPES; Shiota et al., 2003; Appendix K) online as part of Mass Testing. The DPES measures the tendency to experience seven positive emotions, including awe, compassion, and joy. Each subscale of the DPES consists of 6 items with which participants indicate their level of agreement or disagreement on a 7-point Likert scale. Sample items from the awe subscale include “I seek out experiences that challenge my understanding of the world,” and “I often feel awe.” The scale has good reliability (α for the awe subscale = .78) and validity (Shiota et al., 2006).

**Lab session.** Students interested in participating in the study signed up online for a lab session. Depending on the session that they signed up for, participants were assigned to the awe (n = 56, 35%), amusement (n = 46, 28%), or control (n = 60, 37%) condition.² At Time 1 (the day of the lab study), participants came to the lab in groups of approximately 25 students. Participants completed the informed consent procedure and the researcher explained that the study would take place over the following four weeks. After agreeing to participate in the study, participants completed the Mental Health Continuum – Short Form (MHC-SF; Keyes, 2005,  

² Due to an experimenter error with the online questionnaire, data from 41 participants were missing for Follow-up 1. The error was corrected before collecting data from participants in the amusement condition (n = 6 participants with missing data), so the majority of data were missing from participants in the awe condition (n = 16 participants with missing data) and the control condition (n = 19 participants with missing data). To resolve the problem of missing data, additional participants were recruited to participate in a second session. Because the majority of missing data were from participants in the awe and control conditions, only these conditions were conducted in the second session. The study procedure was identical in session 1 and session 2. Therefore, all analyses were conducted for participants overall, not separated by session.
2009; Appendix L) which served as a baseline measure of well-being. The MHC-SF is a 14-item self-report measure of emotional well-being (i.e., positive affect), social well-being (i.e., social acceptance, social coherence, social actualization, social contribution, and social integration), and psychological well-being (i.e., autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance). Participants respond to each item indicating how they felt over the past month on a scale ranging from 0 (never) to 5 (every day). Higher scores on the scale indicate greater well-being. Research evaluating the MHC-SF confirmed the three factor structure and provided evidence of convergent validity (Lamers, Westerhof, Bohlmeijer, ten Klooser, & Keyes (2011). The full scale and subscales were reliable in this sample at the baseline (total $\alpha = .93$; emotional $\alpha = .86$; social $\alpha = .87$; psychological $\alpha = .84$) and at each of the three follow-up measures of well-being ($\alpha$’s range from .88 to .96). After completing the MHC-SF, participants watched a five minute video projected onto a large screen in the lab. The same videos used to induce awe (Planet Earth), amusement (Walk on the Wild Side), and neutral (a creek in winter) emotions from Study 2 were used again for this portion of the study. After watching the video, participants completed two short questionnaires about the video. The first video questionnaire, the Emotions Experienced Questionnaire (EEQ; Shiota et al., 2011; Appendix M) measured participants’ emotional response to the video. Participants rated the extent to which they experienced ten emotions including awe using a 9-point scale anchored at 0 (did not experience that emotion at all) to 8 (strongest experience of that emotion ever).

Next, participants completed the In-Lab Video Questionnaire (Appendix N). The questionnaire included a video reflection task. The instructions stated: “Please take a few minutes to reflect on the video that you watched. What did the video make you think about?
What thoughts are going through your mind right now?” The purpose of the video reflection task was to increase the effectiveness of the emotion induction procedure. Research shows that writing about an experience of awe is an effective method of eliciting awe in the laboratory (e.g., Van Cappellen & Saroglou, 2012). Therefore, I reasoned that the video reflection task would increase the intensity of the emotions experienced in response to the video. Participants also indicated whether they had seen the video before.

Finally, participants completed a short demographics questionnaire measuring gender, age, and ethnicity (Appendix O). After completing all the measures, participants placed their completed questionnaires and the consent form in an envelope identified by a unique participant code. Participants were thanked for their participation in the in-lab session and were reminded that they would receive several emails over the next four weeks for the remainder of the study. Participants received one credit toward the Psychology department research participation pool assignment.

**Online intervention.** Each day for the four days following the lab session, participants received an email which included the participant’s unique identification code and a link to the secure study website (Appendix P). Participants were instructed to enter their identification code on the first page of the website, and then follow the website instructions. The website also contained a video intended to elicit the target emotion (i.e., awe, amusement, or neutral emotions depending on condition) and the video questionnaires. Participants were instructed to watch the videos in a quiet location where they would not be distracted. Four videos were selected for each condition so that participants watched a different video each day matched to their condition. The videos ranged in length from 137 seconds to 301 seconds, and total length of videos watched did not differ by condition ($M_{\text{awe}} = 244.80$ seconds, $SD = 45.25$ seconds, $M_{\text{amusement}} = 238.80$ seconds,
$SD = 65.79$ seconds, $M_{control} = 214.17$ seconds, $SD = 84.07$ seconds, $F (2, 13) = .32, p = .735, \eta^2 = .05$). In the awe condition, videos included footage of a snowboarder racing down a mountain and stop-motion video of fog rolling into San Francisco. In the amusement condition, videos included footage of comedian Jerry Seinfeld performing stand-up comedy and clips from the television game show Wipeout. In the neutral emotion control condition, videos included a segment from a cooking show and a video about how to throw a spiral with a football. Videos were chosen based on research on eliciting emotions using videos (e.g., Giuliani, McRae, & Gross, 2008; Gross & Levenson, 1995; Gruber, Johnson, Oveis, & Keltner, 2008).

After watching the video, participants completed several measures related to the video. First, participants completed the Online Video Questionnaire (Appendix Q) which was used to ensure that participants had watched the video, and to assess whether participants had seen the video before. Because novelty is an important characteristic of awe-inducing experiences (Keltner & Haidt, 2003), it was important to use unfamiliar videos to elicit awe. Next, participants completed the video reflection task, except that instead of handwriting their response, they typed their response into a textbox. Finally, participants completed the EEQ to measure the extent to which they experienced awe and amusement while watching the videos. If participants did not complete the survey within 24 hours of receiving the email, they would receive up to three reminder emails. If they still had not completed the survey after the reminder emails, they were assumed to have withdrawn from the study. Participants who withdrew early from the study received the debriefing letter by email and were granted the second participant pool credit.

**Mental health follow-ups.** One week, two weeks, and four weeks after the in-lab session, participants received emails with links to the follow-up surveys consisting of the MHC-
SF. The emails also included the unique identification code, and participants were asked to enter their code on the first page of the survey. After completed the third follow-up survey (or after withdrawing), participants received a debriefing letter and the second participant pool credit.

**Study 3 Results**

**Manipulation Checks**

The vast majority of participants in each condition reported that they watched the four follow-up videos at home. In the awe condition, an average of 98% of participants reported that they watched all or most of the videos. Averaging across the four videos, 99% of participants in the amusement condition reported that they watched all or most of the videos. In the control condition, an average of 94% of participants reported that they watched all or most of the videos. Participants were also asked to describe the video that they watched in one sentence. This description served as a further check of whether participants had watched the videos. In all cases where participants reported that they had watched all or most of the video, their one-sentence description of the video accurately reflected the video’s content.

The videos in the awe condition had never been seen before by the majority of participants. On average, 95% of participants reported that they had never seen each of the five videos in the awe condition. The videos in the control condition were also quite novel, with an average of 93% of participants reporting that they had never seen the control videos. The videos in the amusement condition were also quite unfamiliar to participants, with the exception of the first in-lab video, *Walk on the Wild Side*, which 52% of participants reported that they had seen before. Averaging across all five amusement condition videos, 78% of participants reported that to the best of their knowledge, they had never seen the videos.
To test whether the videos successfully elicited the target emotions in participants, I conducted a one-way ANOVA comparing the mean level of awe experienced by participants after watching all five videos. The level of awe experienced differed significantly by condition \(F(2, 159) = 101.36, p < .001\). Participants in the awe condition reported experiencing significantly more awe \((M = 5.23, SD = 1.67)\) than participants in the amusement \((M = 1.86, SD = 1.40)\) or control conditions \((M = 1.78, SD = 1.26)\) did. I also conducted a one-way ANOVA to test whether participants in the amusement condition reported experiencing more amusement. The amusement manipulation was also successful \(F(2, 159) = 33.31, p < .001\). Participants in the amusement condition reported more amusement \((M = 4.57, SD = 1.15)\) than participants in the awe \((M = 3.93, SD = 2.24)\) or control conditions \((M = 2.19, SD = 1.93)\) did.

**Preliminary Analyses**

**Creation of composite scores.** Participants’ reports of awe experienced were highly correlated across the five videos. Correlations ranged from .40 to .73 for participants in the awe condition, from .24 to .66 in the amusement condition, and from .38 to .53 in the control condition. Therefore, I created a composite measure of awe experienced by averaging participants’ reports of awe experienced across the five videos. The composite measure of awe experienced was valid for participants in the awe \((\alpha = .88)\), amusement \((\alpha = .80)\), and control \((\alpha = .75)\) conditions.

As shown in Tables 18 and 19, total well-being scores were highly stable across the three follow-ups that occurred one week, two weeks, and four weeks after the initial lab session. To
avoid problems of multicollinearity because of these large correlations, I created a composite variable for the mean well-being score of the three follow-ups ($\alpha = .96$)\textsuperscript{3}.

Table 18

*Correlations Among Mean Well-Being Scores Across Four Timepoints*

<table>
<thead>
<tr>
<th>Well-being score</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Baseline</td>
<td>--</td>
<td>.83***</td>
<td>.77***</td>
<td>.81***</td>
</tr>
<tr>
<td>2. Follow-up 1</td>
<td></td>
<td>--</td>
<td>.91***</td>
<td>.88***</td>
</tr>
<tr>
<td>3. Follow-up 2</td>
<td></td>
<td></td>
<td>--</td>
<td>.91***</td>
</tr>
<tr>
<td>4. Follow-up 3</td>
<td></td>
<td></td>
<td></td>
<td>--</td>
</tr>
</tbody>
</table>

***$p < .001$*

Table 19

*Mean Well-being Across Four Timepoints by Condition*

<table>
<thead>
<tr>
<th>Well-being measure</th>
<th>Condition</th>
<th>Awe</th>
<th>Amusement</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td></td>
<td>4.53 (.83)</td>
<td>4.57 (.88)</td>
<td>4.46 (.74)</td>
</tr>
<tr>
<td>Follow-up 1</td>
<td></td>
<td>4.11 (.92)</td>
<td>4.05 (1.07)</td>
<td>4.14 (.88)</td>
</tr>
<tr>
<td>Follow-up 2</td>
<td></td>
<td>4.14 (.93)</td>
<td>4.15 (.99)</td>
<td>4.14 (.88)</td>
</tr>
<tr>
<td>Follow-up 3</td>
<td></td>
<td>4.21 (1.01)</td>
<td>4.22 (1.19)</td>
<td>4.14 (.83)</td>
</tr>
</tbody>
</table>

In addition, the three well-being subscales (i.e., psychological, emotional, and social well-being) were also highly correlated (see Table 20). Therefore, all analyses reported here were conducted using the overall well-being scale score, not on the subscale scores\textsuperscript{4}.

\textsuperscript{3} I also conducted all analyses using each follow-up measure of mental health as the dependent variable. With the exception of problems with missing data at Follow-up 1, results were nearly identical to the results found when using a composite score.

\textsuperscript{4} I also conducted all analyses using each subscale score as the dependent variable. For analyses involving awe experienced and analyses involving dispositional awe, the patterns of results were very similar to the results found for the analyses using the full scale score as the dependent variable.
Table 20

Correlations Among Subscales of the Mental Health Continuum-Short Form (Mean of Three Follow-Ups)

<table>
<thead>
<tr>
<th>Well-being Scale</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Emotional</td>
<td>--</td>
<td>.60***</td>
<td>.77***</td>
</tr>
<tr>
<td>2. Social</td>
<td>--</td>
<td></td>
<td>.72***</td>
</tr>
<tr>
<td>3. Psychological</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***p < .001

Next, I examined the descriptive statistics for awe experienced, dispositional awe, and each of the well-being total scale scores and subscale scores (i.e., Psychological Well-being, Social Well-being, and Emotional Well-being) at each of the four times (i.e., baseline, Follow-up 1, Follow-up 2, Follow-up 3). All variables appeared to be normally distributed with skewness and kurtosis of less than 1 in absolute value for all variables. Table 21 displays the means, standard deviations, and correlations among the key variables, and Table 22 displays the same information by condition.

Table 21

Means, Standard Deviations and Correlations Among Key Study Variables (N = 162)

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dispositional awe</td>
<td>4.76</td>
<td>1.13</td>
<td>--</td>
<td>.05</td>
<td>.11</td>
<td>.34***</td>
<td>.31***</td>
</tr>
<tr>
<td>2. Awe experienced</td>
<td>2.99</td>
<td>2.17</td>
<td>--</td>
<td>--</td>
<td>.47***</td>
<td>.16*</td>
<td>.12</td>
</tr>
<tr>
<td>3. Amusement experienced</td>
<td>3.49</td>
<td>1.93</td>
<td>--</td>
<td>--</td>
<td>.19*</td>
<td>.19*</td>
<td></td>
</tr>
<tr>
<td>4. Baseline well-being</td>
<td>4.53</td>
<td>.81</td>
<td></td>
<td></td>
<td></td>
<td>.83***</td>
<td></td>
</tr>
<tr>
<td>5. Follow-up well-being</td>
<td>4.14</td>
<td>.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05, **p < .01, ***p < .001
Table 22

Means, Standard Deviations and Correlations Among Key Study Variables by Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awe (n = 56)</td>
<td>1. Dispositional awe</td>
<td>4.58</td>
<td>1.08</td>
<td>-</td>
<td>.30*</td>
<td>.14</td>
<td>.54***</td>
<td>.47***</td>
</tr>
<tr>
<td></td>
<td>2. Awe experienced</td>
<td>5.22</td>
<td>1.66</td>
<td>--</td>
<td>--</td>
<td>.69***</td>
<td>.34*</td>
<td>.37**</td>
</tr>
<tr>
<td></td>
<td>3. Amusement experienced</td>
<td>3.93</td>
<td>2.24</td>
<td>--</td>
<td>.27*</td>
<td>.40**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Baseline well-being</td>
<td>4.53</td>
<td>.83</td>
<td>--</td>
<td>--</td>
<td>.81***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Follow-up well-being</td>
<td>4.15</td>
<td>.96</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amusement (n = 46)</td>
<td>1. Dispositional awe</td>
<td>4.84</td>
<td>1.12</td>
<td>--</td>
<td>.09</td>
<td>.23</td>
<td>.38**</td>
<td>.46**</td>
</tr>
<tr>
<td></td>
<td>2. Awe experienced</td>
<td>1.86</td>
<td>1.40</td>
<td>--</td>
<td>.50***</td>
<td>.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Amusement experienced</td>
<td>4.67</td>
<td>1.15</td>
<td>--</td>
<td>.20</td>
<td></td>
<td>.19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Baseline well-being</td>
<td>4.57</td>
<td>.88</td>
<td>--</td>
<td>.87***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Follow-up well-being</td>
<td>4.14</td>
<td>1.06</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control (n = 60)</td>
<td>1. Dispositional awe</td>
<td>4.78</td>
<td>1.17</td>
<td>--</td>
<td>.22</td>
<td>.20</td>
<td>.14</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>2. Awe experienced</td>
<td>1.77</td>
<td>1.26</td>
<td>--</td>
<td>.57***</td>
<td>.04</td>
<td>-.15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Amusement experienced</td>
<td>2.19</td>
<td>1.22</td>
<td>--</td>
<td>.05</td>
<td>-.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Baseline well-being</td>
<td>4.46</td>
<td>.74</td>
<td>--</td>
<td>.82***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Follow-up well-being</td>
<td>4.13</td>
<td>.86</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05, **p < .01, ***p < .001

The pattern of correlations between participants’ reports of the experience of awe and well-being differed across the three conditions. In the awe condition, awe experienced (averaged across the five videos) was positively related to both baseline and follow-up well-being. However, in the control and amusement conditions, awe experienced was unrelated to well-being. This difference in the pattern of correlations by condition suggests that the relationship between the extent to which one experiences awe and one’s social, psychological, and emotional well-being may depend on the type of video viewed. People with greater well-being (both before and after the intervention) may be more prone to experiencing awe when viewing vast natural imagery.

A similar pattern of correlations was found for participants’ reports of amusement experienced (averaged across the five videos; \( \alpha = .87 \)). In the awe condition, amusement
experienced was positively correlated with baseline and follow-up well-being, but amusement experienced was unrelated to well-being in the other two conditions. Thus, people with greater well-being may experience more positive emotions overall, including feeling amused, in response to awe-inducing (but not amusing or emotionally neutral) videos.

The pattern of correlations between baseline well-being and the other variables is also notable because it suggests that baseline well-being may not be an appropriate covariate for the analyses because it is differentially related to variables across the three conditions. These differential relationships between baseline well-being (the covariate) and the independent (i.e., awe experienced, dispositional awe, condition) and dependent variables (i.e., follow-up well-being) violate the assumption of independence of residuals. Violations of the assumption of independence of residuals can lead to underestimated standard errors (Cohen, Cohen, West, & Aiken, 2003). Therefore, with the exception of the analysis of covariance reported below, I conducted the main analyses on follow-up well-being without taking into account baseline well-being.

Main Analyses

Testing the effect of the awe intervention on well-being. To determine whether participants in the awe condition reported better well-being after the intervention than those in the amusement and control conditions, I conducted a one-way analysis of covariance using mean well-being across the three check-ins as the dependent variable, condition as the independent variable, and baseline well-being as the covariate. First, I tested the assumptions of ANCOVA. The assumption of homogeneity of regression slopes was met. The correlation between the

---

5 I also conducted the analyses including baseline well-being as a covariate. Examination of the residuals provided evidence that the residuals were not independent (e.g., Durbin-Watson = .39). Performing a lag1 autocorrelation transformation (Cohen et al., 2003) did not resolve the problem and the results were difficult to interpret due to underestimated standard errors and inaccurate significance tests.
covariate (i.e., baseline well-being) and follow-up well-being did not differ across the three conditions ($F (2, 153) = .45, p = .640$). The assumption of homogeneity of variance was also met (Levene’s $= F (2, 155) = .67, p = .515$).

The results of the ANCOVA demonstrated that baseline well-being was strongly related to follow-up well-being ($F (1, 155) = 357.45, p < .001, \eta^2 = .70$) but there was no main effect of condition on follow-up well-being ($F (2, 155) = 1.18, p = .309, \eta^2 = .02$). These results indicate that after controlling for baseline well-being, follow-up well-being did not differ between conditions.

**Do awe experienced and condition interact to predict well-being?** Next, I tested whether condition interacted with awe experienced to predict follow-up well-being. To test for this interaction, I conducted a hierarchical multiple regression analysis. I created two dummy codes to represent the three conditions. Table 23 displays the dummy codes used for this analysis.

Table 23

<table>
<thead>
<tr>
<th>Dummy Coding of Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Awe</td>
</tr>
<tr>
<td>D1</td>
</tr>
<tr>
<td>D2</td>
</tr>
</tbody>
</table>

In the first step of the analysis, I entered the composite awe experienced variable (centered) and the two dummy variables used to represent the three conditions. I created two product terms by multiplying awe experienced by both dummy variables. I entered the two product terms (i.e., D1*awe experienced, D2*awe experienced) in the second step of the regression analysis. Mean well-being across the three check-ins was the dependent variable.
First, I examined the data for violations of the assumptions of multiple regression. The residuals appeared to be independent, normal, and homoscedastic. Table 24 displays the regression coefficients and results of significance tests.

Table 24

Regression Coefficients: Mean Follow-Up Well-Being Regressed Onto Condition, Awe Experienced, and Interaction Terms

<table>
<thead>
<tr>
<th>Model</th>
<th>b</th>
<th>SE-b</th>
<th>p</th>
<th>sr²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>4.27</td>
<td>.14</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>D1</td>
<td>-.01</td>
<td>.19</td>
<td>.970</td>
<td>.00</td>
</tr>
<tr>
<td>D2</td>
<td>-.36</td>
<td>.25</td>
<td>.152</td>
<td>.01</td>
</tr>
<tr>
<td>Awe experienced</td>
<td>.11</td>
<td>.05</td>
<td>.035</td>
<td>.03</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>4.01</td>
<td>.17</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>D1</td>
<td>.31</td>
<td>.25</td>
<td>.214</td>
<td>.01</td>
</tr>
<tr>
<td>D2</td>
<td>-.329</td>
<td>.27</td>
<td>.225</td>
<td>.01</td>
</tr>
<tr>
<td>Awe experienced</td>
<td>-.10</td>
<td>.10</td>
<td>.286</td>
<td>.01</td>
</tr>
<tr>
<td>D1*Awe experienced</td>
<td>.26</td>
<td>.14</td>
<td>.063</td>
<td>.02</td>
</tr>
<tr>
<td>D2*Awe experienced</td>
<td>.32</td>
<td>.12</td>
<td>.011</td>
<td>.04</td>
</tr>
</tbody>
</table>

The first step of the regression analysis was not significant ($F (3, 155) = 1.51, p = .214$), indicating that condition and awe experienced did not predict follow-up well-being. The addition of the interaction terms in the second step was significant ($\Delta F (2, 153) = 3.45, p = .034$). The addition of the interaction terms accounted for approximately 7% of variance in well-being.

There was a marginally significant interaction between awe experienced and the dummy code representing the amusement condition compared to the control condition. The interaction between awe experienced and the dummy code representing the awe condition compared to the control condition was also significant.
To follow up the interactions, I entered low and high values of awe experienced (i.e., ± 1 standard deviation) into the regression equation and created separate lines for each condition. Figure 14 illustrates the nature of this interaction.

![Graph](image)

**Figure 14.** Mean follow-up well-being as a function of awe experienced by condition.

To test the simple effects, I examined the correlations between awe experienced and follow-up well-being separately for each condition. In the awe condition, awe experienced was a significant predictor of mean follow-up well-being, accounting for approximately 14% of variance in well-being (\(r = .371, p = .005\)). In the amusement condition, awe experienced did not predict follow-up well-being (\(r = .21, p = .168\)). Similarly, in the control condition, there was not association between awe experienced and follow-up well-being (\(r = -.15, p = .250\)). In the awe condition, but not the amusement or control condition, participants who experienced more awe had greater well-being after the intervention.

### Dispositional awe and well-being

Next, I tested whether dispositional awe predicted well-being, and whether it interacted with condition to predict well-being. First, I regressed well-being (mean of the three follow-ups) onto dispositional awe, awe experienced, and the two...
dummy variables. I examined the residuals for violations of the assumptions of multiple regression. Residuals were independent, normal, and homoscedastic. The regression analysis was significant ($F (4, 154) = 4.78, p = .001$). Taken together, dispositional awe, awe experienced, and the conditions accounted for 11% of variability in well-being. As can be seen in Table 25, dispositional awe was the only significant predictor of well-being. Participants who experienced more awe in their lives tended to have greater well-being after the intervention.

Table 25

*Unstandardized Regression Coefficients, Significance Levels, and Semi-Partial Correlations for Multiple Regression Analysis of Dispositional Awe, Awe Experienced and Condition Predicting Mean Well-Being*

<table>
<thead>
<tr>
<th>Model</th>
<th>b</th>
<th>SE-b</th>
<th>p</th>
<th>sr²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.81</td>
<td>.34</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Dispositional awe</td>
<td>.25</td>
<td>.07</td>
<td>&lt; .001</td>
<td>.08</td>
</tr>
<tr>
<td>Awe experienced</td>
<td>.07</td>
<td>.05</td>
<td>.17</td>
<td>.01</td>
</tr>
<tr>
<td>D1</td>
<td>.00</td>
<td>.18</td>
<td>.988</td>
<td>.00</td>
</tr>
<tr>
<td>D2</td>
<td>-.16</td>
<td>.25</td>
<td>.524</td>
<td>.00</td>
</tr>
</tbody>
</table>

Next, I tested whether dispositional awe interacted with condition to predict well-being. I conducted a hierarchical regression analysis in which I regressed well-being (mean of three check-ins) on dispositional awe (centered) and the dummy variables representing condition in Step 1 and the interactions between dispositional awe (centered) and the two dummy variables in Step 2. Residuals met the assumptions normality, independence, and homoscedasticity.

The first step of the regression was significant ($F (3, 155) = 5.70, p = .001$). Dispositional awe and the dummy variables accounted for approximately 10% of variability in follow-up well-being. The addition of the interaction terms in the second step contributed an additional 1% of variance in well-being which was statistically significant ($\Delta F (2, 153) = 4.93, p = .008$). Table 26
displays the unstandardized regression coefficients, significance levels, and semi-partial correlations for the regression analysis.

Table 26

*Multiple Regression Results for Dispositional Awe by Condition Interaction Predicting Well-Being*

<table>
<thead>
<tr>
<th>Model</th>
<th>b</th>
<th>SE-b</th>
<th>p</th>
<th>sr²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>4.11</td>
<td>.12</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Dispositional awe</td>
<td>.27</td>
<td>.06</td>
<td>&lt; .001</td>
<td>.10</td>
</tr>
<tr>
<td>D1</td>
<td>.01</td>
<td>.18</td>
<td>.959</td>
<td>.00</td>
</tr>
<tr>
<td>D2</td>
<td>.09</td>
<td>.17</td>
<td>.604</td>
<td>.00</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>4.13</td>
<td>.12</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Dispositional awe</td>
<td>.024</td>
<td>.10</td>
<td>.810</td>
<td>.00</td>
</tr>
<tr>
<td>D1</td>
<td>-.03</td>
<td>.18</td>
<td>.859</td>
<td>.00</td>
</tr>
<tr>
<td>D2</td>
<td>.087</td>
<td>.168</td>
<td>.604</td>
<td>.00</td>
</tr>
<tr>
<td>D1 * Dispositional awe</td>
<td>.42</td>
<td>.15</td>
<td>.008</td>
<td>.04</td>
</tr>
<tr>
<td>D2 * Dispositional awe</td>
<td>.39</td>
<td>.15</td>
<td>.010</td>
<td>.04</td>
</tr>
</tbody>
</table>

As can be seen in Table 26, dispositional awe was no longer a significant predictor of well-being once the interaction terms were added to the analysis. Both interaction terms were significant predictors of well-being. I entered low and high values of dispositional awe (i.e., ± 1 standard deviation) into the regression equation and created separate lines for each condition. Figure 15 illustrates the nature of this interaction.
To test the simple effects, I examined the correlations between dispositional awe and follow-up well-being separately for each condition. In the awe condition, dispositional awe was a significant predictor of follow-up well-being, accounting for approximately 22% of variance in well-being ($r = .47, p < .001$). Dispositional awe was also a significant positive predictor of well-being in the amusement condition, accounting for approximately 22% of variance in well-being ($r = .47, p < .001$). However, in the control condition, dispositional awe was not associated with mean well-being ($r = .03, p = .806$). Therefore, for participants who tend to experience high levels of awe in the daily lives, exposure to awe-inducing and amusing videos, but not neutral videos led to high well-being after the intervention.

**Study 3 Discussion**

This study was the first to report the results of an intervention designed to increase well-being through the experimental induction of awe. As in previous research, videos were used to
elicit awe, amusement, or neutral emotions. However, this study used a combination of videos shown in the lab and online to induce the target emotions. Providing participants with links to short videos to watch at home was a successful and effective way to elicit awe. The vast majority of participants reported that they watched all or most of the five videos, and their responses to a manipulation check question supported their self-reports. Self-reports of emotional experience showed that participants in the awe condition experienced strong levels of awe ($M = 5.22, SD = 1.66$ on a scale ranging from 0 to 8). This level of awe is comparable to experiences of awe reported by participants exposed to a slideshow of panoramic views in a laboratory (Shiota et al., 2011). Participants’ responses on the video reflection task also provide anecdotal support for the effectiveness of the awe manipulation at inducing awe. For example, one participant reflected on a video depicting fog rolling into San Francisco: “This video, like the last, left me awestruck. I would never imagine fog being so beautiful.” The high level of compliance with the at-home portion of the study was somewhat surprising, but may reflect the short and relatively enjoyable nature of the videos. It also highlights the potential usefulness of online interventions for student populations, the majority of whom have easy access to personal computers and an internet connection.

Although I failed to find differences in well-being based on condition alone, the results of this study provide preliminary support for the efficacy of an awe intervention at increasing well-being. Despite randomly assigning participants to conditions, I found that awe experienced was differentially associated with baseline well-being (measured before the intervention). These results suggest that certain people, that is, those who already experience fairly good well-being, may have the greatest potential to experience awe when exposed to videos of vast and complex natural scenes. In other words, interventions designed to increase well-being through increasing
the amount of awe people experience may be most effective for participants who are already quite happy. Unfortunately, because of this unexpected relationship between baseline well-being and the other variables of interest in the study, I was unable to control for baseline well-being in subsequent analyses.

Participants in the awe condition who reported experiencing the greatest awe in response to the videos had better overall well-being after the intervention. In addition, participants who typically experienced high levels of awe in their daily lives and who were randomly assigned to watch awesome or amusing videos also had greater well-being than participants assigned to watch neutral videos. These results highlight the importance of a match between the person and the intervention. People who tend to seek out experiences of awe and see beauty in nature were the most moved by the videos, and those who felt the most awe had greater well-being at the end of the study. These results provide evidence that experiencing awe is related to well-being, although the direction of causality requires further testing.

Awe experienced predicted greater well-being in the awe condition, but not in the amusement or control conditions. Therefore, it is not simply the case that viewing positive images of any kind are related to improved well-being. The experience of awe predicts well-being only when viewing awe-inducing images. Interestingly, dispositional awe was associated with greater well-being in both the awe and amusement conditions. Therefore, it is possible that certain people experience a positive outlook on life, and for these people, exposure to positive images, whether awe-inducing or amusing, contribute to their well-being.

**Limitations**

Because I was unable to statistically control for baseline well-being, I cannot conclude that experiencing awe led to increased well-being. It is possible that participants who had greater
initial well-being were more receptive to experiencing awe when viewing the awe-inducing videos, resulting in the significant relationship between these two variables. However, my results do demonstrate a strong relationship between experiencing awe and well-being.

**General Discussion**

In three studies, I examined the consequences of experiencing awe over a lifetime (Study 1), in the moment (Study 2), and over the course of one month (Study 3). I found evidence from a qualitative analysis and two lab-based experiments that experiencing awe leads to positive consequences under certain circumstances.

In Study 1, I conducted a thematic analysis of participants’ descriptions of the experience of awe. Consistent with previous qualitative and experimental research on awe, I found that participants described strong cognitive, psychological, and physiological consequences of experiencing awe. Participants generally described the experience of awe as positive. They described thinking about aspects of their lives, including personal problems, in new ways. Based on these results and extant research on the consequences of experiencing awe, I next examined the consequences of experiencing awe when thinking about a personal problem, and for overall well-being.

In Study 2, I tested the consequences of experiencing awe in the laboratory. I hypothesized that participants who watched a video designed to induce awe would judge an ongoing personal problem to be less distressing than participants who watched an amusing or neutral video, and that these relationships would be mediated by self-focus. I found some evidence to support these hypotheses. Specifically, for participants in the awe condition relative to the control condition, awe experienced and reflection predicted reduced problem-related distress. In addition, participants in the awe condition were less likely to write about their
problem in a negative way at the end of the study than participants in the control condition were. Awe and reflection were also predictive of longer written solutions, indicating that experiencing awe may prompt people to reflect more deeply on their problems (but not to generate more solutions).

The effects of experiencing awe when contemplating an ongoing personal problem were not uniformly positive, however. I found that the effects of experiencing awe depended on problem type. For task-related problems, I found that participants who had experienced awe were more distressed about their problems than those in the control condition. It is possible that experiencing awe when thinking about a difficult task that requires an active solution reduces feelings of agency and efficacy, thus leading to distress. Future research could test this empirical question.

In Study 3, I examined the effect of experiencing awe on emotional, psychological, and social well-being. Research shows that experiencing awe in the lab leads to increases in momentary life satisfaction (Rudd et al., 2012), but to date, researchers have not tested the effects of experiencing awe on well-being over a longer time period. I conducted an intervention study in which I found that participants in the awe condition who experienced more awe had greater well-being over the four weeks after the intervention. In addition, participants who experienced more awe in their day-to-day lives experienced greater well-being if they were assigned to the awe or amusement conditions, but not the control condition. Thus, experiencing awe does appear to have positive consequences for well-being.

**Limitations**

In Studies 2 and 3, I measured awe experienced through a single self-report item. Although this measure of awe experienced has been used in previous research (e.g., Shiota et al.,
the use of self-report of emotional experience is somewhat limited. Self-report measures of emotional experience do not capture the physiological or expressive aspects of emotional experience, for example. However, in a review of research on the measurement of emotions, Mauss and Robinson (2009) conclude that self-report is appropriate for measuring the subjective experience of emotions either online (i.e., as they are occurring) or soon after. In Studies 2 and 3, subjective emotional experience was measured immediately following the video induction, thus, problems of recall bias were likely avoided.

A related limitation of studies 2 and 3 is common method variance, which occurs when the independent and dependent variables are both measured via self-report (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Common method variance can lead to measurement error such as artificially inflating the relationship between measures of different constructs. In Studies 2 and 3, awe experienced was measured via self-report, as were the dependent variables (e.g., problem-related distress in Study 2 and well-being in Study 3). Self-report is an appropriate method for measuring emotion, which is by definition a private experience. Subjective well-being is also difficult to measure via methods other than self-report. Other forms of measurement for the dependent variables could have been used to strengthen the study and reduce the possibility of common method variance, however. For example, problem-related distress could have been assessed using physiological measures such as skin conductance or heart rate.

The studies were also limited by the somewhat homogenous sample characteristics. Participants in Studies 2 and 3 were primarily White, female, young undergraduate students. Thus, the sample was not representative of the larger Canadian or world population and it may not be appropriate to make broad claims about the nature of awe based on results drawn from such “WEIRD” (i.e., Western, educated, industrialized, rich, and democratic; Henrich, Heine, &
Norenzayan, 2010) participants. Although the community participants interviewed in Study 1 were slightly more diverse in terms of age, gender, and ethnicity, participants in Study 1 were nevertheless drawn from a single city in Ontario, Canada. If the experience of awe differs cross-culturally, different results could be expected in different cultures. However, there is some evidence that awe may be a “basic” emotion. For example, researchers have identified a distinct autonomic nervous system response (Shiota et al., 2011), facial expression (Campos, Shiota, Keltner, Gonzaga, & Goetz, 2013), and vocal response (Simon-Thomas et al., 2009). These physiological and expressive characteristics suggest that the experience of awe may be universal, although more research is needed to further substantiate this claim.

**Contributions of This Research**

This research contributed to the literature on awe in several ways. Study 1 was one of only a handful of studies to examine the experience of awe from a qualitative perspective. One previous study of the experience of awe, conducted by Bonner and Friedman (2011), used Interpretative Phenomenological Analysis to clarify what it means to experience awe. However, this study was a secondary examination of interviews with six participants about their thoughts about the experience of awe in general, not specific experiences of awe from their lives. In contrast, in Study 1, participants described memorable experiences of awe from their lives. Thus, the results of Study 1 provide an in-depth account of what awe feels like. This focus on the cognitive, emotional, and embodied experience of awe has been somewhat lacking in the burgeoning field of research on awe. Thus, one of the main contributions of this paper was in understanding how people experience the emotion awe, and the consequences they attribute to awe.
Another contribution of this research is the finding that experiencing awe is generally beneficial when thinking about a personal problem. To date, research on awe has examined the types of experiences that elicit awe, and the effects of experiencing awe, for example, on spirituality (Saroglou et al., 2008), prosocial behaviour (Piff, Dietz, Feinberg, Stancato, & Keltner, 2015), or persuasion (Griskevicius et al., 2010). This research focuses on what happens when someone who is initially in a neutral mood experiences awe. However, because awe appears to function by changing one’s focus from the self to the environment, I reasoned that it may be beneficial to experience awe when thinking about a stressful situation. I found evidence to support this reasoning and found that awe may be helpful when experiencing certain types of personal problems. These results supported descriptions given by participants in Study 1 of the effects of awe when going through a difficult life event, such as an unplanned pregnancy or an experience of intimate partner violence. Thus, awe is not simply beneficial when everything is already going well, but can be helpful when the going gets rough as well.

The results of Study 3 make a significant contribution to positive psychology. To my knowledge, Study 3 was the first to directly test the effectiveness of eliciting awe to improve well-being. I tested a small-scale, brief and inexpensive intervention and found that participants who experienced the most awe when exposed to videos of vast natural scenery had improved well-being at the end of the study. These results suggest that a daily dose of awe may be beneficial, especially for people who are predisposed to experience awe in their daily lives. Many people lack access to settings that might elicit awe, such as vast natural landscapes, due to limited health, time, or financial resources. For these people, an accessible, brief, and inexpensive intervention that brings the experience of awe to the viewer is needed.
The results of the three studies reported here also contribute to the growing body of research examines the effects of being in nature, or viewing images of nature. One such line of research tests Attention Restoration Theory (Kaplan, 1995), which posits that natural settings restore depleted directed attention. For example, in two experiments, Berman, Jonides, and Kaplan (2008) found that participants who took a walk in nature performed better on backwards digit span test (a measure of directed attention performance) than those who took a walk in an urban environment. According to Attention Restoration Theory, in order for natural settings to be restorative, they must be fascinating and draw attention without effort, provide a feeling of being away, be extensive and provide the opportunity to explore more of the environment, and be compatible with one’s desires or needs to take part in enjoyable activities. Many of these characteristics call to mind awe-inducing situations. Experiences that induce awe tend to be extensive or vast (Keltner & Haidt, 2003), and they are fascinating. A participant in Study 1 described this sense of feeling drawn in when experiencing awe:

I guess maybe I felt like a little bit, of, you know, almost anxiety a little bit, you know, when you feel like...you know, you can't pull away from something, it's drawing you in and maybe you feel a little powerless to kind of stop the experience (Ash, male, 36 years old).

Experiences that elicit awe are often unusual, and outside of everyday experience (Keltner & Haidt, 2003). Therefore, elicitors of awe appear to meet the criteria for restorative environments. Research on Attention Restoration Theory generally lacks a measure of emotional experience (with the exception of measures of positive and negative mood). However, it is possible that the cognitive benefits experienced in nature may be attributable to the experience of awe. Future research on Attention Restoration Theory could include a measure of awe experienced to determine if the emotional experience of awe leads to the cognitive benefits associated with being in or viewing nature.
The current research also contributes to research on nature relatedness, or the subjective connection that one feels with nature (Nisbet, Zelenski, & Murphy, 2011). Research shows that people who feel connected with nature experience greater well-being than those who feel disconnected from nature. In addition, changes in nature-relatedness mediate changes in well-being (Nisbet et al., 2011). This research shows that nature relatedness is associated with the experience of positive emotions, as measured by the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988). However, research on nature relatedness generally does not include a measure of awe. Research on awe, including the three studies reported here, shows that experiencing awe is beneficial. Therefore, future research on nature relatedness could investigate the role of awe in feelings of connection with nature.

Finally, results of all three studies have implications for the effects of experiencing awe when undergoing a difficult life event. In Study 1, many participants described experiencing awe in the midst of a stressful or overwhelming situation. For example, participants described experiences of abuse, anxiety related to single parenthood, and struggles with mental illness. Without exception, participants related that experiencing awe was beneficial during these difficult experiences. In Study 2, I found experimental evidence demonstrating that experiencing awe and engaging in self-reflection when thinking about an ongoing personal problem can lead to reduced distress. Study 3 demonstrated that feeling awe every day for one week was beneficial for well-being. These results suggest that experiencing awe may be beneficial for people experiencing ongoing problems. Future research could test the effects of an awe intervention within clinical populations or for people undergoing major life stressors such as an illness.
Conclusion

The experience of awe is complex and often profound. Feeling awe may be momentarily unnerving. It can lead to feelings of smallness and insignificance. However, experiencing awe can also be positive, resulting in feelings of calm and clarity in the midst of a crisis. Awe also facilitates reflection, and can reduce distress about a personal problem. Over time, a daily dose of awe leads to improved well-being. Taken together, the results of the three studies reported here provide strong evidence that the experience of awe is largely beneficial.
References


128


lower levels of inflammatory cytokines. *Emotion, 15*, 129 – 133.

http://dx.doi.org/10.1037/emo0000033


http://www.indigenouspsych.org/Members/Sundararajan,%20Louise/Religious%20Awe-
-Potential%20Contributions.pdf

Tabachnick & Fiddell (2007).


http://www.pnas.org/content/105/33/11655.full.pdf


Appendices

Appendix A – Interview Study Advertisement

<table>
<thead>
<tr>
<th>Do you often experience <strong>awe?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you interested in sharing your thoughts about this emotion?</td>
</tr>
</tbody>
</table>

**Investigating the Experience of Awe**

*Be involved* in a private interview about your experiences of awe conducted by a PhD student in the Psychology department at the University of Guelph

<table>
<thead>
<tr>
<th>Who can participate?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anyone aged 18 or older who experiences awe at least once a month</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How long will it take?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviews will take about an hour</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Where will the interview take place?</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the University of Guelph or at a location that is convenient for you</td>
</tr>
</tbody>
</table>

| Receive | a $20 gift certificate as a thank you for participating |

**For more information or to participate:**

Jennifer Dobson (PhD Candidate, Psychology Department, University of Guelph)

(519) 824-4120 x 53307

dobsonj@uoguelph.ca
Appendix B - Interview Script

What does the word “awe” mean to you? What are some synonyms for awe?

Please tell me about the last time you felt awe?
- What were you doing when you experienced awe?
- Where were you when you experienced awe?
- Were you alone or with others when you experienced awe?
- Had you had the experience of awe before? Since?
- What did you do after the experience of awe?

What does it feel like when you experience awe?
- cognitively
- emotionally
- physiologically
- psychologically

Do you seek out experiences and settings that you think will make you feel awe? If so, what types of experiences, settings, or situations tend to elicit awe for you?

Do you think that experiencing awe benefits you in any way? If so, how?

Is awe a positive or negative emotion? Do you think there are any disadvantages or drawbacks to experiencing awe?

Is there something else you would like to tell me about your experiences with awe?

I’m now going to collect some basic demographic information.

Debrief and thanks.
Appendix C – Study 1 Demographics Questionnaire

What is your age? _____

What is your gender? ________________

Which of the following BEST describes your ethnic background?

- ☐ Aboriginal/First Nations/Metis
- ☐ White/European
- ☐ Black/African/Caribbean
- ☐ Southeast Asian (e.g., Chinese, Japanese, Korean, Vietnamese, Cambodian, Filipino, etc)
- ☐ Arab (Saudi Arabian, Palestinian, Iraqi, etc)
- ☐ South Asian (East Indian, Sri Lankan, etc)
- ☐ Latin American (Costa Rican, Guatemalan, Brazilian, Columbian, etc)
- ☐ West Asian (Iranian, Afghani, etc)
- ☐ Other (please specify) ___________________________________

Which of the following best describes your HIGHEST level of education?

- ☐ Some high school
- ☐ Completed high school
- ☐ Some college/university
- ☐ Completed college/university
- ☐ Some graduate education
- ☐ Completed graduate education

What is your marital status? ______________________________________

What is your occupation? _______________________________________
Appendix D – Dispositional Positive Emotions Scale – Awe Subscale

Please respond to the following statement by writing the number that best represents you in the box beside the item.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>Neutral</td>
<td>Strongly agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I often feel awe.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I see beauty all around me.</td>
<td></td>
</tr>
<tr>
<td>I feel wonder almost every day.</td>
<td></td>
</tr>
<tr>
<td>I often look for patterns in the objects around me.</td>
<td></td>
</tr>
<tr>
<td>I have many opportunities to see the beauty of nature.</td>
<td></td>
</tr>
<tr>
<td>I seek out experiences that challenge my understanding of the world.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix E – Social Problem Solving Task

Please read the following examples of social problems:

- You notice that your roommate seems to be avoiding you. You want your roommate to be your friend and to like you, but you aren’t sure what to do.
- You have a midterm coming up next week and you’re worried that you won’t have enough time to study properly. You promised a co-worker that you would take an extra shift, but now you are feeling overwhelmed with school and work obligations.

In life, people experience lots of daily hassles, such as a disagreement with a roommate or trouble finding time to study for a midterm. These aren’t major issues, but they can still contribute to day-to-day stress.

Now please think of a problem like this that you are currently experiencing in your own life. This problem might be similar to one of the sample problems you read. It is important that you choose a problem that you are currently experiencing, and haven’t yet figured out how to solve.

Once you have thought of a problem from your own life, please take a few minutes to write about the problem below. Please include enough detail about the problem that someone else reading it would understand what you are experiencing, but do not include names. Write only about the problem and please do not write about possible solutions to the problem.

Write about the problem below:

---------------------------------------------------------------------------------------

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---------------------------------------------------------------------------------------
Appendix F – Emotions Experienced Questionnaire

Please rate how strongly you feel each of the following emotions right now using the following scale:

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<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>did not experience that emotion at all</td>
<td>strongest experience of that emotion ever</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Amusement
- Anger
- Awe
- Contentment
- Disgust
- Enthusiasm/Excitement
- Fear
- Love/Attachment
- Sadness
- Tenderness/Compassion
- Worry/Anxiety
Appendix G – Reflection-Rumination Questionnaire

For each of the following statements, please indicate your level of agreement or disagreement with each statement. Think about how you are feeling RIGHT NOW when you rate each statement. Respond using the scale as shown below:

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>strongly disagree</td>
<td>Disagree</td>
<td>neutral</td>
<td>agree</td>
<td>strongly agree</td>
</tr>
</tbody>
</table>

**Rumination Items**
1. Right now, my attention is focused on aspects of myself that I wish I’d stop thinking about.
2. Right now, I am rehashing in my mind recent things I’ve said or done.
3. Right now, it’s hard for me to shut off thoughts about myself.
4. Right now, my thoughts keep going back to what happened in an argument or disagreement, even though it’s long over with.
5. Right now, I am “ruminating” or dwelling over things that happened to me in the past.
6. Right now, I’m not wasting time rethinking things that are over and done with. (-)
7. Right now, I’m playing back in my mind how I acted in past situations.
8. Right now, I’m re-evaluating something I’ve done.
9. Right now, I’m not ruminating or dwelling on myself (for very long.) (-)
10. Right now, it is easy for me to put unwanted thoughts out of my mind. (-)
11. Right now, I am reflecting on episodes from my life that I should no longer concern myself with.
12. Right now, I am thinking back over my embarrassing or disappointing moments.

**Reflection Items**
13. Right now, philosophical or abstract thinking doesn’t appeal to me that much. (-)
14. Right now, I’m not really a meditative type of person. (-)
15. Right now, I am exploring my “inner” self.
16. Right now, my attitudes and feelings about things fascinate me.
17. Right now, I don’t really care for introspective or self-reflective thinking. (-)
18. Right now, I am analyzing why I do things.
19. Right now, I think that people often say I’m a “deep” introspective type of person.
20. Right now, I don’t care much for self-analysis. (-)
21. Right now, I’m very self-inquisitive.
22. Right now, I am meditating on the nature and meaning of things.
23. Right now, I am looking at life in philosophical ways.
24. Right now, contemplating myself isn’t my idea of fun. (-)

Note: (-) denotes items to be reverse-scored.
Appendix H– Problem Distress Questions

How bothered are you about the problem you described?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all bothered</td>
<td>Neutral</td>
<td>Very bothered</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How upset do you feel about the problem you described?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all upset</td>
<td>Neutral</td>
<td>Very upset</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How anxious do you feel about the problem you described?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all anxious</td>
<td>Neutral</td>
<td>Very anxious</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How worried do you feel about the problem you described?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all worried</td>
<td>Neutral</td>
<td>Very worried</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How important does the problem seem in the grand scheme of things?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all important</td>
<td>Neutral</td>
<td>Very important</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please take a few minutes to write a possible solution to the problem that you described. Write out the steps that you could take to solve the problem. Try to think of the ideal solution to the problem.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Appendix I – Study 2 Demographics Questionnaire

How old are you? ______

What is your gender? ____________________

Which of the following BEST describes your ethnic background?

- [ ] Aboriginal/First Nations/Metis
- [ ] White/European
- [ ] Black/African/Caribbean
- [ ] Southeast Asian (e.g., Chinese, Japanese, Korean, Vietnamese, Cambodian, Filipino, etc.)
- [ ] Arab (Saudi Arabian, Palestinian, Iraqi, etc.)
- [ ] South Asian (East Indian, Sri Lankan, etc.)
- [ ] Latin American (Costa Rican, Guatemalan, Brazilian, Columbian, etc.)
- [ ] West Asian (Iranian, Afghani, etc.)
- [ ] Other (please specify) _______________________________
Appendix J – Free Thought Listing

What Are You Thinking Right Now?

Please take a moment to write down what is going through your mind right now. There are no restrictions on what you write. You can write as much or as little as you wish.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Appendix K – Dispositional Positive Emotion Scale

Please respond to the following statement by writing the number that best represents you in the box beside the item.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>Neutral</td>
<td>Strongly agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I often feel bursts of joy.

I am an inherently cheerful person.

I am often completely overjoyed when something good happens.

On a typical day, many events make me happy.

Good things happen to me all the time.

My life is always improving.

I am generally a contented person.

I am at peace with my life.

When I think about my life I experience a deep feeling of contentment.

I feel satisfied more often than most people.

My life is very fulfilling.

I feel good about myself.

I am proud of myself and my accomplishments.

Many people respect me.

I always stand up for what I believe.

People usually recognize my authority.

Other people are generally trustworthy.

I develop strong feelings of closeness to people easily.

I find it easy to trust others.

I can depend on people when I need help.

People are usually considerate of my needs and feelings.

I love many people.
<table>
<thead>
<tr>
<th>It’s important to take care of people who are vulnerable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>When I see someone hurt or in need, I feel a powerful urge to take care of them.</td>
</tr>
<tr>
<td>Taking care of others gives me a warm feeling inside.</td>
</tr>
<tr>
<td>I often notice people who need help.</td>
</tr>
<tr>
<td>I am a very compassionate person.</td>
</tr>
<tr>
<td>I find humor in almost everything.</td>
</tr>
<tr>
<td>I really enjoy teasing people I care about.</td>
</tr>
<tr>
<td>I am very easily amused.</td>
</tr>
<tr>
<td>The people around me make a lot of jokes.</td>
</tr>
<tr>
<td>I make jokes about everything.</td>
</tr>
<tr>
<td>I often feel awe.</td>
</tr>
<tr>
<td>I see beauty all around me.</td>
</tr>
<tr>
<td>I feel wonder almost every day.</td>
</tr>
<tr>
<td>I often look for patterns in the objects around me.</td>
</tr>
<tr>
<td>I have many opportunities to see the beauty of nature.</td>
</tr>
<tr>
<td>I seek out experiences that challenge my understanding of the world.</td>
</tr>
</tbody>
</table>
Appendix L – Mental Health Continuum – Short Form

Please answer the following questions are about how you have been feeling during the past month. Place a check mark in the box that best represents how often you have experienced or felt the following:

<table>
<thead>
<tr>
<th>During the past month, how often did you feel…</th>
<th>NEVER</th>
<th>ONCE OR TWICE</th>
<th>ABOUT ONCE A WEEK</th>
<th>ABOUT 2 OR 3 TIMES A WEEK</th>
<th>ALMOST EVERY DAY</th>
<th>EVERY DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. happy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. interested in life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. satisfied with life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4. that you had something important to contribute to society</td>
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<td></td>
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</tr>
<tr>
<td>5. that you belonged to a community (like a social group, or your neighbourhood)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>6. that our society is a good place, or is becoming a better place, for all people</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>7. that people are basically good</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. that the way our society works makes sense to you</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>9. that you liked most parts of your personality</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>10. good at managing the</td>
<td></td>
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<tr>
<td>responsibilities of your daily life</td>
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<td>-----------------------------------</td>
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<td>----------------------</td>
<td>----------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. that you had warm and trusting relationships with others</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>12. that you had experiences that challenged you to grow and become a better person</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>13. confident to think or express your own ideas or opinions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. that your life has a sense of direction or meaning to it</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix M – Emotions Experienced Questionnaire

Please rate how strongly you feel each of the following emotions right now using the following scale:

<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>did not experience that emotion at all</td>
<td>strongest experience of that emotion ever</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Amusement
Anger
Awe
Contentment
Disgust
Enthusiasm/Excitement
Fear
Love/Attachment
Sadness
Tenderness/Compassion
Worry/Anxiety
Appendix M - In-Lab Video Questionnaire

To the best of your knowledge, have you ever seen that video clip before?

<table>
<thead>
<tr>
<th>Response</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, I have seen that video clip several times before</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, I have seen that video clip a few times before</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, I have seen that video clip once before</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No, I have never seen that video clip before</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I’m not sure if I’ve seen that video clip before</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

Please take a few minutes to reflect on the video that you watched. What did the video make you think about? What thoughts are going through your mind right now?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Appendix N – Study 3 Demographic Questionnaire

How old are you? ______

What is your gender? _____________________

Which of the following BEST describes your ethnic background?

☐ Aboriginal/First Nations/Metis
☐ White/European
☐ Black/African/Caribbean
☐ Southeast Asian (e.g., Chinese, Japanese, Korean, Vietnamese, Cambodian, Filipino, etc.)
☐ Arab (Saudi Arabian, Palestinian, Iraqi, etc.)
☐ South Asian (East Indian, Sri Lankan, etc.)
☐ Latin American (Costa Rican, Guatemalan, Brazilian, Columbian, etc.)
☐ West Asian (Iranian, Afghani, etc.)
☐ Other (please specify) _______________________________
Appendix O - Email Instructions for Participants (Online Follow-up Sessions)

Subject line: Emotion Study Follow-up

Thank you for participating in the study entitled “Emotions Experienced in Response to Video: A Multi-Session Study”. For this session, which should take about 10 to 15 minutes, you will watch a short video and then fill out two questionnaires. Please choose a time today when you have at least 15 minutes free from distractions to complete this portion of the study. Try to complete the study in a quiet room that is free from distractions.

Follow this link to the questionnaires and video:

<table>
<thead>
<tr>
<th>Date</th>
<th>Condition</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday October 8th</td>
<td>Awe</td>
<td><a href="https://www.surveymonkey.com/s/FollowupA">https://www.surveymonkey.com/s/FollowupA</a></td>
</tr>
<tr>
<td>Tuesday October 8th</td>
<td>Amusement</td>
<td><a href="https://www.surveymonkey.com/s/FollowupM">https://www.surveymonkey.com/s/FollowupM</a></td>
</tr>
<tr>
<td>Tuesday October 8th</td>
<td>Control</td>
<td><a href="https://www.surveymoneky.com/s/Followup_C">https://www.surveymoneky.com/s/Followup_C</a></td>
</tr>
<tr>
<td>Wednesday October 9th</td>
<td>Awe</td>
<td><a href="https://www.surveymoney.com/s/FollowupA2">https://www.surveymoney.com/s/FollowupA2</a></td>
</tr>
<tr>
<td>Wednesday October 9th</td>
<td>Amusement</td>
<td><a href="https://www.surveymonkey.com/s/FollowupM2">https://www.surveymonkey.com/s/FollowupM2</a></td>
</tr>
<tr>
<td>Wednesday October 9th</td>
<td>Control</td>
<td><a href="https://www.surveymoney.com/s/FollowupC2">https://www.surveymoney.com/s/FollowupC2</a></td>
</tr>
<tr>
<td>Thursday October 10th</td>
<td>Awe</td>
<td><a href="https://www.surveymonkey.com/s/FollowupA3">https://www.surveymonkey.com/s/FollowupA3</a></td>
</tr>
<tr>
<td>Thursday October 10th</td>
<td>Amusement</td>
<td><a href="https://www.surveymoney.com/s/FollowupM3">https://www.surveymoney.com/s/FollowupM3</a></td>
</tr>
<tr>
<td>Thursday October 10th</td>
<td>Control</td>
<td><a href="https://www.surveymoney.com/s/FollowupC3">https://www.surveymoney.com/s/FollowupC3</a></td>
</tr>
<tr>
<td>Friday October 11th</td>
<td>Awe</td>
<td><a href="https://www.surveymonkey.com/s/FollowupA4">https://www.surveymonkey.com/s/FollowupA4</a></td>
</tr>
<tr>
<td>Friday October 11th</td>
<td>Amusement</td>
<td><a href="https://www.surveymonkey.com/s/FollowupM4">https://www.surveymonkey.com/s/FollowupM4</a></td>
</tr>
<tr>
<td>Friday October 11th</td>
<td>Control</td>
<td><a href="https://www.surveymoney.com/s/FollowupC4">https://www.surveymoney.com/s/FollowupC4</a></td>
</tr>
</tbody>
</table>

- When prompted, please enter your participant code. Your participant code is: CODE
If you have any questions or have trouble accessing the survey or viewing the video, please contact Jennifer Dobson at dobsonj@uoguelph.ca or 519-824-4120 x53307

Thank you!

Email Instructions for Participants (Online Check-In Sessions)

Thank you for participating in the study entitled “Emotions Experienced in Response to Video: A Multi-Session Study”. For this session, which should take about 5 to 10 minutes, simply fill out a short questionnaire.

- Click on the link below to complete the questionnaires:

<table>
<thead>
<tr>
<th>Date</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday October 15th, 2013</td>
<td><a href="https://www.surveymonkey.com/s/Online_CheckIn">https://www.surveymonkey.com/s/Online_CheckIn</a></td>
</tr>
</tbody>
</table>
When prompted, please enter your participant code. Your participant code is: CODE

If you have any questions or had trouble viewing the video or completing the questionnaires, please contact Jennifer Dobson at dobsonj@uoguelph.ca or 519-824-4120 x53307

Thank you!
Appendix P - Online Video Questionnaire

Please answer the following questions honestly. There is space for you to include comments after each question if you choose to do so. Your responses will not affect whether or not you receive credit. We ask these questions to get a better idea about your experience while participating in this study.

Did you watch the video?

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, I watched the whole video</td>
</tr>
<tr>
<td>Yes, I watched most of the video</td>
</tr>
<tr>
<td>No, I didn’t watch the video</td>
</tr>
</tbody>
</table>

Comments:

Did your computer have sound?

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, the computer I watched the video on had sound</td>
</tr>
<tr>
<td>No, I watched the video without sound</td>
</tr>
</tbody>
</table>

Comments:

Were you able to watch the video in a quiet room without distractions?

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, the room was totally quiet and free from distractions</td>
</tr>
<tr>
<td>Yes, the room was mostly quiet and mostly free from distractions</td>
</tr>
<tr>
<td>No, the room was somewhat noisy and contained some distractions</td>
</tr>
<tr>
<td>No, the room was very noisy and very distracting</td>
</tr>
</tbody>
</table>

Comments:

In one sentence, please describe the video that you watched today. (e.g., what was it about?)

Video Description:

To the best of your knowledge, have you ever seen that video clip before?

Yes, I have seen that video clip several times before
Yes, I have seen that video clip a few times before
Yes, I have seen that video clip once before
No, I have never seen that video clip before
I’m not sure if I’ve seen that video clip before

Comments:

Please take a few minutes to reflect on the video that you watched. What did the video make you think about? What thoughts are going through your mind right now?

Video Reflection: