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**Spiritual experiences evoke awe through the small self in both religious and non-religious
individuals**

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Running Head: SPIRITUALITY AND AWE

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Abstract

Spiritual experiences are profound moments of personal transcendence, connection, and wonder. Five studies (total $N = 1064$) investigate how spiritual experiences induce feelings of *awe*, in both religious and non-religious people, through a sense of small self. Recalling spiritual experiences increased feelings of Awe (Studies 1-5), Small Self (Studies 2, 4, & 5), and Spiritual Humility (Studies 3 & 4), but did not impact Intellectual Humility (Studies 3 & 4). We thus note a paradox—spirituality promotes humility toward the divine, but not humility about one’s beliefs. Moreover, the effect of spiritual experiences on Awe was mediated by feelings of Small Self (Studies 2, 4 & 5) and Spirituality Humility (Studies 3 & 4). The effects of spiritual experiences on Awe and Small Self were found in both religious and non-religious individuals, but religious people recalled more explicit religious events and life and death events as sources of spirituality, whereas non-religious people were more likely to report experiences in nature, peak experiences, science, and yoga/ meditation as spiritual experiences. Though religious and non-religious people may generate different types of spiritual experiences, we conclude that spirituality induces awe through the feelings of small self that are shared by religious and non-religious individuals, and this may help us to understand the meaning of spirituality without religion.

Word count: 212

Spiritual experiences evoke awe through feelings of small self in both religious and non-religious individuals

“The only thing that [religious experience] unequivocally testifies to is that we can experience union with *something* larger than ourselves and in that union find our greatest peace.” - William James, *Varieties of Religious Experience* (1902)

Though religion and spirituality are often associated, researchers and laypersons alike recognize essential differences between the two. Whereas religiosity relates to the affiliation and adherence to a prescribed set of religious beliefs and practices, spirituality refers to the religious experience itself (James, 1902/ 1988), the thoughts, feelings, and relationship felt toward God or the divine (e.g., Hill et al., 2000; Zinnbauer & Pargament, 1999). But what exactly characterizes these experiences? Spiritual experiences take many forms, and though they often relate to an experience with the “sacred”, many experiences people describe as spiritual center on non-religious themes. For example, Superbowl champion Tom Brady described watching the famous “Catch in Candlestick Park” game as a spiritual experience he has spent his life trying to replicate (McKenna, 2016). Other examples may include experiences in nature (Taylor, 2010), food (Farb & Armelagos, 1980), and music (Hays & Minichiello, 2005) as sources of spirituality. But across these experiences some common themes emerge – feelings of wonder, meaning, and connection to something beyond oneself, e.g., God or the Universe (James, 1902; Piedmont, 1999).

The present research examines the relationship between spiritual experiences and feelings of *awe*—a positive emotion of wonder in response to something vast and beyond comprehension (Keltner & Haidt, 2003). Connection between spirituality and awe has been argued in many works - for example, awe has been described as a “spiritual emotion” (Keltner & Haidt, 2003; Haidt & Algoe, 2004). Spirituality is positively correlated with feelings of awe and other positive emotions (Van Cappellen et al., 2016), and appraisals of awe has been included as an integral aspect of the spiritual experience (Underwood & Teresi, 2002). Both spirituality and awe are classified as self-transcendent experiences (Fredrickson, 2002; Piedmont, 1999), meaning that focus is directed beyond oneself to other people or stimuli. Rather, attention is rapt with something much greater than oneself (e.g., nature, God). Feelings of awe can also promote spiritual goals (for example, after an awe manipulation, people showed more preference to travel to Tibet over another vacation destination; Van Cappellen et al., 2013), and awe can also increase religious belief through motivation to reduce uncertainty (Valdesolo & Graham, 2014).

We argue here that awe, and more specifically the feeling of “small self” that accompanies awe, are central features of spiritual experiences for both religious and non-religious people. Despite some links between spirituality and awe observed in previous research, to date no work has shown feelings of awe can arise from spiritual experiences (i.e., that spiritual experiences induce awe), or what specific appraisals might be responsible for feelings of awe evoked from spiritual experiences. In general, sense of “small self” in awe is triggered by exposure to vast stimuli or concepts, (Bai et al., 2016; Piff et al., 2015, van Elk et al., 2016) such as view of high places (Shiota et al., 2007), the majestic beauty of nature (Cohen, Gruber, & Keltner, 2010), or admiration of great heroes (Shiota, Keltner, & Mossman, 2007). Spiritual experiences also seem to invoke a sense of small self—the infinite power of God, size of the

Universe, and grandeur of creation can all make a person feel tiny in comparison. Concepts of God are related to metaphors for elevation that place the divine above oneself (Meier et al., 2007), and likewise thoughts of God direct attention upward (Chasteen, Burdzy, & Pratt, 2010), embodiment evidence that we place the self in a diminutive state relative to the divine. Also related to small self, feelings of *humility* (Davis et al, 2010) —personal modesty and deference before more powerful forces—is a central value of all religions and correlated with spirituality (e.g., Powers et al., 2007). But important, there are different forms of humility, each defined by their object of deference. In particular, religion seems to inspire *spiritual humility*, the submissive and modest stance before God (Davis et al., 2010), or a kind of “small self” in relation to the sacred. Spirituality and awe therefore appear to share a profound sense of smallness in relation to something much greater than oneself, and so we test whether spiritual experiences may create awe through these feelings of small self.

Along with feelings of small self, awe is also characterized by a need for cognitive accommodation (Keltner & Haidt, 2003; Shiota, Keltner, & Mossman, 2007) – a realization of the limits of own knowledge and need to change existing schemas to make sense of new information (Piaget, 1970). But unlike the small self and spiritual humility, we do not necessarily expect spirituality to affect this epistemological aspect of awe. Need for cognitive accommodation is part of a hard-wired drive to make sense, activated by exposure to new ideas or information (Weiner, 1985). Need for accommodation is therefore not stable, but a temporary motivational state between uncertainty and certainty. Once uncertainty is resolved, need for accommodation dissolves. Spiritual experiences often come as a result of a search for answers, at the end of that transition. Indeed, though dispositional awe correlates with more cognitive openness (Shiota et al., 2007), situation-induced awe activates motivation to resolve uncertainty

(Valdesolo & Graham, 2014; Valdesolo, Park, & Gottlieb, in press). Though spiritual experiences are sometimes described as mysterious, (Batson & Schoenrade, 1991), the knowledge gained through spiritual experiences is most often felt as a *revelation*, held with high clarity and certainty, rather than doubt (Genia, 1996; James, 1902/ 1988). The explanations found in such experiences are associated with positive feelings epiphany (the “aha” effect”) and sense of meaningfulness (Gopnik, 1998; Preston & Epley, 2005), that helps resolve existential uncertainty (Laurin et al., 2008; Valdesolo & Graham, 2014), protect against anxiety (Inzlicht & Tullet, 2010), and provide answers to questions that science cannot (Preston & Epley, 2009). For these reasons, we do not necessarily expect that spirituality would increase cognitive need for accommodation, but we test this as a possibility and to compare with small self as a key component of the awe experience.

The Present Research

We investigate here whether spiritual experiences evoke awe in both religious and non-religious people, and if so, what aspects of awe (i.e., small self, need for accommodation) are involved. Whereas other studies have used inductions of awe to observe consequences on spirituality and small self, we look at awe as a result of those processes. We also examined various forms of humility— general humility, spiritual humility, and intellectual humility—as they relate to feelings of small self and need for accommodation. Need for accommodation is related to *intellectual humility*—a willingness to change beliefs when confronted with conflicting information (Davis et al., 2015) that can be distinguished from general and spiritual humility. We predict that spirituality induces feelings of awe (Studies 1-3) through their shared feelings of personal smallness in relation to some external vastness, i.e., the “small self” (Studies 2 & 3) and spiritual humility (Study 3). We also looked at intellectual humility, the state of cognitive

accommodation where one is prepared to change existing beliefs (Study 3), but we do not necessarily expect spirituality would affect this epistemological aspect of awe.

Important here, we distinguish spiritual experiences from an explicit religious definition, or those inherently connected to religious beliefs. We assume that non-religious people also experience spirituality, and so an important goal of this work is to examine and compare the spiritual experiences for religious and non-religious people. Religious practice or belief in gods is not necessary to experience spirituality (Pargament, 2009). This distinction echoes other work that distinguishes spirituality from religion (Hill et al., 2000; Preston, Ritter & Hernandez, 2010; Ritter & Preston, 2013, Zinnbauer et al., 1997), and experiences of people who may identify as “spiritual but not religious” (Ammerman, 2013; Saucier & Skrzypińska, 2006). We hope to clarify the meaning of spirituality by investigating the main components of the experience shared by both religious and secular individuals. We expect that religious and non-religious people will differ in sources of spirituality, but we predict these spiritual experiences will share a common feeling of awe, and will be induced through a shared sense of small self.

Study 1

Study 1 tested the primary hypothesis that spiritual experiences increase feelings of awe. Participants were asked to recall a time they felt either spiritual or humor, and then completed a measure of awe.

Method

Note on sample size and power. Prior testing for a separate set of studies suggested a reliable effect of spiritual manipulations on awe¹. For Studies 1-3 we adopted criteria of 50 participants per condition to detect a medium sized effect at 80% power. In all studies, sample size was determined before collection and analyses performed after all data for the study were collected. We report all measures and exclusions.

Participants. 100 U.S. participants were recruited on Mturk for a small fee (Mean age = 33; 59 women, 38 men, 1 other, 2 non-reporting; 50% Christian, 2% Jewish, 2% Buddhist, 45% non-religious).

Procedure

Participants were randomly assigned to one of two recall conditions: Spiritual experiences or Humor experiences. Humor was used as a control condition to control for overall positive affect. In the Spiritual condition, participants were asked to recall a time they felt “strong feelings of spirituality and connection to the divine.” To include experiences of non-religious individuals, we also include the instruction “If you are not religious, recall a time when you felt a deep connection with the Universe/ world around you”. In the Humor condition participants recalled a time they felt “strong feelings of amusement/ humor”. Similar methods of autobiographical recall have been used in many studies of mood induction and a recent meta-analysis shows that such manipulations reliably impact affect (Lench, Flores, & Bench, 2011).

Participants were given space to write about the event. Participants next rated how negative/

¹ These prior studies tested the hypothesis that spirituality might enhance interest in nature, and found no such relationship. But studies did find a consistent effect of spirituality on awe ($\eta_p^2 > .03$, $h > .53$) that we pursue in the present research and used to estimate effect size here.

positive the recalled event was (1 = *extremely negative*, 7 = *extremely positive*), how spiritual, and how amused they felt now (1 = *not at all*; 7 = *extremely*). Participants then completed a 5-item Awe Scale (Shiota, Keltner, & John, 2006), a 6-item religiosity scale (Ritter & Preston, 2011, adapted from Shariff et al., 2008), and demographic information (see Appendix).

Results and Discussion

Manipulation Check. As a manipulation check, feelings of spirituality and amusement were each analyzed by respective independent *t*-tests. As expected, people reported feeling more spiritual in the Spirituality ($M = 4.40$, $SD = 1.78$) than the Humor condition ($M = 3.03$, $SD = 2.12$; $t(98) = 3.36$, $p = .001$, Cohen's $d = .69$, 95% C.I. [.27, 1.10]), and more amused in the Humor ($M = 5.98$, $SD = .85$) than the Spirituality condition ($M = 4.43$, $SD = 1.75$; $t(98) = -5.92$, $p < .001$, Cohen's $d = -1.21$, 95% C.I. [-1.64, -.77]). There were no differences between conditions on how positive/ negative the experiences were rated ($t < 1$), with both conditions rated highly positive ($M_{grand} = 6.34$, $SD = 1.15$).

Awe. As a test of our primary hypothesis, means on the five-item Awe Scale ($\alpha = .79$) were analyzed by independent *t*-test, ($t(146) = 2.48$, $p = .015$, Cohen's $d = .51$, 95% C.I. [.10, .91]). As predicted, awe was higher in the Spiritual ($M = 5.17$, $SD = 1.07$) vs. the Humor condition ($M = 4.61$, $SD = 1.13$).

Religiosity. An independent *t*-test on the religiosity scale ($\alpha = .97$) was not significant ($t(98) = 1.46$, $p = .15$). When entered as a covariate, religiosity emerged as a significant covariate on awe ($F(1, 97) = 7.12$, $p = .009$, $\eta_p^2 = .07$), as the effect of condition on awe remained significant ($F(1, 97) = 17.97$, $p = .035$, $\eta_p^2 = .05$).

Summary. Study 1 provided evidence for our overarching hypothesis that spiritual experiences induce feelings of awe. We replicate and extend this design in Study 2 by investigating the effect of spiritual experiences on feelings of small self and its role in spiritual awe.

Study 2

Study 2 aimed to replicate the finding of Study 1 that spiritual experiences induce awe, and extended the design by investigating the role of small self in spiritual awe. As in Study 1, we expected spiritual experiences would increase awe, and further that this effect would be mediated by feelings of small self.

Method

Participants. 100 participants were recruited on Mturk for a small fee, mean age = 30.2 years; 36 women, 63 men, 1 other; 34% Christian, 4% Jewish, 2% Hindu, 1% Buddhist, 6% other, 52 % non-religious.

Procedure

As in Study 1, participants were randomly assigned to a Spiritual or Humor recall condition. Participants were given space to write about the event. Participants next rated how negative/ positive the recalled event was (1 = *extremely negative*, 7 = *extremely positive*), how spiritual, and how amused they felt now (1 = *not at all*; 7 = *extremely*). Participants then completed a 5-item Small Self scale (Shiota et al., 2007), followed by a single item “I feel awe” (1 = *not at all*; 7 = *extremely*). Here we used a single item of awe to obtain a discreet measure of

awe without confounding with small self or other appraisals. Participants then completed the six-item religiosity scale, and demographic information.

Results and Discussion

Manipulation Checks. People reported feeling more spiritual in the Spirituality ($M = 3.45$, $SD = 1.90$) vs. the Humor condition ($M = 2.32$, $SD = 1.66$; $t(98) = 3.16$, $p = .002$, Cohen's $d = .63$, 95% C.I. [.23, 1.03]) and more amused in the Humor ($M = 5.72$, $SD = 1.04$) vs. Spirituality condition ($M = 3.89$, $SD = 1.79$; $t(98) = -6.16$, $p < .001$, Cohen's $d = -1.23$, 95% C.I. [-1.66, -.80]). There were no differences between conditions on how positive/ negative the experiences were rated ($t = .00$), with both conditions rated highly positive ($M = 6.22$, $SD = 1.23$).

Awe and the Small Self. Replicating Study 1, means of self-reported awe were higher in the Spiritual ($M = 4.74$, $SD = 1.78$) vs. the Humor condition, ($M = 3.49$, $SD = 1.61$; independent $t(98) = 3.65$, $p < .001$, Cohen's $d = .73$, 95% C. I. [.32, 1.14]). As predicted, means on the Small Self Scale ($\alpha = .67$) in Study 2 were higher in the Spiritual ($M = 4.77$, $SD = .99$) vs. the Humor condition, ($M = 3.86$, $SD = 1.15$; independent $t(98) = 4.28$, $p < .001$, Cohen's $d = .86$, 95% CI: [.44, 1.27]).

Using linear regression, we examined whether the effect of spiritual condition on awe was mediated by feelings of small self (see Figure 1). To calculate the indirect effect estimate, we use a bootstrapped method with 10,000 resamples using the SPSS PROCESS Macro (Preacher & Hayes, 2008). Feelings of small self predicted awe when entered alone (Unstandardized $b = .91$ [95% CI: .66, 1.16], $t(98) = 7.10$, $p < .001$). When entered together,

small self predicted awe ($b = .83$ [95 % CI: .55, 1.10], $t(97) = 5.95$ $p < .001$), but condition (Spiritual = 1, Humor = 0) did not, ($b = .49$, 95 % CI: [.14, 1.13], $t(97) = 1.54$, $p = .13$), providing positive support that small self mediates the effect of spiritual experiences on awe (Sobel $z = 3.68$, $p < .001$, indirect effect estimate = .75 [.37, 1.24], $SE = .22$).

[Figure 1 here]

Religiosity. An independent t -test on the religiosity scale ($\alpha = .97$) was not significant ($t < 1$). When entered as a covariate, religiosity emerged as a significant covariate on measures of Awe ($F(1, 97) = 4.38$, $p = .039$, $\eta_p^2 = .04$), as the effect of condition remained significant ($F(1, 97) = 12.83$, $p = .001$, $\eta_p^2 = .12$). Religiosity also emerged as a covariate on Small Self ($F(1, 97) = 7.36$, $p = .008$, $\eta_p^2 = .07$), as the main effect of condition on Spiritual Humility remained significant ($F(1, 97) = 17.97$, $p < .001$, $\eta_p^2 = .16$).

Summary. Study 2 replicated and extended Study 1. As in Study 1, recalling spiritual experiences evoke greater feelings of awe than humor experiences. Study 2 also found that spiritual experiences increased the feeling of “small self” – the feeling of personal smallness in relation to something greater. Other studies have used inductions of awe to observe consequences on spirituality and small self, this study shows that awe and small self can arise from spirituality. Further, small self mediated the overall effect of spirituality on awe, suggesting that spiritual experiences create awe through shared feelings of “small self” that are essential to both spirituality and awe.

Study 3

Study 2 showed that spiritual experiences induce awe, mediated through feelings of small self. Study 3 aimed to replicate and extend these findings by examining the role of *humility* between spirituality and awe, as a related form of personal smallness/ modesty. We also distinguish between general, spiritual, and intellectual humility. *Spiritual humility* refers a deference or submissive stance before God, related to a feeling of sacred small self. *Intellectual humility* refers to a willingness to change beliefs when confronted with conflicting information (Davis et al., 2015), related to the need for cognitive accommodation. We also included a measure of Need for Cognitive Closure (used in previous studies of awe to measure need for accommodation, Shiota et al, 2007). We expected to replicate the effect of spirituality on feelings of awe, and on measures related to feeling of small self (i.e., Small Self and Spiritual Humility). However, we do not necessarily expect spirituality to affect aspects of awe related to cognitive accommodation, (i.e. Intellectual Humility and Need for Cognitive Closure).

Method

Participants. 99 participants were recruited on Mturk for a small fee (mean age = 32.7 years; 50 women, 47 men, 1 other, 1 non-reporting; 55.5% Christian, 2% Jewish, 3% Hindu, 1 other, 35.4% non-religious, 2 non-reporting).

Procedure. As in Study 1, participants were randomly assigned to one of two recall conditions: Spirituality or Humor. After writing, participants rated how happy, spiritual, amused, and how much awe they felt on 7-point scales (1 = *not at all*; 7 = *extremely*). Next, participants completed the 5-item General Humility scale (Davis et al., 2015) Spiritual Humility scale

(adapted from Davis et al., 2010), Intellectual Humility (Davis et al., 2015), a short form of Need for Cognitive Closure (Kruglanski & Webster, 1996), the six-item religiosity scale, and demographic information.

Results

Manipulation Check. As a manipulation check, feelings of spirituality and amusement were each analyzed by respective independent *t*-tests. People reported feeling more spiritual in the Spirituality ($M = 4.52$, $SD = 1.90$) than the Humor condition ($M = 3.47$, $SD = 1.80$; $t(97) = 2.81$, $p = .006$, Cohen's $d = .56$, 95% CI [.16, .96]), and more amused in the Humor ($M = 5.38$, $SD = 1.30$) compared to the Spirituality condition ($M = 4.06$, $SD = 1.46$; $t(97) = -4.76$, $p < .001$, Cohen's $d = -.95$, 95% CI [-1.37, -.54]). There was no difference in self-reported happiness between conditions ($t(97) = -.43$, $p = .67$).

Awe. Means on the awe item were analyzed by independent *t*-test. As in Studies 1 and 2, awe was higher in the Spiritual ($M = 4.02$, $SD = 1.84$) vs. the Humor condition, ($M = 3.02$, $SD = 1.73$; $t(97) = 2.77$, $p = .007$, Cohen's $d = .56$ [.15, .96]).

General Humility. Means on the General Humility Scale² ($\alpha = .60$) were analyzed by independent *t*-test. Feelings of general humility were higher in the Spiritual ($M = 5.39$, $SD = .86$) vs. the Humor condition, ($M = 4.76$, $SD = 1.10$, $t(97) = 3.22$, $p = .002$, Cohen's $d = .65$ [.24, 1.05]).

² Item 3 on the General Humility Scale, "I think that I am entitled to more respect than the average person", loaded poorly with other items, and lowered scale reliability below acceptable levels ($\alpha = .56$). This item was therefore omitted from the scale. When the item is included in the scale, effect of condition on General Humility remains significant, $t(97) = 4.70$, $p = .008$.

Spiritual Humility. Means on the Spiritual Humility Scale ($\alpha=.87$) were analyzed by independent *t*-test, ($t(97) = 3.32, p = .001$, Cohen's $d = .67$, 95% C.I. [.26, 1.07], $h=.90$), with greater spiritual humility in the Spiritual ($M = 5.53, SD = 1.07$) vs. the Humor condition, ($M = 4.69, SD = 1.42$).

Intellectual Humility and Cognitive Closure. Means on the Intellectual Humility Scale ($\alpha = .85$) and Cognitive Closure Scale ($\alpha = .79$) were positively correlated ($r = .28, p = .005$), indicating convergence between these constructs as measures of need for accommodation. Means of the two measures were analyzed by respective independent *t*-tests. No differences were observed for either Intellectual Humility ($t(97) = -.46, p = .64$) or Cognitive Closure ($t(97) = -.91, p = .37$) in the Spiritual vs. the Humor condition.

Mediation Analysis. We examined whether the effect of condition on Awe was mediated by either General or Spiritual Humility using linear regression. First, General Humility predicted Awe when entered alone (unstandardized $b = .41$, [95% CI: .055, .76], $t(97) = 2.29, p = .02$). When General Humility and condition were entered together, General Humility did not predict Awe ($b = .29$ [CI: .09, .65], $t(97) = 1.54, p = .13$), but condition did ($b = .82$ [CI: .07, 1.56], $t(97) = 2.18, p = .03$), indicating no mediation by General Humility. Feelings of Spiritual Humility predicted Awe when entered alone ($b = .55$ [CI: .29, .81], $t(97) = 4.19, p < .001$). When entered together, Spiritual Humility predicted Awe ($b = .47$, [CI: .20, .75], $t(97) = 4.36, p = .001$), but condition did not, ($b = .60$, [CI: .12, 1.31], $t(97) = 1.67, p = .10$), indicating mediation by spiritual humility (Sobel $z = 2.32, p = .02$; indirect effect estimate = .40 [.13, .83], $SE = .18$).

Religiosity. An independent *t*-test on the religiosity scale ($\alpha = .79$) was significant ($t(97) = 2.11, p = .037, \eta_p^2 = .044$, Cohen's $d = .42$, 95% CI [.02, .82]), with greater religiosity reported

in the Spiritual ($M = 4.00$, $SD = 2.10$) vs. Humor condition ($M = 3.15$, $SD = 1.88$). When entered as a covariate, religiosity emerged as a significant covariate on measures of Awe ($F(1, 96) = 4.51$, $p = .036$, $\eta_p^2 = .05$), as the effect of condition remained significant ($F(1, 96) = 5.36$, $p = .023$, $\eta_p^2 = .05$). Religiosity also emerged as a significant covariate on Spiritual Humility ($F(1, 96) = 14.31$, $p < .001$, $\eta_p^2 = .13$), as the main effect of condition on Spiritual Humility remained significant ($F(1, 96) = 7.09$, $p = .009$, $\eta_p^2 = .07$).

Discussion

Study 3 replicated the effect of spiritual experiences on feelings of awe observed in Studies 1 & 2, and further explored the two core components of awe—small self and need for accommodation. Recall of spiritual experiences increased feelings of general humility, and as expected, also increased spiritual humility. Moreover, the effect of spirituality on awe was mediated by spiritual humility, i.e., feeling of small self relative to the sacred, but not general humility. As in Studies 1 and 2, these findings suggest that the small self is central to spirituality and awe experiences, and helps to explain the relationship between the two. However, spiritual recall did not affect Intellectual Humility and Need for Cognitive Closure—measures related to need for accommodation. This suggests that although spiritual experiences induce general awe, they do not affect the intellectual or epistemological aspect of awe associated with a greater need for accommodation. But, it is possible these null effects could be Type 2 error, and indeed Need for Cognitive Closure is conceptualized and measured as a trait (not state) variable, so may not be impacted by our manipulation. Study 4 was conducted to replicate these and other effects observed in Studies 1-3.

Study 4

The goal of Study 4 was to bring together all key measures from Studies 1-3, so to replicate the observed effects. Studies 1-3 showed that recalling spiritual experiences induced awe. Studies 2 found this effect was mediated through feelings of Small Self, and Study 3 found the effect was mediated by Spiritual Humility, which can be thought of as a small self in relation to the divine. But Study 3 also showed no effect on measures of Intellectual Humility, which relates to need for accommodation, the epistemological aspect of awe. Study 4 measured all these variables, and also improved the experimental design by including an additional control condition where people recalled their activities in typical day, as a neutral comparison. We expected to replicate the effect of spirituality on feelings of awe, and on measures related to feeling of small self (i.e., Small Self and Spiritual Humility). But as in Study 3, we do not necessarily expect spirituality to affect aspects of awe related to cognitive accommodation, (i.e. Intellectual Humility).

Method

Participants. Study 4 included two control conditions to compare to the Spirituality condition, we therefore aimed to double the sample size per condition to obtain power necessary for a one-way ANOVA testing an experimental condition against two control condition. 294 participants were recruited on Mturk. Data from 3 participants were excluded for incomplete surveys, and 3 participants in the Spiritual condition were omitted because they could not recall a spiritual experience, leaving $N = 288$ (Mean age = 34.4 years; 144 women, 143 men, 1 non-reporting; 54.5% Christian, 2% Jewish, 2% Buddhist, 10% other, <1% Hindu, Muslim, 35% non-religious).

Procedure. Procedure followed Studies 1-3, but included an additional control condition where participants recalled a “typical day”. In addition to self-reported feelings of spirituality and humor after the manipulation, additional ratings of happiness and boredom were measured on 7-point scales (1 = *not at all*; 7 = *extremely*). The Small Self scale was used as in Study 2, followed by a 5-item measure of General Humility. Participants also completed the 5-item measure of Spiritual Humility as in Study 3, but unlike Study 3 items on the scale were in reference only to “the Sacred” rather than “the Sacred/ Universe”. Participants completed the 6-item measure of Intellectual Humility, and a 5-item measure of Awe, edited to avoid conceptual overlap with Small Self and Spiritual Humility, the 6-item measure of religiosity, and demographic information. See Appendix for all measures.

Results and Discussion

Emotion Measures Check. As a manipulation check, feelings of happiness, spirituality, amusement, and boredom were each analyzed by one-way ANOVAs, showing the manipulations worked as intended (all means and standard deviations, Table 1). The one-way ANOVA on spirituality was significant ($F(2, 284) = 9.34, p = .001$), as was the planned contrast comparing means in Spirituality condition to Humor and Typical day conditions (weights 2, -1, -1; $t(284) = 4.24, p < .001$, Cohen’s $d = .53$ [.28, .78]). The one-way ANOVA on amusement was significant ($F(2, 284) = 61.92, p < .001$), as was the planned contrast comparing means in the Humor condition to the Spirituality and Typical Day conditions ($t(287) = 11.16, p < .001$, Cohen’s $d = 1.40$, 95% C.I. [1.13, 1.67]). The one-way ANOVA on boredom was significant, ($F(2, 285) = 11.16, p < .001$), as was the planned contrast comparing means in the Typical Day condition to the Spirituality and Humor conditions ($t(287) = 4.48, p < .001$, Cohen’s $d = .56$, 95% C.I. [.31,

.81]). The one-way ANOVA on happiness was significant, ($F(2, 284) = 12.06, p < .001$). Post-hoc analyses (least squares differences) found that happiness was greatest in the Humor condition ($M = 5.82, SD = 1.02$), compared to the Spirituality condition ($M = 5.28, SD = 1.34, p = .004$), which was greater than the Typical Day condition ($M = 4.92, SD = 1.42, p < .001$).

Awe, small self, and humility. One-way ANOVA on the Awe scale ($\alpha = .80$) was significant, $F(2, 288) = 16.62, p < .001, \eta_p^2 = .10, 90\% \text{ CI } [.05, .16]^3$, as was the planned contrast (weights: 2, -1, -1; $t(285) = 5.16, p < .001, \text{Cohen's } d = .65 [.39, .90]$). Post-hoc analyses confirmed that Awe was higher in the Spiritual ($M = 5.23, SD = .94$) vs. the Humor condition ($M = 4.75, SD = 1.07, p = .002$) or Typical day condition ($M = 4.36, SD = 1.13, p < .001$).

One-way ANOVA on the Small Self scale ($\alpha = .65$) was significant, $F(2, 285) = 7.89, p < .001, \eta_p^2 = .045, 90\% \text{ CI } [.02, .09]$, as was the planned contrast, $t(285) = 3.83, p < .001, \text{Cohen's } d = .48 [.23, .73]$. Post-hoc analyses confirmed that Small Self was higher in the Spiritual ($M = 5.12, SD = .88$) than either Humor condition, ($M = 4.71, SD = 1.11, p = .006$) or Typical Day condition, ($M = 4.56, SD = 1.04, p < .001$).

One-way ANOVAs on the General Humility Scale ($\alpha = .62$) showed no significant overall effect, ($F < 1$), nor on the Intellectual Humility Scale ($\alpha = .88, (F(2, 285) = 1.42, p = .24)$). However, the one-way ANOVA on the Spiritual Humility scale ($\alpha = .96$) was significant ($F(2, 285) = 3.29, p = .04, \eta_p^2 = .018, 90\% \text{ CI } [.0006, .05]$), as was the planned contrast: $t(285) = 2.19, p = .03, \text{Cohen's } d = .27 [.03, .52]$. Post-hoc analyses found that that Spiritual Humility

³ We report 90% confidence intervals for partial eta-squared to be equivalent to the ANOVA F test (which employs a one-tailed, upper tailed, probability). This means that we should employ a confidence coefficient of $(1 - 2\alpha)$ or 90% CI instead of 95% (Steiger, 2004; Wuensch, 2009).

was higher in the Spiritual ($M = 4.37$, $SD = 1.75$) than the Humor condition, ($M = 3.67$, $SD = 2.03$, $p = .011$), but not from Typical Day condition, ($M = 4.04$, $SD = 1.86$, $p = .22$).

[Table 1 about here]

Finally, we examined whether small self and spiritual humility (respectively) mediated the effect of Spiritual condition on Awe, using linear regression. Conditions were dummy-coded (Spirituality = 1, Control = 0), and we used a bootstrapped method with 10,000 resamples using the SPSS PROCESS Macro (Preacher & Hayes, 2008). First, Small Self predicted Awe when entered alone (Unstandardized $b = .50$, CI: [.39, .61], $t(287) = 9.09$, $p < .001$). When entered together, Small Self predicted Awe ($b = .46$, 95% CI [.35, .57], $t(287) = 8.23$, $p < .001$), as did condition, ($b = .45$, CI: [.35, .57], $t(287) = 3.72$, $p = .10$), with mediation by Awe (indirect effect estimate = .22 [.11, .35], $SE = .06$).

Spiritual Humility predicted Awe when entered alone ($b = .20$ [CI: .14, .27], $t(287) = 6.33$, $p < .001$). When entered together, Spiritual Humility predicted Awe ($b = .19$, CI [.12, .25], $t(287) = 5.91$, $p < .001$), as did condition, ($b = .58$, [CI: .33, .83], $t(287) = 4.61$, $p < .001$), with mediation by Spiritual Humility (indirect effect estimate = .10 [.01, .20], $SE = .05$).

Religiosity. A one-way ANOVA on the religiosity scale ($\alpha = .96$) was not significant ($F < 1$). When entered as a covariate, religiosity emerged as a significant covariate on the one-way ANOVA on small self ($F(1, 284) = 10.70$, $p = .001$, $\eta_p^2 = .036$), as the effect of condition remained significant ($F(1, 284) = 8.43$, $p < .001$, $\eta_p^2 = .056$). Religiosity emerged as a highly significant covariate the one-way ANOVA on spiritual humility ($F(1, 284) = 236.82$, $p < .001$,

$\eta_p^2=.46$), and the omnibus effect of condition on spiritual humility was significant with religion covariate ($F(1, 284) = 5.95, p = .003, \eta_p^2 = .04$).

Summary. Study 4 tested the effects of spiritual recall compared to two control conditions (humor, typical day), on all key dependent measures: Awe, Small Self, Spiritual Humility, and Intellectual Humility. The key effects of all studies were replicated. Spiritual recall increased feelings of Awe, Small Self, And Spiritual Humility, but not Intellectual Humility, though we note that the effect size on Spiritual Humility was somewhat smaller than in Study 3. Study 4 also replicated the mediation of Spiritual recall on Awe by both Small Self (observed in Study 2) and Spiritual Humility (observed in Study 3).

Study 5

Studies 1-4 looked at experiences of spiritual awe in both religious and non-religious participants. In these previous studies, participants in the Spiritual condition were asked to recall a time they felt “strong feelings of spirituality and connection to the divine” and to address experiences of non-religious individuals, we also included the instruction “If you are not religious, recall a time when you felt a deep connection with the Universe/ world around you”. It is therefore possible this flexibility in instructions resulted in two qualitatively different manipulations for religious and non-religious people. The goal of Study 5 was to control for self-selection differences in the task activity by giving a single instruction in the spiritual condition. Moreover, we increased the overall sample size of Study 5 so that we could directly compare effects of condition on religious and non-religious participants. We expected to replicate the effects observed in Studies 1-4 for both religious and non-religious participants, i.e., that spiritual experiences induce feelings of awe, mediated by increased feeling of small self.

Method

Participants. We wanted to collect a sample large enough to compare effects for religious vs. non-religious participants, and therefore aimed to collect a minimum 200 participants per condition (less exclusions) to obtain minimum of 150 non-religious participants in the total sample. 499 participants were recruited on Mturk. Data from 14 participants were excluded for incomplete surveys, and 8 participants in the Spiritual condition were omitted because they could not recall a spiritual experience, leaving $N = 477$ (Mean age = 34.7 years; 271 women, 203 men, 3 non-reporting; 53.5% Christian, 2.3% Jewish, 2% Buddhist, 3.6% other, 2% Hindu, Muslim, or non-reporting; 36.7% non-religious).

Procedure. Participants were randomly assigned to recall either a spiritual experience, or the events of a “typical day”. Instructions to recall spiritual experiences read: “Think of a time in your life when you felt strong feelings of spirituality. That is, a time when you felt deeply connected and some deeper meaning in life. Describe what you were doing and what happened in detail.” Immediately following, participants rated how happy, amused, spiritual, bored, and sad they felt at on 7-point scales (1 = *not at all*; 7 = *extremely*). Half the participants then responded to items from the Small Self, General Humility, and Intellectual Humility scales, which were presented in a randomized order on a single page. The other half of participants completed the 5-item awe scale, with items presented in randomized order embedded in an 8-item System Justification scale (Jost et al., 2005), in order to reduce demand characteristics. Participants then completed the other half of the items (whichever ones they did not receive) on the next page. Finally, participants were given the 6-item measure of religiosity, and demographic information.

Results and Discussion

Emotion Measures Check. Feelings of happiness, spirituality, amusement, boredom, and sadness were each analyzed by independent samples t-tests. The independent samples t-test for spirituality ($t(472) = 5.18, p < .001$, Cohen's $d = .48$ [.29, .66]) was significant, and the t-test for amusement was not significant, but marginal ($t(472) = -1.91, p = .06$, Cohen's $d = -.18$ [-.36, .01]). The t-test for boredom was significant, ($t(475) = -3.03, p = .003$, Cohen's $d = -.28$ [-.46, -.10]). The independent samples t-test for happiness was not significant, ($t(474) = 1.64, p = .10$).

Awe, small self, system justification, and humility. As expected, the independent samples t-test on the Awe scale ($\alpha = .75$) was significant, ($t(475) = 3.96, p < .001$, Cohen's $d = .36$ [.18, .55]), with greater awe reported in the Spiritual ($M = 5.34, SD = .89$) vs. Typical day condition ($M = 5.00, SD = .99$). An independent samples t-test on the Small Self scale ($\alpha = .57$) was also significant, ($t(475) = 3.36, p = .001$, Cohen's $d = .31$ [.13, .49]). Small Self was higher in the Spiritual ($M = 4.98, SD = .93$) than Typical Day condition, ($M = 4.68, SD = 1.00$). There was also a significant effect for General Humility ($\alpha = .55, t(475) = 2.74, p = .006$, Cohen's $d = .25$ [.07, .43]), where humility was higher in the Spirituality condition ($M = 4.91, SD = .94$) compared to the Typical Day condition ($M = 4.67, SD = .94$). Independent samples t-tests on the System Justification Scale ($\alpha = .80, t(475) = .50, p = .62$), and the Intellectual Humility Scale ($\alpha = .79, t(475) = 1.77, p = .08$) showed no significant effects.

We also conducted 2 x 2 ANOVAs to examine whether the order of the scales affected participants' responses. There were no significant main effects of ordering for Awe ($F(1, 473) = .33, p = .08$), System Justification ($F(1, 473) = .002, p = .97$), Small Self ($F(1, 473) = .09, p = .76$), General Humility ($F(1, 473) = .13, p = .72$), or Intellectual Humility ($F(1, 473) = .89, p =$

.35). There were also no significant interactions between ordering and condition for all of the dependent measures ($F > 1$).

Mediation by Small Self. As in Studies 2 & 4, we next examined whether Small Self mediated the effect of Spiritual condition on Awe, using linear regression. Conditions were dummy-coded (Spirituality = 1, Control = 0) and we used a bootstrapped method with 10,000 resamples using the SPSS PROCESS Macro (Preacher & Hayes, 2008). First, Small Self predicted Awe when entered alone (Unstandardized $b = .42$, CI: [.34, .50], $t(475) = 10.35$, $p < .001$). When entered together, Small Self predicted Awe ($b = .41$, 95% CI [.32, .49], $t(474) = 9.88$, $p < .001$), as did condition, ($b = .23$, 95% CI: [.07, .38], $t(474) = 2.79$, $p = .006$). The indirect effect was significant (indirect effect estimate = .13 [.05, .21], $SE = .04$),

Role of religious affiliation. An important question in Study 5 was whether the spirituality manipulation would affect religious and non-religious participants in a similar way. To examine this question, we coded for whether participants affiliated with a religion or consider themselves non-religious and conducted a 2 (Condition: Spiritual/ Control) x 2 (Religious: Yes/ No) ANOVA on our dependent measures. There was a significant main effect of Religion for System Justification ($F(1, 471) = 33.04$, $p < .001$), with religious people ($M = 3.79$, $SD = 1.02$) reporting greater system justification beliefs than the non-religious ($M = 3.24$, $SD = 1.08$). There was also a significant main effect of Religion for Small Self ($F(1, 471) = 5.46$, $p = .02$), with religious individuals ($M = 4.90$, $SD = .95$) reporting greater feelings of Small Self than non-religious ($M = 4.64$, $SD = 1.02$). There was a main effect of Religion for Humility ($F(1, 471) = 7.24$, $p = .007$), but in the opposite direction – non-religious participants ($M = 4.92$, $SD = .99$) reported greater humility than religious participants ($M = 4.70$, $SD = .96$). Similarly, non-

religious participants ($M = 5.53$, $SD = .97$) reported greater feelings of Intellectual Humility ($F(1, 471) = 30.85$, $p < .001$) than religious participants ($M = 5.07$, $SD = .95$). There were no significant main effects of religion on Awe ($F(1, 471) = .72$, $p = .40$). Most important, no significant interactions were observed on any dependent measures, for Awe ($F(1, 471) = 1.85$, $p = .17$), System Justification ($F(1, 471) = .24$, $p = .63$), Small Self ($F(1, 471) = 1.78$, $p = .18$), General Humility ($F(1, 471) = 3.65$, $p = .06$), or Intellectual Humility ($F(1, 471) = .09$, $p = .76$). In other words, though there were baseline differences on these measures between religious and non-religious individuals, the spiritual manipulation affected changes in measures in a similar way.

Summary. Study 5 tested the effects of spiritual recall in a larger sample of religious and non-religious participants, and using a single manipulation instruction within the Spiritual condition. The key effects observed in Studies 1-4 were replicated, among both religious and non-religious participants. Spiritual recall increased feelings of Awe, Small Self, but not Intellectual Humility. Study 5 also replicated the meditation effect of Spiritual recall by Awe. Consistent with the previous studies, this suggests awe and feeling of small self is central to the experience of spirituality in both religious and non-religious people, and that these experiences induce awe through the sense of personal smallness in relation to something grander than oneself.

Meta-analyses to Compare Religious and Non-religious individuals.

As we note throughout this work, religion and spirituality are related but not equivalent (Ritter & Preston, 2013), and people can identify as spiritual without identifying as religious (Zinnbauer et al., 1997). All studies in this research therefore included individuals who reported no religious affiliation because it was important to generalize to all kinds of spiritual experiences, and we were interested in observing whether spiritual experiences would induce awe and small self among both religious and non-religious people. However, sample sizes for many of our individual studies did not yield adequate power to compare the effects between these groups. But we can aggregate the data in a mini-meta-analysis to observe whether the effects reported are specific to religious individuals or generalize to non-religious individuals, and to examine the overall strength of the effects across similar studies. We can also use aggregated data across studies to examine the kinds of spiritual experiences reported by participants, and if they differ by religious identification.

Meta-analyses. We used a fixed-effects meta-analytic procedure because we intended to provide a conditional inference about the three studies reported here and not to generalize to situations or populations outside of these studies (Hedges & Vevea, 1998). We obtained mean effects sizes and confidence intervals on the effect sizes using the “metafor” package in R. Important, in these analyses religiousness is used as a dichotomous categorical variable: either having some religious affiliation, or none. Thus, *religiousness* as a dichotomous variable here differs from *religiosity*, the continuous measure of religious belief used in these studies.

The meta-analytic effect size (5 studies, $n = 1,064$) for condition on feelings of Awe was significant ($d = .49$, 95% C.I. [.37, .62], $z = 7.65$, $p < .0001$). We also calculated mean effect

sizes for non-religious ($d = .52$, 95% C.I. [.32, .72], $z = 5.01$, $p < .0001$) and religious participants ($d = .58$, 95% C.I. [.35, .80], $z = 5.05$, $p < .0001$), and found each to be significant.

Similarly, we calculated a meta-analytic effect size (3 studies, $n = 873$) for the effect of condition on Small Self ($d = .41$, 95% C.I. [.27, .55], $z = 5.75$, $p < .0001$), along with mean effect sizes for non-religious ($d = .50$, 95% C.I. [.28, .73], $z = 4.36$, $p < .0001$) and religious participants ($d = .33$, 95% C.I. [.16, .51], $z = 3.71$, $p = .0002$). Spiritual experiences increased Small Self for both religious and non-religious people, but the mean effect size for non-religious participants was somewhat larger than for religious participants.

We calculated a meta-analytic effect size (2 studies, $n = 387$) for the effect of condition on Spiritual Humility ($d = .38$, 95% C.I. [.16, .59], $z = 3.48$, $p = .0005$), along with mean effect sizes for non-religious ($d = .27$, 95% C.I. [-.09, .63], $z = 1.45$, $p = .15$) and religious participants ($d = .43$, 95% C.I. [.16, .69], $z = 3.12$, $p = .0018$). Not surprisingly, the mean effect size for religious participants was significant, but non-significant for non-religious participants. This difference may also account for the relatively small effect sizes of the planned contrast on Spiritual Humility observed in Study 4. In Study 3 items were phrased in reference to “the Sacred/ the Universe”, to include experiences of both religious and non-religious participants. But in Study 4, items specifically ask about feelings of smallness and deference toward “the Sacred”, which may reduce responding by non-religious individuals. Although the effect of spiritual experiences on spiritual humility was small overall, there is a stronger effect with religious participants that is dampened when the null effects with non-religious participants are included.

We also calculated a meta-analytic effect (3 Studies, $n = 872$) for General Humility ($d = 0.26$, 95% C.I. [.12, .40], $z = 3.67$, $p = .0002$), as well as mean effect sizes for non-religious ($d = 0.34$, 95% C.I. [.11, .57], $z = 2.88$, $p = .004$) and religious participants ($d = 0.21$, 95% C.I. [.03, .38], $z = 2.34$, $p = .02$).

The overall meta-analytic effect size (2 studies, $n = 387$) for Intellectual Humility was not significant ($d = 0.12$, 95% C.I. [-.08, .33], $z = 1.17$, $p = .24$), and similarly, the mean effect size for religious participants was also not significant ($d = 0.04$, 95% C.I. [-.22, .30], $z = .30$, $p = .76$). However, the effect size of Intellectual Humility for non-religious participants was significant ($d = 0.37$, 95% C.I. [.01, .73], $z = 1.99$, $p = .05$), with participants in the Spiritual condition reporting greater Intellectual Humility than in the Control conditions. Further studies should be conducted to determine whether this effect is replicable. The meta-analytic effect is a weighted mean of two studies - however, the effect is driven only by Study 4 ($d = 0.59$). The effect size for Study 3 ($d = -0.17$) is actually in the opposite direction, with participants in the Amusement condition reporting greater Intellectual Humility than the Spiritual condition.

Kinds of spiritual experiences. We were also interested in examining the kinds of spiritual experiences people recalled and comparing these experiences between religious and non-religious participants. Both authors first read through all responses to the spiritual manipulation in all five studies and agreed on eight types of experiences: 1) Religious experiences, where experience had direct connection to an explicit religious activity or belief (e.g., attending church); 2) Life and death experiences, (e.g., birth of a child, death of a loved one); 3) Experiences in nature (e.g., hiking, stargazing); 4) Connection with others (e.g., meeting spouse, coordinated group dancing); 5) Peak experiences (e.g., riding a motorcycle, psychedelic

drugs); 6) Meditation/ yoga; 7) Science (e.g., watching “Cosmos”); and 8) Other (not categorizable). Authors each independently coded experiences in the spiritual condition of each study, blind to the religious affiliation of participants. Experiences were coded as 0 or 1 for each category, and could be coded in more than one category, see Table 2. Any discrepancies between coders were discussed until agreement was reached.

Chi-square analyses. We conducted Chi-square analyses to compare frequency of different kinds of spiritual experiences between religious and non-religious people, see frequencies Table 2. Religious people were more likely to report experiences with an explicit religious theme (e.g., attending services, reading religious texts) ($\chi^2(1, N=463) = 33.26, p < .0001$), as well as life and death experiences ($\chi^2(1, N=463) = 4.60, p = .03$), whereas non-religious people were more likely to report nature ($\chi^2(1, N=463) = 9.11, p = .003$), peak experiences ($\chi^2(1, N=463) = 7.75, p = .005$), meditation/ yoga ($\chi^2(1, N=463) = 6.40, p = .011$), and science ($\chi^2(1, N=463) = 7.22, p = .007$) as sources of spiritual experiences. Though included in the larger category of “life and death experiences”, the most common single experience reported was the birth of a child (9% spiritual experiences), and we found no differences between religious and non-religious people in frequency ($\chi^2(1, N=463) = .28, p = .60$). There was no difference in experiences connected with other people ($\chi^2(1, N=463) = .93, p = .34$) or the “other” category ($\chi^2(1, N=463) = .90, p = .89$) as sources of spiritual experience.

[Table 2 about here]

Summary. In sum, the effect of spiritual recall on awe was robust across all four studies. Though non-religious people reported more alternative (non-religious) sources of spiritual experience, recalling spiritual experiences induced feelings of awe and small self in both

religious and non-religious individuals, indicating that the meaning of spiritual experiences is not unique to religious individuals. Meta-analysis also showed only religious individuals showed increased spiritual humility following the spiritual manipulation, however this is not surprising given that items were phrased in an explicitly religious manner, and also helps account for the relatively smaller effects on spiritual humility observed in Study 4.

General Discussion

Feelings of spirituality and awe share a feeling of smallness to something greater than oneself— whether it is relative to God, the grandeur of nature, or some noble hero. The present results provided evidence that spiritual experiences induce awe, and illustrated the importance of *small self* as a core component to both spiritual experiences and awe. Further, appraisals of small self were instrumental in the feeling of spiritual awe. The effect of spirituality on awe was mediated by small self (Studies 2 and 3), and also by spiritual humility (Studies 3 and 4), which may be thought of as small self in relation to the sacred. Important, the effects of awe and small self were found for both religious and non-religious people. Previous research has also shown spirituality is associated with happiness and positive emotions in general (Diener, Tay, & Myers, 2011; Frederickson, 2002; Ritter, Preston, & Hernandez, 2014), and also that spirituality and awe are related (Saslow et al., 2013; Van Cappellan & Saroglou, 2012), but it was unknown whether spiritual experiences can create feelings of awe, or the specific appraisals involved in spiritual experiences that might arouse feelings of awe.

We did not find evidence that spiritual awe was related to a need for cognitive accommodation – which has also been linked to the emotion of awe. Recalling spiritual experiences did not affect intellectual humility (Studies 3 and 4), or need for cognitive closure

(Study 3), both related to the epistemological aspects of awe. However, we did not necessarily expect spiritual experiences to impact these variables, as spirituality is frequently associated with greater feelings of certainty (Ritter et al., 2014). It is worth noting that meta-analyses showed a small effect on intellectual humility for non-religious participants, however. It may be that non-religious people are more open to changing their ideas, though we would want more supporting evidence before claiming this as a reliable effect. But overall, divergence between small self and need for accommodation in response to spiritual experiences presents an interesting paradox: spirituality can promote humility in relation to targets of belief (i.e., God and the sacred), but not humility about one's beliefs (see also Rowatt et al., 2007; Woodruff et al., 2014). Perhaps this apparent contradiction might be best understood through another: spiritual experiences are marked by a profound sense of smallness compared to an all-powerful and all-knowing God, but also connection to that greatness (Bai et al., 2016). In the words of astrophysicist Neil DeGrasse Tyson: "we are all connected to each other biologically, to the earth chemically, and to the rest of the universe atomically. That's kinda cool. That makes me smile. And I actually feel quite large at the end of that" (Hickey & Ellis, 2007). In this way, spiritual experiences can be simultaneously small and grand.

Finally, a major goal of this work was to explore the spiritual experiences of individuals who do not necessarily identify with a particular religion or believe in God. Would spiritual experiences in non-religious people induce awe as it does with religious people? In contrast with spirituality, religiosity is often defined in terms of affiliation and adherence to a prescribed set of beliefs and practices (e.g., Hill et al., 2000; Zinnbauer & Pargament, 1999). And indeed, though religiosity was a significant covariate on the observed effects, participants who reported no religion were still able to recall spiritual experiences, and meta-analyses showed that effect sizes

on awe and small self for non-religious people were comparable to those of religious people. This raises the question of the meaning of spirituality— and whether it need be in relation to something “divine” in a traditional theistic sense. Spirituality is often defined in terms of the religious *experience* itself (James, 1902/ 1988), the thoughts, feelings, and relationship felt toward God or some greater force in the Universe. But the exact source of that experience is not clearly defined, and sometimes does not involve a “divine” target at all. Scholars also recognize that spirituality can be felt outside of religious affiliation or belief in God (Pargament, 2009). For example, the wonders of science can be a rich source of awe and spirituality without a religious interpretation (Gottlieb, Keltner & Lombrozo, 2015; Preston, 2011; Valdesolo, Shtulman, & Baron, in press). Not surprisingly, we found that religious and non-religious people recalled different kinds of spiritual experiences – where religious people recalled events that were more explicitly religious, non-religious people reported more alternative spiritual sources (e.g., nature, yoga, science). But this may seem to leave the concept of spirituality even more ill-defined and vague (Zinnbauer et al., 1997) – if not about God, what exactly does a spiritual experience entail? The opening quote by James suggests that spiritual experience is not defined by any specific belief, but rather the sense of smallness felt in throes of spirituality. The present results converge with this conception of spirituality. Though we focused on spiritual experiences here, we likewise expect religious experiences would similarly affect awe and the small self (though religious awe may be restricted to religious participants). Many institutional and ritual aspects of religious practice also seem to stimulate sense of smallness, (for example, grand cathedrals, physical elevation of sacred objects, prayer postures as submissive to God). Indeed, the experience of awe and small self may be one of the essential points of overlap that could help us to understand the meaning of spirituality without religion.

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Table 1.

Means and standard deviations for all measures by Recall condition, Study 3.

Measure	Spiritual Recall		Humor Recall		Typical Day Recall	
	M	(SD)	M	(SD)	M	(SD)
Happy	5.28	(1.34)	5.82	(1.02)	4.92	(1.42)
*Spiritual	4.22	(1.79)	3.35	(2.05)	3.13	(1.72)
Amused	3.88	(1.58)	5.77	(1.15)	3.75	(1.41)
Bored	2.59	(1.42)	2.53	(1.51)	3.47	(1.69)
*Awe	5.23	(.94)	4.75	(1.08)	4.36	(1.13)
*Small Self	5.12	(.88)	4.71	(1.11)	4.55	(1.04)
General Humility	4.76	(1.06)	4.66	(.99)	4.61	(.85)
*Spiritual Humility	4.37	(1.75)	3.67	(2.03)	4.04	(1.86)
Intellectual Humility	5.45	(1.23)	5.25	(1.00)	5.19	(1.11)

Note. * Significant difference in Spiritual condition compared to Humor and Typical Day conditions.

Table 2.

Frequency of Spiritual Experiences recalled in all studies, by religious and non-religious participants.

Experience Type	Participants		Total (N = 463) Frequency (percent)
	Religious (N = 297) Frequency (percent)	Non-Religious (N = 166) Frequency (percent)	
1. ⁺ Religious	122 (41%)	25 (15%)	147 (32%)
2. ⁺ Life/ Death	94 (32%)	37 (22%)	131 (28%)
<i>Birth of child</i>	26 (9%)	17 (10%)	43 (9%)
3. *Nature	46 (15%)	45 (27%)	91 (20%)
4. Connection to people	37 (12%)	26 (16%)	63 (14%)
5. *Peak experiences	8 (3%)	14 (8%)	22 (5%)
6. *Yoga/ Meditation	5 (2%)	10 (6%)	15 (3%)
7. *Science	1 (.3%)	4 (2%)	5 (1%)
8. Other	28 (9%)	15 (9%)	43 (9%)

Notes. Reported N for each column reflects the total spiritual experiences in all five studies. Percentage values indicate proportion of experience type of total N for column. Experiences could be coded in more than one category, therefore sum of column totals > column N, and sum of column percentages > 100%.

“Birth of child” was frequently cited as a single spiritual experience, coded as a subset of “Life and Death” category.

⁺ Religious people report more experiences proportionately (chi-square).

* Non-religious people report more experiences proportionately (chi-square).

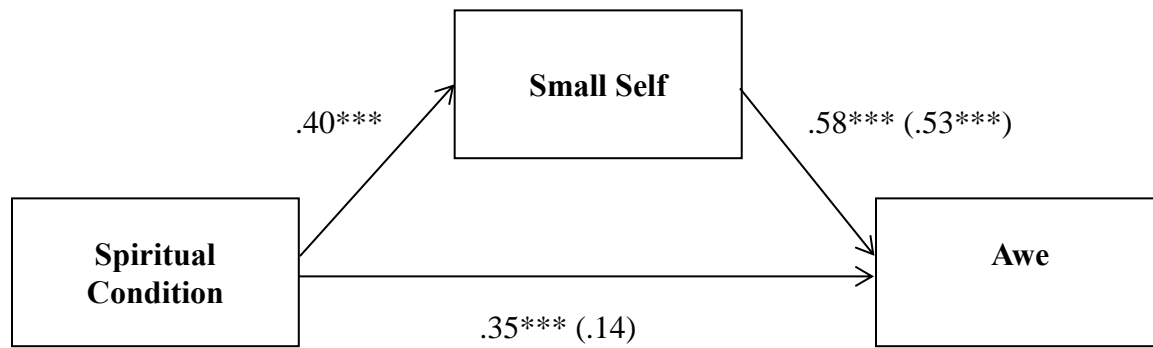


Figure 1. Mediation analysis of Spiritual Condition on Awe through Small Self, Study 2. Values indicate standardized regression coefficients. Parentheses denote regression coefficients controlling for third variable. $*p \leq .001$

Appendix

Note. Unless otherwise noted, items on all scales scored on 7-point Likert scale: 1 = strongly disagree; 7 = strongly agree.

Awe Scale, Study 1 (adapted from Shiota et al, 2006)

1. I feel awe
2. I see beauty all around me
3. I often look for patterns in the objects around me.
4. I have many opportunities to see the beauty of nature
5. I seek experiences that challenge my understanding of the world.

Awe Scale, Studies 3-5

1. I feel awe.
2. I see beauty all around me.
3. I feel wonder and amazement toward the world.
4. I like to see patterns in objects and in my environment.
5. I would enjoy opportunities to see and experience nature.

Note: wording of awe scale edited to capture state-feelings of awe, and to avoid conceptual overlap with small self or intellectual humility.

Small Self Scale, Studies 2, 4, & 5 (adapted from Shiota et al., 2007; Piff et al, 2015)

1. I feel like I am a part of a greater whole.
2. I feel small or insignificant
3. I feel the existence of things more powerful than myself.
4. I feel like I am in the presence of something grand.
5. I feel like my own day to day concerns are relatively trivial.

General Humility Scale (Study 3)

1. I feel humble.
2. In the broader scheme of things, what I accomplish in the world is very small.

3. I try my best in things, but I realize that I have a lot of work to do in many areas.
4. There are many things I know I that I cannot comprehend.

General Humility Scale (Study 4, 5)

1. I want people to see me as important and high status. (reverse score)
2. I feel humble.
3. I deserve more recognition for my accomplishments. (reverse score)
4. I don't think I am more special than anyone else.
5. In all, what I accomplish in the world is very limited.

Spiritual Humility Scale, Study 3 & 4* (adapted from Davis et al., 2010)

1. I accept my place in relation to the Sacred (/Universe).
2. I am comfortable with my place in relation to the Sacred (/Universe).
3. I feel humble before the Sacred (/Universe).
4. I know my place in relation to the (/Universe).
5. I feel miniscule next to the Sacred (/Universe).

* inclusion of “/Universe” in Study 3 only.

Intellectual Humility Scale, Studies 3-5 (adapted from Davis et al., 2015)

1. I like experiences that challenge my understanding of the world.
2. I question my own beliefs, positions, and viewpoints because they could be wrong.
3. I reconsider (rethink) my opinions when presented with new evidence.
4. I recognize the value in opinions that are different from my own
5. I accept that my beliefs, attitudes, and theories may be wrong.
6. In the face of conflicting evidence, I am open to changing my opinions.

General Religiosity Scale (Ritter & Preston, 2011, adapted from *Shariff, Cohen, & Norenzayan, 2008).

1. My religious beliefs are very important to me.
2. My religion or faith is an important part of my identity.
3. If someone wanted to understand who I am as a person, my religion or faith would be very important in knowing that.

4. I believe strongly in the teachings of my religion or faith.
5. I consider myself a religious person.
6. How often do you attend religious services? (1 = *never*; 7 = *very frequently*)

*Scale by Shariff et al (2008) did not include item 6 on religious attendance, and also included item: "I believe in God", that we do not include in measure of religiosity.