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Small but still significant:

Awe and the Self

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Abstract

Awe is an emotion elicited from experiencing great vastness that dramatically expands a person's frame of reference. In this way, awe has been found to have numerous effects on the self, including feeling "small." While smallness has previously been confounded with insignificance, little research has fully examined awe's effects on existential significance (or insignificance). Four within-person experiments tested the effects of awe on subjective perceptions of the size of the self and personal significance. Before and after awe (vs. control), participants completed reports of metaphorical self and world size and significance. Across studies, awe shrinks the self without making one feel insignificant. Within-person, participants generally report greater significance across all conditions, not specific to awe. Study 4 also examines if fear-based inductions effect significance. This opens future research questions pertaining to awe's existential consequences on perceptions of the self and world.

Key words: awe, self-size, significance, mattering

Small but still significant: Awe and the Self

Awe is an emotional state that arises when an encounter with something vast dramatically expands a person's frame of reference, challenging comprehension (Keltner & Haidt, 2003). Awe experiences have myriad psychological (Anderson et al., 2018; Bai et al., 2021; Krause & Hayward, 2015; Rudd et al., 2012), physical (Stellar et al., 2015), and social (Li et al., 2024) benefits. Monroy and Keltner (2023) suggest the benefits of awe stem from five processes: neurophysiological changes, prosociality, social integration, a sense of meaning, and self-diminishment. Here, we focus on awe's relation to the last of these, self-diminishment. Abundant evidence suggests awe leads the self to feel small (Piff et al., 2015; Bai et al., 2017; Shiota et al., 2007; Tyson et al., 2021; Rivera et al., 2020). Yet, research has not deeply probed what it means to feel small in an awe experience. In four studies, we probed two aspects of the small self, metaphorically small self-size and subjective feelings of insignificance. Although intuitively, it certainly makes sense that these experiences would be related, distinguishing them from each other might help illuminate the implications of awe for the self.

The Small (and Insignificant?) Self

Awe's self-diminishing qualities have been described in various ways, including a shift in attention away from the self (Bai et al., 2017; Keltner & Monroy, 2023), reduced self salience (Stellar, 2021), and, the foci of the current studies, metaphorical smallness and subjective insignificance (Bai et al., 2017; Tyson et al., 2022). The Small Self Scale (SSS; Tyson et al., 2022) measures self smallness using figural (e.g., smaller to larger circles, human shapes, and signatures) and verbal (e.g., "I feel insignificant") items to capture the metaphorically small self and subjective insignificance, respectively. The reliability of the SSS speaks to the commonality between these experiences. However, although awe leads to a small self on such measures, it is

not clear if it is the experience of small self-size or the experience of personal insignificance (or both) that is the key to awe's effect on the self.

Metaphorical smallness and personal significance may differ in subtle ways. Self-size (as measured by figural items) captures the power of metaphor and embodiment in cognition (e.g., Landau, 2021; Landau et al., 2010). Such representations may carry broad and varied meanings that questionnaire items may not convey. Being metaphorically small might imply a variety of things—feeling childlike, newness, a sense of wonder, vulnerability, or, of course, a sense of personal insignificance. Personal significance, measured using self-report ratings, captures a person's conscious sense of whether their life matters. Existential significance is the feeling that one's life has value in the grand scheme of things, that it matters to others over time (King & Hicks, 2021). This feeling of significance is a critical component of the experience of meaning in life (Costin & Vignoles, 2020).

The conflation of small self-size with feelings of psychological insignificance may explain the somewhat puzzling nature of the small self. For example, the small self has been used to explain awe's tendency to enhance prosocial behavior—Piff and colleagues (2015) suggested awe shifts attention, away from the self and toward the broader collective (Piff et al., 2015). Yet, outside of the context of awe inductions, the small self correlates negatively with self-esteem (Tyson, et al., 2022), a predictor of prosocial behavior (Fu et al., 2017). The small self relates negatively to identification with the broader collective (Tyson et al., 2022). Similarly, in awe induction studies, the small self predicted lower connectedness to others and the world (Edwards et al., 2023).

Research on the effects of awe on the self presents a quandary in terms of the likely effects of awe on personal significance. The ways that awe transforms the self do not suggest the

self does not matter. For example, awe enhances self-continuity (Pan & Jiang, 2023; via its effects on global attentional focus). Through awe, then, the self in the past, present, and future become a more integrated whole. Such an experience would potentially enhance rather than diminish existential mattering. Additionally, induced awe promotes authentic self-pursuit (Jiang & Sedikides, 2022). Authenticity does not involve diminishing the self but rather embracing the genuine self in its fullness. Awe promotes such authenticity and serves as an inspiration via its effects on self-transcendence (Dai & Jiang, 2024; Jiang & Sedikides, 2022). Transcending the self is not the same as feeling personally unimportant. A person rising above the self and recognizing they are but a small part of a greater whole can still value that part that is themselves. Further, awe enhances connectedness to others (Bai et al., 2017; Edwards et al., 2023; Tyson, et al., 2022; Krause & Hayward, 2015; Van Cappellen & Saroglou, 2012). Surely, it is through social connections that we experience mattering our lives (King & Hicks, 2021; Stavrova & Luhmann, 2016). Awe expands social categorization of the self, so that post-awe, people are more likely to identify with universal categories (Shiota, et al., 2007), to include others in the self (Bai et al., 2017; Van Cappellen & Saraglous, 2012), and to endorse global citizenship (Seo et al., 2023). Thus, awe appears to relocate the self in a larger context, binding the self to the social world. Such binding would seem to facilitate rather than diminish personal significance. Finally, it seems unlikely that a person who feels they do not matter would feel empowered by awe to enact prosocial behaviors. Such behavior might serve a compensatory function (boosting personal significance for those experiencing awe), but theoretical approaches to awe have not generally viewed its prosocial effects through a compensatory lens (though see Prade & Saroglou, 2016).

As a first step toward resolving these puzzles, the present studies sought to tease metaphorical self-size from subjective insignificance. To our knowledge, only one study has shown that awe leads to lower feelings of personal significance (Dai et al., 2022). A notable feature of that study was that significance was measured with items that refer to the vastness of the universe (e.g., "Even considering how big the universe is, I can say that my life matters"). As such, it may be that awe lowered existential significance due to its effects, not so much on the self but the world.

The Big World

An additional ambiguity about the small self concerns the world that self inhabits. Awe enhances the experience of vastness, the experience something larger than the self. Vastness is definitional to awe and so, self-reports of vastness are practically manipulation checks for awe. Although self-reports of vastness include items that compare the self to "something larger" they do not capture metaphorical changes in world size that might be fostered by awe. Previous research has not directly assessed the psychological size of the world. For instance, in one study demonstrating that awe diminishes subjective self-size (Bai et al, 2017, Study 3), participants drew the self after an awe induction. For this measure, the size of the world remained constant by necessity—it was the sheet of paper. As such, participants may have drawn a smaller self as the only way to convey a growing world. To assess whether awe affects the metaphorical size of the world, we used a figural measure of world size, providing a context for changes in self-size.

Overview

Four mixed (between/within-person) design experiments tested the effects of awe on subjective perceptions of self-size, personal significance, the size of the world, and vastness.[1]

[1]The Small Self Scale also includes as self-perspectives dimension, which involves recognizing the trivial nature of one's day-to-day concerns. Awe (versus control) experiences lead to feelings of smaller self-size and vastness with

Awe studies have rarely employed within-person designs (e.g., Bai, et al., 2017, Studies 4 & 6). Measuring within-person change provides stronger evidence for the conclusion that within the same person, the self shrinks *and* feels more insignificant pre- to post- awe. In contrast, relying solely on between-person comparisons may reflect unexpected influences of control conditions (see Supplemental Studies S1-S4). Thus, the present studies allowed us to probe the implications of these design features for conclusions about the effect of awe on the self.

The studies employed varied awe inductions, including videos (Studies 1 & 3), writing (Study 2), and images (Study 4). Control conditions included amusement (Studies 1, 3-4) and neutral (Study 2). Studies 1-3 induced positive awe. Study 4 included both positive and negative awe.

Across studies, we measured self-size using items from the Small Self Scale (SSS; Tyson et al., 2021) as well as a single-item figural measure, the Self and World Evaluation (SAWE). The SAWE allowed participants to adjust the size of the self and world relative to each other.[2] We measured subjective significance, using a single item from the Small Self Scale (Study 1), a measure of significance from an established meaning in life scale (Studies 2-4, as in Dai et al., 2022), and a measure with less extreme items (Studies 3-4). We used the SAWE to measure world size (all studies), along with self-reports of vastness (Studies 1-2).

We predicted that awe (versus control) conditions would lead to smaller self-size and explored its effects on personal significance (separate from self-size). We expected awe (versus control) conditions to enhance both the size of the world and vastness. Although in no case did

less consistent effects on self-perspectives (Tyson et al., 2021). Self-perspectives were not included in the present studies (exception for Study 2, see Supplement).

[2]See the Supplement, Studies 1-4, for additional information regarding the SAWE and findings regarding the effect of awe on self-certainty and self-esteem. Briefly, induced awe did not affect these self-related variables.

we preregister our intent to do so, we used Bayes Factors (BF01) to evaluate null results when they emerged. Interpretation of these values was guided by Kinney and colleagues (2021).

Openness and Transparency

Materials and data for all studies are available on OSF: https://osf.io/ab7h6/?view_only=5187f7f7c08647718712056d8355e262 and https://osf.io/kws48/?view_only=9c7619eaa9474421ac399c6416bee409. Studies 3-4 were pre-registered. All measures are reported unless otherwise specified and reported in the Supplement.

Study 1

Study 1 examined the effects awe (versus amusement) on self-size, subjective significance, world-size, and vastness within-person. In this study, we used the single item from the SSS to measure subjective significance. We expected awe to reduce self-size and explored its effects on subjective significance. Study 1 was not pre-registered.

Method

Participants

Students ($N = 291$) from a Midwestern university participated as a part of a course assignment and consented to the use of their responses as research data. Sample size was determined by course enrollment (295) and the number of students so consenting. Data were excluded for 62 participants who failed ≥ 1 of four attention checks. Demographics for the final sample ($N = 228$) are in Table 1. A sensitivity power analysis suggested the sample provided 80% power to detect an effect $\geq d = 0.186$.

Procedure and Measures

Participants completed pre-measures of the dependent measures. They then completed unrelated measures included for another purpose. After, they were assigned randomly to awe (*n*

= 111) or amusement (n = 117) conditions. In the awe condition, they watched a video of the Northern Lights. In the amusement condition, they watched a video of news clip bloopers.[3] Participants then completed the dependent measures again. Order of self-report and SAWE measures was counterbalanced.

Small Self Measures

Self-report measures were rated from 1 (*strongly disagree*) to 7 (*strongly agree*). Pre- and post-manipulation, participants reported on self-size and vastness using the SSS (Tyson et al., 2021). They also rated self- and world-size using the SAWE. Pre-manipulation, participants were instructed to think about how they feel *on average in everyday life*. Post-manipulation, participants were instructed to think about how they felt *right now* following the video.

The Small Self Scale. SSS self-size included one verbal item ("I feel small") and three figural items (a circle, stick figure, and signature of "me") varying in size from 1 (smallest) to 7 (largest), α_{pre} = .52, α_{post} = .69. The item "I feel insignificant" (reversed) was analyzed separately. The vastness subscale (α_{pre} = .92, α_{post} = .95) included 5-items (e.g., "I feel the presence of something greater than myself").

The SAWE. Pre-manipulation, participants were instructed:

> Think about how big or small *you* feel on average, in your day to day experiences. Similarly, think about how big or small your *environment* (e.g., context, setting, surroundings, world) feels to you, on average, in your day to day experiences. Using the slider scale below, adjust the figure (representing yourself) and the circle (representing your environment) to represent how big or small you feel on

[3]See Supplement for pilot test of the videos.

average relative to your environment. Think about it as symbolic representation rather than a literal representation.

Participants could adjust the size of the figure and circle (separately) on scales from 1 (smallest) to 25 (largest). The figure and circle were presented at the middle points of 13 (Figure 1).

Following the manipulation, participants completed the same measures with instructions to think about "how big or small you and your environment felt *during the experience just before."* The figure and circle were presented again, with the scale starting points matching participants' responses on the pre-measure (i.e., starting at their individual baseline).

Results

Preliminary Results

Conditions did not differ on pre-measures, all p's > .45, all d's < 0.06. As Table 2 shows, the measures of self-size related positively pre- and post-manipulation. These both related positively significance. Vastness was not related to SAWE world-size. Vastness related positively to, SSS self-size, SAWE self-size, and significance but was not related to SAWE world-size. Post-manipulation, correlations were the same with the exception that vastness did not relate to significance. No significant interactions involving order of dependent measures emerged, all p*'s* >.56, all η_p^2's $\leq$ .004.

Primary Analyses

Self-size

Figure 2 shows the means for the significant condition X time interactions for SSS, $F(1, 226) = 24.05$, $p < .001$, $\eta_p^2 = .096$, and SAWE self-size measures, $F(1, 226) = 4.36$, $p = .038$, $\eta_p^2 = .02$. In the awe condition, SSS, $F(1, 110) = 20.26$, $p < .001$, $g = 0.23$, and SAWE, $F(1, 110) = 12.48$, $p < .001$, $g = 0.33$, self-size significantly decreased, within-person. For amusement, SSS

self-size, $F(1, 116) = 5.09$, $p = .026$, $g = 0.21$, significantly increased, within-person. Amusement did not affect SAWE self-size, $F(1, 116) = 0.43$, $p = .513$, $g = 0.06$, within-person.

Post-manipulation between-person differences showed awe led to significantly lower self-size, for the SSS, $F(1, 226) = 16.08$, $p < .001$, d =0 .53, and the SAWE, $F(1, 226) = 4.54$, $p = .034$, $d = 0.29$, compared to the amusement condition.

Significance

Regarding personal significance, Figure 3 means for the significant condition X time interaction, $F(1, 226) = 4.65$, $p = .032$, $\eta_p^2 = .02$. As can be seen, both awe, $F(1, 110) = 20.26$, $p < .001$, $\eta_p^2 = .16$, and amusement, $F(1, 116) = 5.09$, $p = .026$, $\eta_p^2 = .04$, significantly increased, within-person. Post-manipulation between-person, amusement led to greater subjective significance, $F(1, 226) = 4.19$, $p = .042$, $\eta_p^2 = .02$, than awe.

Vastness and World-size

Condition X time interactions were significant for self-reported vastness, $F(1, 226) = 46.99$, $p < .001$, $\eta_p^2 = .17$, and SAWE world-size $F(1, 226) = 11.73$, $p < .001$, $\eta_p^2 = .049$. As Figure 4 shows, awe led to higher vastness, $F(1, 110) = 9.70$, $p = .002$, $g = 0.29$, and SAWE world-size, $F(1, 110) = 11.94$, $p < .001$, $g = 0.34$. Amusement significantly decreased vastness, $F(1, 116) = 39.54$, $p < .001$, $g = 0.58$, but did not affect SAWE world-size, $F(1, 116) = 1.51$, $p = .22$, $g = 0.11$. Post-manipulation between persons, the awe condition reported significantly greater vastness, $F(1, 226) = 23.06$, $p < .001$, $d = .640$, and world-size, $F(1, 226) = 6.77$, $p = .010$, $d = .346$, compared to amusement.

Brief Discussion, Study 1

Overall, awe decreased self-size and increased vastness as in previous studies (Bai et al., 2017, Tyson et al., 2021). In addition, awe enhanced the metaphorical size of the world.

However, subjective significance was not reduced by awe. Instead, both awe and amusement boosted the feeling of significance, within-person, with the effect of amusement being especially strong. Thus, the metaphorically small self is separable from feelings of significance.

This study (and Supplemental Studies S1-S4) supports the conclusion that the SAWE self-size measure converges with a more established of self-size, suggesting the SAWE captures perception of self-size even taking into account the perception of the world's size. Notably, SAWE world-size and self-reported vastness were unrelated, suggesting metaphorical world-size is conceptually different from vastness.

Study 2

A limitation of Study 1 was the use of a single item to measure significance. In Study 2, we used a full measure of existential significance to examine whether awe affects existential significance. Study 2 was not preregistered.

Method

Participants

Participants (N = 752) were recruited from Cloud Research (Litman et al., 2017), with the requirement that they be over 18 years old and live in the U.S. They were compensated $1.00 USD for completing a 10-minute study online. Participants (n = 149) were excluded for not completing the full study or failing attention checks (final N = 603; see Table 1). A sensitivity analysis with α set at .05, suggested the sample provided 80% power to detect an effect size $\geq d$ = 0.096 for the condition X time interaction.

Procedure and Measures

Participants completed pre-measures of SSS self-size (α = .87) and vastness (α = .96) and the SAWE, as in Study 1. Like Study 1, SSS self-size excluded the item "I feel insignificant."

Additionally, participants completed a state measure of significance. This was followed by the Big Five Inventory (John & Srivastava, 1999) to create a delay. Next, we assigned participants randomly to an awe (n = 291) or amusement (n = 312) condition. In the awe condition, participants were asked to write a past awe experience as used in previous research (Yaden et al., 2019; Rudd et al., 2012; Shiota et al., 2007) and has been shown to be an effective way to elicit memories of emotion experiences:

> Please take a few minutes to think about a particular time, fairly recently, when you felt intense awe. Now that you have chosen a SINGLE experience of intense awe, please describe your experience in about 2 full paragraphs in the box below. While you are writing, please focus as much as possible on the experience itself, rather than what led up to it, what happened afterwards, or your interpretation of the experience. Try to be as descriptive and specific as possible.

In the neutral condition, participants were instructed to write about what they did in the past week.

Post- manipulation, participants completed measures of SSS self-size (α =.92) and vastness (α = .96), the SAWE and state significance. (See the Supplement for additional measures).

State Significance

State significance was measured using 3 items (adapted from Costin & Vignoles, 2020): "I feel [felt] like I matter in the grand scheme of things," "I feel [felt] like I could make a difference in the world," "I feel [felt] like I do [did] not matter" (reversed), α's$_{pre/post}$ = .88.

Results

Preliminary Analyses

Conditions did not differ on premeasures (all p's $\geq$ .14, all d's < 0.07). Table 3 shows that pre-manipulation, as in Study 1, measures of self-size related positively to each other and both related positively to significance. Vastness related positively to self-size and significance. ; SAWE world-size related negatively related to SAWE self-size.[4] Similar results emerged post-manipulations except that vastness related positively to SAWE world-size.

Primary Analyses

Self-size

Figure 5 shows the means for the significant condition X time interactions for SSS, $F(1, 601) = 11.58$, $p < .001$, $\eta_p^2 = .019$, and SAWE $F(1, 601) = 8.87$, $p = .003$, $\eta_p^2 = .015$, self-size. As shown, within-person, in contrast to expectations, awe did not change SSS self-size, $F(1, 290) = 2.04$, $p = .155$, $g = 0.08$, or SAWE self-size, $F(1, 290) = 0.042$, $p = .84$, $g = 0.01$. For these null effects, $BF01 = 6.18$ and 16.75, providing moderate and strong evidence for the null, respectively. Control participants endorsed greater SSS self-size, $F(1, 311) = 14.15$, $p < .001$, $g = 0.21$, and SAWE self-size, $F(1, 311) = 19.49$, $p < .001$, $g = 0.25$, within-person. Between person comparisons, post manipulation, awe (versus control) led to lower SSS self-size, $F(1, 601) = 13.61$, $p < .001$, $d = 0.30$, and lower SAWE self-size, $F(1, 601) = 7.26$, $p = .007$, $d = 0.23$.

State Significance

The condition X time interaction was not significant for state significance, $F(1, 601) = 0.66$, $p = .416$, $\eta_p^2 = .001$; $BF01 = 17.67$, providing strong evidence for the null. Only a significant main effect of time emerged, $F(1, 602) = 15.49$, $p < .001$, $\eta_p^2 = .025$. State significance increased from pre-, $M(SD) = 4.63(1.60)$, to post-, $M(SD) = 4.82(1.64)$, regardless of

[4]We examined the pictorial items from the SSS measure individually: SAWE self-size related positively to the circle ($r = .70$), stick figure ($r = .74$, $p < .001$), and signature ($r = .66$) items, all p's < .001.

condition. Awe, *M(SD)* = 4.67(1.49), did not uniquely affect a person's feelings of existential significance, $F(1, 601) = 0.73$, $p = .392$, $\eta_p^2 = .001$, compared to control *M(SD)* = 4.78(1.51).

Vastness and World-size

Figure 6 shows the means for the significant condition X time interactions for vastness $F(1, 601) = 125.00$, $p < .001$, $\eta_p^2 = .17$, and SAWE world-size, $F(1, 601) = 7.33$, $p = .007$, $\eta_p^2 = .012$. Within-person, writing about awe led to greater vastness, $F(1, 290) = 119.90$, $p < .001$, $g = 0.63$, and greater SAWE world-size, $F(1, 290) = 14.17$, $p < .001$, $g = 0.22$. The control condition decreased vastness, $F(1, 311) = 17.37$, $p < .001$, $g = 0.28$, and did not change SAWE world-size, $F(1, 311) = 0.003$, $p = .958$, $g = 0.003$, within-person. Between condition comparisons for post-manipulation measures showed the awe (versus control) led to greater vastness, $F(1, 601) = 67.56$, $p < .001$, $d = 0.67$, but not a larger world, $F(1, 601) = 1.41$, $p = .24$, $d = 0.10$.

Brief Discussion, Study 2

After writing about awe, participants reported greater vastness and a larger metaphorical world, but neither self-size nor subjective significance were affected by awe, within person. All participants, regardless of condition, increased in subjective significance pre- to post-manipulation. This increase may be due to both conditions focusing on the self, making the self salient. Study S3 replicated these null findings for self-size within person, using a similar manipulation. Notably, Study 2 suggests that between- (versus within-) comparisons can have misleading effects, suggesting that awe (versus control) reduced self-size. Although the writing manipulation affected vastness as expected, a limitation of this study is that writing about awe may not be a particularly strong or vivid. Additionally, the lack of effect of awe on existential significance may be due to the relatively extreme wording of the items used. Finally, Studies 1-2 did not include manipulation checks for emotions, and thus are included in future studies.

Study 3

Study 3 tested the same predictions as Study 2 using a stronger awe induction. Based on previous research and Study 1, we predicted that awe (versus amusement) would lead to smaller self-size and greater world-size. In addition to the significance measure from Study 2, we added an additional measure that tapped somewhat less extreme aspects of mattering. We explored whether awe would affect subjective significance and mattering. Study 3 was pre-registered: https://osf.io/gptje/?view_only=26f0cd5b9e8048b38101fdfff50dc97e.

Using the software program G*Power, our goal was to obtain .80 power to detect an effect size of $f = .11$ at the standard .05 alpha error probability using the smallest interaction effect size from Study 1. Results indicated 162/condition was required. We aimed to collect 200/ condition, assuming some exclusions.

Method

Participants

Participants ($N = 413$) were recruited from Connect (Hartman et al., 2023), with the same requirements as Studies 1-2. They were compensated $1.00 USD for completing a 10-minute study online. Participants ($n = 10$) were excluded for not completing the full study or reporting that they did not watch the video, leaving a final sample of 403 (see Table 1).

Procedure and Measures

Participants completed pre-measures in randomized order [SAWE, significance ($\alpha = .89$), from Study 2, and mattering ($\alpha = .95$)]. This was followed by the Big Five Inventory (John & Srivastava, 1999) to create a delay. Following, they were assigned randomly to watch an awe inducing video ($n = 201$) or amusement ($n = 202$) video, commonly used in previous studies (Bai et al., 2021, Elk et al., 2019; Piff et al., 2015; Yuan, et al., 2023). Awe participants watched a

video of breathtaking natural scenery. Amusement participants watched a video of animals with humorous voice overs. Next, participants rated various emotions and completed post-measures [SAWE, significance (α = .89) mattering (α = .92)] in randomized order.

Mattering

Mattering was measured with three items from Martela & Steger (2022): "my life is full of value," "my personal existence is significant," and "every day I experience the sense that life is worth living."

Results

Preliminary analysis

Conditions did not differ on pre-measures (all p's $\geq .05$). Manipulation checks suggested the awe condition led to greater awe, $t(399) = 9.09$, $p < .001$, $d = 0.91$, compared the amusement condition. The amusement condition led to greater amusement, $t(399) = 6.39$, $p < .001$, $d = 0.64$ than the awe condition. Conditions did not differ on other emotions ($p > .05$; see Table 4).

Table 5 shows, collapsed across conditions, ratings of awe whether, pre- or post-manipulation, related positively to self-size, significance, mattering, and world-size. Self-size related positively to both significance and matter. Because significance and mattering were strongly related, although we did not preregister our intent to do so, these were aggregated into a total significance score for analyses. Analyses of each are in the Supplement.

Self-size

Figure 7 shows the means for the significant condition X time interactions for self-size, $F(1, 401) = 13.78$, $p < .001$, $\eta_p^2 = .033$. As shown, within-person, awe led to smaller self-size, $F(1, 200) = 4.81$, $p = .029$, $g = 0.15$, and amusement led to greater self-size, $F(1, 201) = 11.58$, p

= .001, g = 0.24. Between-person comparisons showed that awe (versus amusement) did not significantly affect self-size, $F(1, 401) = 2.76$, $p = .098$, $d = 0.17$.

Significance/Mattering

As the two measures of significance and mattering were highly related, they were combined into one score (analysis of them separately can be found in the Supplement). The condition X time interaction on total significance was not significant, $F(1, 399) = 0.52$, $p = .522$, $\eta_p^2 = .001$; $BF01 = 15.50$, providing strong evidence for the null. Collapsing across conditions, total significance increased from pre-, *M(SD)* = 4.41(1.47), to post-manipulation, *M(SD)* = 4.89(1.50), $F(1, 400) = 31.27$, $p < .001$, $\eta_p^2 = .073$. Across timepoints, awe, *M(SD)* = 4.79(1.44), and amusement, *M(SD)* = 4.79(1.48), conditions, did not differ, $F(1, 400) = 0.003$, $p = .956$, $\eta_p^2 < .001$.

World-size

Figure 7 shows the means for the significant condition X time interaction for world-size, $F(1, 401) = 31.21$, $p < .001$, $\eta_p^2 = .072$. As shown, within-person, awe led to greater world-size, $F(1, 200) = 38.98$, $p < .001$, $g = .439$, while amusement did not change in world-size, $F(1, 201) = 0.09$, $p = .764$, $g = .021$. Between-person comparisons showed that awe (versus amusement) led to larger world-size, $F(1, 401) = 13.25$, $p < .001$, $d = 0.36$.

Brief Discussion, Study 3

Following the awe induction, participants reported a larger metaphorical world, and a smaller self-size (though only within-person, but not between conditions). As found in Studies 1-2, subjective significance increased, within person, regardless of awe or amusement condition. And conditions did not differ in reported significance. Studies 1-3 mainly focus on positive

experiences of awe. However, awe experiences can also be mixed with greater negative emotions (e.g., fear; Gordon et al., 2017) which may have unique effects on significance.

Study 4

Study 4 expanded Studies 1-3, incorporating a negative awe induction. Experiences of awe that elicit fear (as well as awe) may have a unique effect on subjective significance. We predicted that negative awe would lead to smaller self-size. Additionally, we explored how negative awe might affect subjective significance. We predicted that negative awe (versus amusement and positive awe) might lower feelings of existential significance, as these experiences might be more threatening, but not the lesser extreme feelings of everyday mattering. In the end, they were collapsed again as in Study 3, as the two measures were strongly related. This study was preregistered: https://osf.io/j4r8a/?view_only=21958624bb264bdea2f4cddf07bde1cf.

Using the smallest effect size, for the (within-between) interaction term from Study 3, G*Power suggested with α set at .05, to obtain .80 power to detect an effect size of $f = .11$ with α = .05, required 166/condition. We aimed to collect 200/condition.

Method

Participants

Participants ($N = 409$) were recruited and compensated as in Study 3. Participants ($n = 12$) were excluded for not completing the full study, failing an attention check, or reporting that they did not take the study seriously, leaving a final sample of 397 (see Table 1).

Procedure and Measures

Participants completed pre- and post- measures of the SAWE, significance ($\alpha_{pre} = .92$, $\alpha_{post} = .91$), and mattering ($\alpha_{pre} = .95$, $\alpha_{post} = .95$) from Study 3, in randomized order. As in the

previous studies participants completed the Big Five Inventory (John & Srivastava, 1999) to create a delay. Participants were then assigned randomly to one of three conditions in which they look at 12 images each for 10 seconds, inducing negative awe (images of natural disasters and lightening, $n = 130$), positive awe (images of beautiful natural landscapes, $n = 133$) or amusement (images of funny animals, $n = 134$), based on previous research (Yuan et al., 2023). Pilot testing indicated the positive awe condition, *M(SD)* = 4.11(1.82), reported greater feelings of awe compared to the negative awe condition, *M(SD)* = 3.18(1.93). However, the negative awe condition reported greater awe than the amusement condition, *M(SD)* = 2.37(1.92), $F(2, 299) = 21.23$, $p < .001$, $\eta_p^2 = .12$. The negative awe condition, *M(SD)* = 2.19(1.96) reported greater fear than the positive awe, *M(SD)* = 0.55(1.28), and amusement condition, *M(SD)* =0.42(0.98), $F(2, 299) = 45.65$, $p < .001$, $\eta_p^2 = .234$. Finally, the amusement condition, *M(SD)* = 4.01(1.58), reported greater amusement, compared to the positive, *M(SD)* = 2.36(1.82), or negative, *M(SD)* =1.21(1.62) conditions, $F(2, 299) = 71.96$, $p < .001$, $\eta_p^2 = .33$. See Supplement for full pilot study results.

Results

Preliminary analysis

Pre-manipulation, conditions did not differ on the dependent variables (all p's $\geq .050$, all η_p^2's $< .015$). Post-manipulation, participants differed on reported awe, fear, and amusement F's (2, 391) ranged from 14.18 to 64.56, *ps* < .001. Bonferroni corrected comparisons suggested that positive awe and amusement inductions worked as intended but negative awe did not. The positive awe condition reported greater awe compared to negative awe and amusement conditions (*ps* < .001). The amusement condition reported greater amusement compared to both awe conditions (*p's* < .001), and positive awe reported greater amusement compared to the

negative awe condition ($p < .001$). Unexpectedly, the negative awe condition did not differ from the amusement condition on reported awe ($p = 1.00$), differing from the pilot study. Instead, the negative awe condition reported greater fear compared to the positive awe and amusement conditions ($p's < .001$), which did not differ from each other. Table 6 shows descriptive statistics for all emotions.

The failure of the negative awe induction to produce awe renders this study irrelevant for predictions for negative awe. However, because the condition did induce fear, and fear might be relevant to small self-size and subjective significance, we continued to include this condition in analyses, which will hereafter be labeled fear.

Table 7 shows, collapsed across conditions as in previous studies, at both pre- and post-measurements, self-size, significance, and mattering all related positively. In addition, awe related positively to all of these self-related measures as well as world-size. In contrast to awe, fear related negatively to self-size and mattering. As in Study 3, we aggregated significance and mattering for subsequent analyses, due to their high correlation.

Self-size

Figure 8 shows the means for the significant condition X time interactions for self-size, $F(2, 394) = 7.87$, $p < .001$, $\eta_p^2 = .038$. As shown, within-person, fear led to smaller self-size, $F(1, 129) = 13.96$, $p < .001$, $\eta_p^2 = .098$, pre- to post-. Positive awe, $F(1, 132) = 0.03$, $p = .857$, $\eta_p^2 < .001$, and amusement did change self-size, $F(1, 133) = 3.02$, $p = .085$, $\eta_p^2 = .022$, within person. For the effect of awe on self-size, $BF01 = 11.45$, providing moderate to strong evidence for the null. Between-person comparisons showed a significant condition effect, $F(2, 394) = 5.15$, $p = .006$, $\eta_p^2 = .025$. Bonferroni pairwise comparisons show fear led to lower self-size compared to amusement. Positive awe did not differ from either condition.

Significance/Mattering

Figure 9 shows the means for the condition X time interaction on total significance, $F(2, 394) = 8.46$, $p < .001$, $\eta_p^2 = .041$. Within-person, positive awe led to *greater* total significance from pre- to post-manipulation, $F(1, 132) = 18.97$, $p > .001$, $\eta_p^2 = .126$. Neither fear, $F(1, 129) = 81.44$, $p = .233$, $\eta_p^2 = .011$, nor amusement, $F(1, 133) = 2.18$, $p = .143$, $\eta_p^2 = .016$, changed total significance. Between-persons condition did not affect total significance, $F(2,394) = 0.61$, $p = .541$, $\eta_p^2 = .003$. See Supplement for the significance and mattering measures analyzed separately.

World-size

Figure 8 shows the means for the condition X time interaction for world-size, $F(2, 394) = 5.46$, $p = .005$, $\eta_p^2 = .027$. Within-person, positive awe led to greater world-size, $F(1, 132) = 19.51$, $p < .001$, $\eta_p^2 = .129$, pre- to post-manipulation. Fear showed a similar pattern, $F(1, 132) = 25.52$, $p < .001$, $\eta_p^2 = .165$. Amusement did not change world-size, $F(1, 133) = 1.16$, $p = .284$, $\eta_p^2 = .009$. Between-person comparisons showed a significant condition effect, $F(2, 394) = 3.16$, $p = .043$, $\eta_p^2 = .016$, however, Bonferroni corrected pairwise comparisons did not reveal significant condition differences (*ps* > .073).

Brief Discussion, Study 4

Like Study 2, positive awe did not shrink the self nor did participants differ from the amusement condition on self-size. Positive awe did however lead to a larger world-size pre- to post-measure. As in Studies 1-3, positive awe did not affect significance or mattering, either pre- to post-measure or compared to amusement, between-persons. Interestingly, correlations suggested that fear (not awe) was negatively related to self-size and the subjective sense of mattering. Further, inducing fear led to lower self-size within-person and compared to both the

positive awe and amusement conditions, between-persons. However, in contrast to self-size, subjective significance was not affected by fear.

General Discussion

Awe is an important emotion associated with numerous benefits. Understanding the psychological mechanisms by which awe leads to such outcomes is an important goal. In this regard, self-diminishment has been suggested as a process that might undergird some of awe's benefits. The present studies sought to examine two aspects of self-diminishment, the metaphorically small self and subjective feelings of (in)significance. Using mixed designs, we found some evidence that, within-person, awe leads the self to feel physically small (Studies 1 and 3) but no evidence that awe induces feelings of insignificance. In Studies 1-3, only time led to higher levels of significance, regardless of condition. However, in Study 4, positive awe led to an increase in significance, within-person. Finally, these studies showed that awe consistently enhances perceptions of vastness (Studies 1-2) and grows the psychological size of the world (all studies).

Results across all studies contrast with one previous study showing awe led to lowered significance (Dai et al., 2022). First, participant in all of the present studies were U.S. based adults. In contrast, Dai and colleagues (2022) included only Chinese participants. Cross-cultural research has demonstrated that participants from collectivist versus individualist cultures may differ in experiences of the social world post-awe. Compared to U.S. participants, Chinese participants reported wider social circles and networks at baseline and did not change from pre- to post-awe (Bai et at., 2017, Study 5). It may be that awe had different effects on significance due to differences in self-construal, culturally different views of the meaning of significance, or differences in baseline significance. Second, the awe induction used by Dai and colleagues

(2022) was a video directly concerning the vastness of the universe (looking at the earth from space, comparing Earth's size to other celestial bodies). By comparison, the present studies used manipulations that were more intimately tied to everyday experience. It is one thing to get to witness the awe-inspiring beauty of our planet, but it is another entirely to be placed amid space. Future research might probe these possible explanations.

The effects of awe on the self

The present studies extend research on the small self that mainly examine smallness and insignificance as one construct. The present results suggest that, while consistently positively related, these are separable experiences. While self-size can be reduced by awe, significance appears to be unaffected. The present studies suggest that one can feel small without feeling insignificant. This distinction helps connect how research shows that awe both quiets and enhances the self. Allowing awe the connect the self to others (Edwards et al., 2023; Tyson et al., 2022), promote prosocial behaviors (Piff et al., 2015), lead to greater humility (Steller et al., 2018) but also promote authentic self-pursuit (Jian & Sedikides, 2022), and self-continuity (Pan & Jiang, 2023). Even as awe may render the self less salient or metaphorically smaller, it does not rob of the self of its importance or the sense that matters. Awe appears to allow person to maintain a sense of subjective mattering even within what is now a much larger world. Overall, the "small self" should be best understood as becoming a smaller, but not less significant, in an expanded world.

Based on the current findings, researcher should consider how they measure self-size in the future. Either by examining insignificance separately from other items of smallness in the Small Self Scale or by implementing the Self and World Evaluation Scale. Other methods for assessing self-size, such as through analyzing written descriptions (see for example Goldy et al.,

2022) may also help distinguish awe's effects on different elements of the self, such as self-focus, collective-focus, or significance.

It is worth noting that awe only inconsistently led to a smaller self in these studies. Generally, studies (videos, Studies 1 & 3) with more powerful manipulations led to self-shrinkage. These differing results suggest that the metaphorical shrinking of the self may be less likely to occur in subtler, milder experiences of awe in daily life. Alternatively, they may point to a need to identify when and for whom awe shrinks the self. Potential moderators may include the need for accommodation and the individual differences in self-related variables. Accommodation refers to the need to change existing mental schemas and expectancies to adapt to the new experience (e.g., Keltner & Haidt, 2003). The more extreme an awe experience, the more likely it will require the person to accommodate that experience. Awe experiences that require accommodation may enhance awe's effect on self-size. Additionally, pre-existing differences in self-related variables may render people more susceptible to reductions in self-size pre- to post-awe. For example, independent (versus interdependent) self-construals (Vignoles et al., 2016) may enhance the existential challenge of awe. If a person's self is not deeply embedded in social connections, they may be less likely to feel that they remain tethered to the world, during awe. Thus, the small self may be a more common (and potentially threatening) experience for those with more independent self-construals.

Feelings of smallness are not wholly pleasant (Dai et al., 2022) and may engender feelings of disconnection (Edwards et al., 2023). Why, then, has the small self predicted prosocial behavior in past research (Piff et al., 2015)? One possibility is that the threatening aspects of self-smallness engender motivation to reinstate personal significance via prosocial behavior. Self-threats can lead to limited prosociality, directed at ingroups (but not outgroups,

e.g., Jonas et a., 2002; Zaleskiewicz et al., 2015). The small self's link to prosocial behavior may be limited in this way (as suggested by Prade & Saroglou, 2016).

It is notable that in some studies, results for within versus between person comparisons would suggest different conclusions. For example, in Study 1 between condition comparisons would suggest awe (versus amusement) led to lower significance, but within-person results suggested no change. Study 2 showed similar results for self-size. In Study 3, within-person changes in self-size were significant but between-condition comparisons showed no difference from controls. Finally, in Study 4, within-person changes indicated that positive awe increased significance, but condition comparisons suggested no difference. These results suggest that within-person comparisons may provide important information that is missed in between-person designs. Certainly, these results also suggest that control conditions used in awe research may matter greatly to effects observed on the self, particularly for between-person experiments. Optimal control conditions would not affect the self. Scrupulous pilot testing is necessary to identify such controls, regarding both the content and format of control conditions.

The effect of awe on the world

In contrast to results for the small self, between- and within-person strategies for assessing awe's effects provide convergent conclusions for the effect of awe on perceptions of the world: awe promotes a sense of vastness (Studies 1-2) and grows the world (all studies). While prior research has tended to treat vastness in the context of its relation to the small self (Piff et al., 2015), the present studies consistently show that awe makes the world feel larger (and vaster).

Although self-size and significance were positively related, awe affected these experiences differently. Regarding self-reported vastness and world-size, these were generally

unrelated but were similarly affected by awe. Future research might probe what these measures capture. As noted previously, reports of vastness involve sensing something grander than oneself (essentially the definition of awe) and could be described as a more spiritual experience. World-size is the subjective perception of the size of one's environment (metaphorically). Results for world-size suggest that awe enlarges the schema of the world, in line with awe eliciting need for accommodation. Probing whether that enlarged world contains other people is an important goal for future research.

This research demonstrates that awe consistently affects the size of the world. Identifying this effect opens a host of future research questions pertaining to the potential role of the changes in world- (not just self-) size in the outcomes associated with awe. The present studies suggest that encounters with stimuli that evoke a sense of a vastness enlarge the world, providing the self with an angel's eye view of existence. From this vantage point, the self may have a perspective on itself as small. At the same time, the self that is looking upon itself is part of and tethered to that now psychologically larger world. The psychological representation of the world enlarged by awe may include not only the physical world but the self and other people. In contrast to the small self, in addition to correlating positively with self-esteem, vastness positively relates to identification with humanity (Tyson et al., 2022). Awe's capacity to enhance the psychological size of the social world may be important to its effects on prosocial behavior. In growing the world, awe may enhance the prominence of and connection to similarly situated others. Thus, future research might probe whether changes in perceptions of the world explain awe's prosocial consequences, via a greater connection to others.

Limitations

All data were collected online using student samples and adults from Cloud Research. Relying on these sources of data resulted in majority White samples, casting the generalizability of findings ambiguous. Moreover, even the strongest awe manipulations employed (videos) may be relatively weak. Field-based awe manipulations testing within-person effects are an important direction for future research. Such research might also help to remove differences in control conditions. In-person lab studies would allow for more intense awe experiences (e.g. through virtual reality, Edwards et al., 2023) and would help further clarify awe's within-person implications.

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Table 1. Demographics, All Studies

	Study 1	**Study 2**	**Study 3**	**Study 4**
Gender (counts)				
Women	157	338	200	197
Men	62	260	201	198
Nonbinary	8	6	1	1
Transgender	0	12	0	0
Alternative Identity	1	1	1	1
Ethnicity (%)				
White	85.1	78.3	63	62.5
Black/African American	7.5	10.4	21.8	21.2
Hispanic/Latino	8.8	7.6	7.4	10.6
American Indian/Alaska Native	0.4	1.2	1.7	1.3
Asian	8.3	6	13	13.1
Native Hawaiian/Pacific Islander	1.8	0.5	0.5	0.3
Other	0	1	1	0.5
Age, range	18-23	18-85	18-73	18-72
Age, *M years* (*SD*)	19.85(1.30)	40 (12.72)	38 (12.37)	37.10 (11.36)

Table 2. Bivariate Correlations, Study 1

	1.	2.	3.	4.	5.
1. SSS Self-size	--	0.58**	0.64**	0.22**	-0.36**
2. SAWE self-size	0.63**	--	0.49**	0.33**	-0.37**
3. Significance item	0.63**	0.37**	--	0.25**	-0.31**
4. Vastness	-0.16*	-0.03	-0.004	--	0.01
5. SAWE world-size	-0.41**	-0.39**	-0.24**	0.11	--

Note. Correlations above the diagonal are pre-measures and correlations below the diagonal are post-measures. SSS = Self Size Scale. SAWE = Self and World Evaluation. $N = 228$. **$p < .001$, *$p < .05$.

Table 3. Correlations among measures of self and world size, Study 2.

	1.	2.	3.	4.	5.
1. SSS Self-size	--	.70**	.68**	.30**	-.18**
2. SAWE self-size	.77**	--	.47**	.20**	-.19**
3. Significance	.65**	.51**	--	.53**	-.11*
4. Vastness	.14**	.15**	.50**	--	.53**
5. SAWE world-size	-.25**	-.24**	-.11*	.13*	--

Note. Correlations above the diagonal are pre-measures and correlations below the diagonal are post-measures. SSS = Self Size Scale. SAWE = Self and World Evaluation. $N = 603$; $^{**}p < .001$, $^{*}p < .01$.

Table 4. Means and Standard Deviation of Emotions post Manipulation, Study 3

	Awe condition	Amusement condition
	M(SD)	***M(SD)***
Amusement	3.83 (1.85)	4.98 (1.73)
Awe	5.36 (1.73)	3.70 (1.93)
Cheerful	4.94 (1.71)	4.71 (1.68)
Content	5.04 (1.52)	5.23 (1.52)
Depressed/ blue	2.16 (1.48)	2.01 (1.44)
Fear	1.61 (1.14)	1.51 (1.09)
Frustrated	1.80 (1.34)	1.76 (1.32)
Happy	4.84 (1.64)	4.85 (1.69)
Sad	1.87 (1.34)	1.82 (1.31)
Stressed	2.23 (1.58)	2.29 (1.62)
Worried/anxious	2.18 (1.58)	2.26 (1.60)

Table 5. Bivariate Correlations, Study 3

	1.	2.	3.	4.	5.
1. Awe	--	.20**	.28**	.24**	.07
2. Self-size	.17**	--	.34**	.44**	-.21**
3. Significance	.29**	.42**	--	.72**	.09
4. Mattering	.31**	.43**	.74**	--	.08
5. World-size	.19**	-.26**	.002	.03	--

Note. Correlations above the diagonal are pre-measures and correlations below the diagonal are post-measures (only a post-measure of awe). **$p < .001$.

Table 6. Means and Standard Deviation of Reported Emotions post Manipulation, Study 4

	Positive Awe condition ***M(SD)***	Negative Awe condition ***M(SD)***	Amusement condition ***M(SD)***
Amusement	4.12 (1.92)$_a$	2.88 (1.82)$_b$	5.37 (1.54)$_c$
Awe	5.15 (1.56)$_a$	4.06 (1.98)$_b$	4.22 (1.83)$_b$
Fear	1.41 (0.93)$_a$	3.06 (2.03)$_b$	1.38 (0.87)$_a$
Cheerful	4.85 (1.69)$_a$	2.85 (1.81)$_b$	5.36 (1.53)$_c$
Content	5.49 (1.35)$_a$	3.78 (1.96)$_b$	5.39 (1.37)$_a$
Depressed/ blue	1.91 (1.42)$_a$	3.02 (1.85)$_b$	1.72 (1.26)$_a$
Frustrated	1.57 (1.24)$_a$	2.46 (1.73)$_b$	1.48 (1.20)$_a$
Happy	4.98 (1.48)$_a$	3.20 (1.89)$_b$	5.31 (1.49)$_a$
Sad	1.74 (1.30)$_a$	3.13 (1.88)$_b$	1.70 (1.26)$_a$
Stressed	1.97 (1.40)$_a$	3.25 (2.00)$_b$	2.05 (1.51)$_a$
Worried/anxious	1.97 (1.36)$_a$	3.54 (2.08)$_b$	1.97 (1.53)$_a$

Note. Subscripts show Bonferroni pairwise comparisons.

Table 7. Bivariate Correlations, Study 4

	1.	2.	3.	4.	5.	6.
1. Awe	--	-.06	.10*	.20***	.17***	.09
2. Fear	-.06	--	-.01	-.05	-.07	-.03
3. Self-size	.13**	-.10*	--	.42***	.47***	-.11*
4. Significance	.20***	-.06	.44***	--	.74***	-.01
5. Mattering	.20***	-.13*	.44***	.73***	--	-.01
6. World-size	.13**	-.001	-.10	-.04	-.05	--

Note. Correlations above the diagonal are pre-measures and correlations below the diagonal are post-measures (only a post-measure of awe and fear). ***$p < .001$, ** $p < .01$, * $p < .05$.

Figure 1. Self-World Size Figure Scale

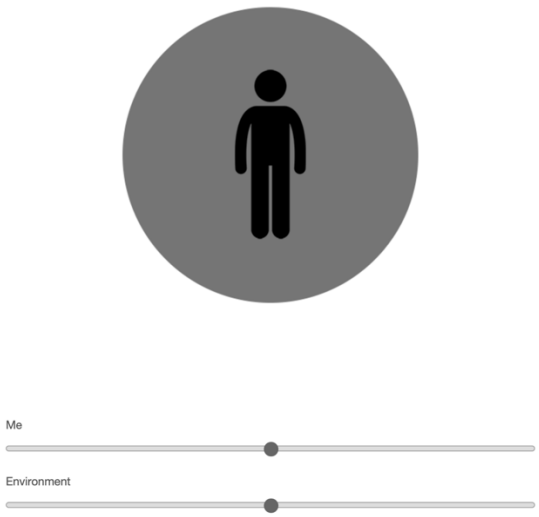
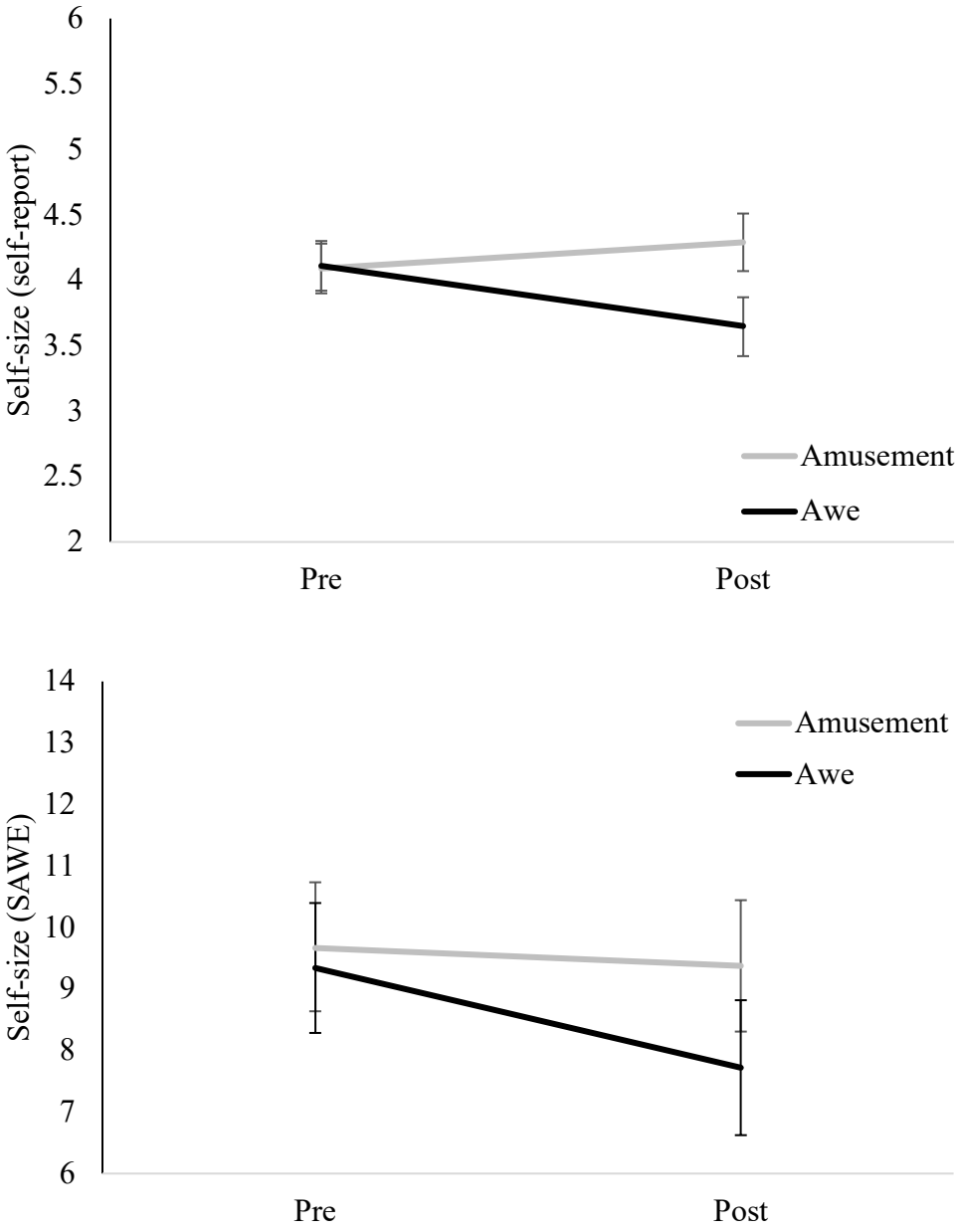
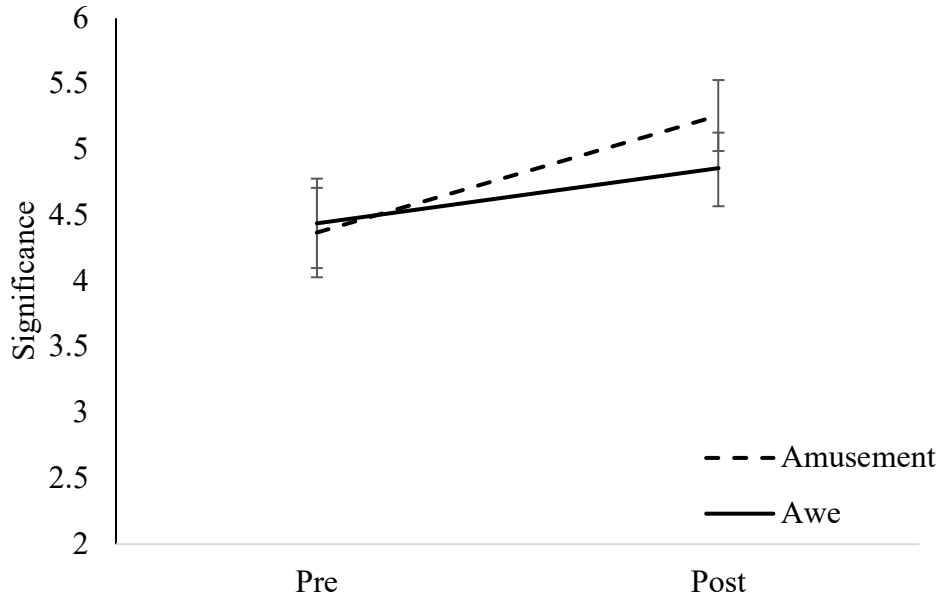


Figure 2. Condition X Time Interaction on Perceptions of the Self, Study 1



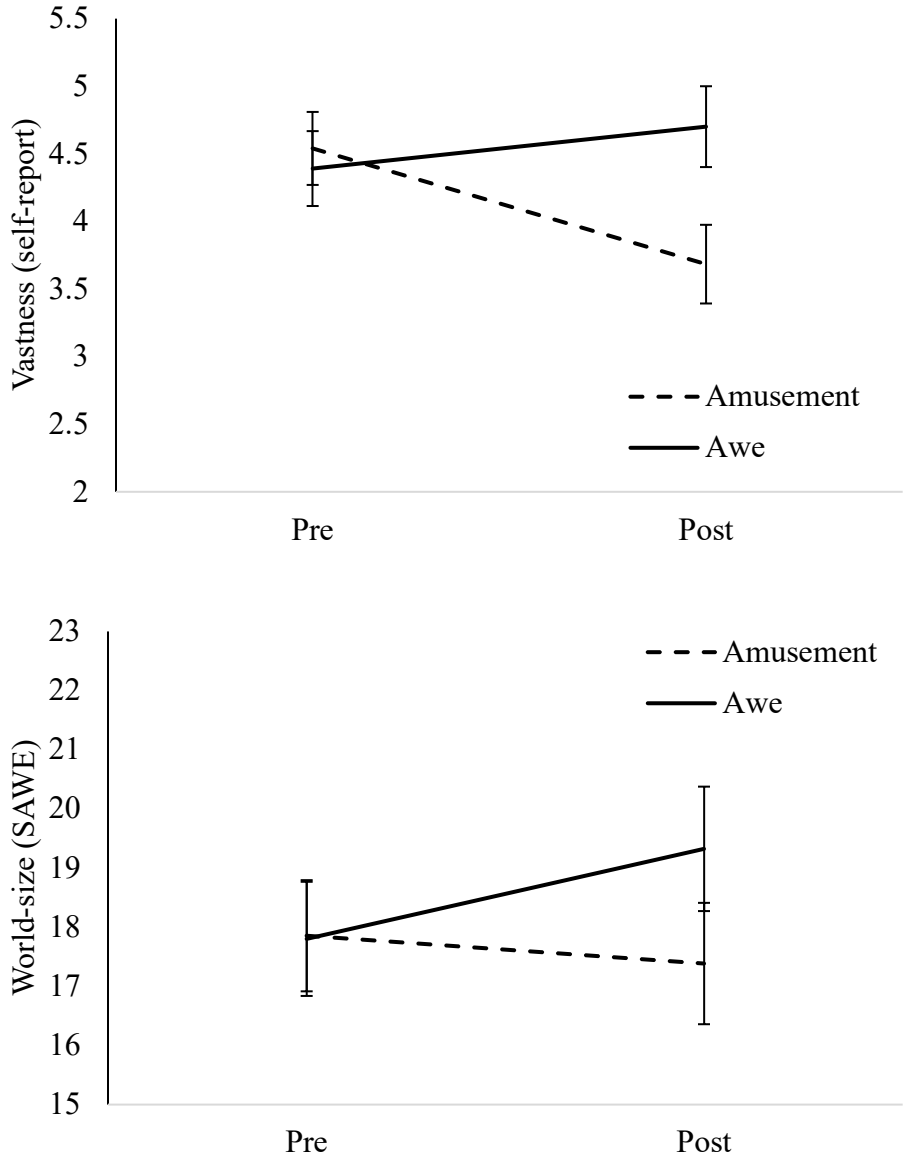
Note. Error bars are *95% Confidence Intervals*. The self-report scale ranged from 1 to 7; SAWE self-size ranged from 1 to 25.

Figure 3. Condition X Time Interaction on Perceptions of the Self, Study 1



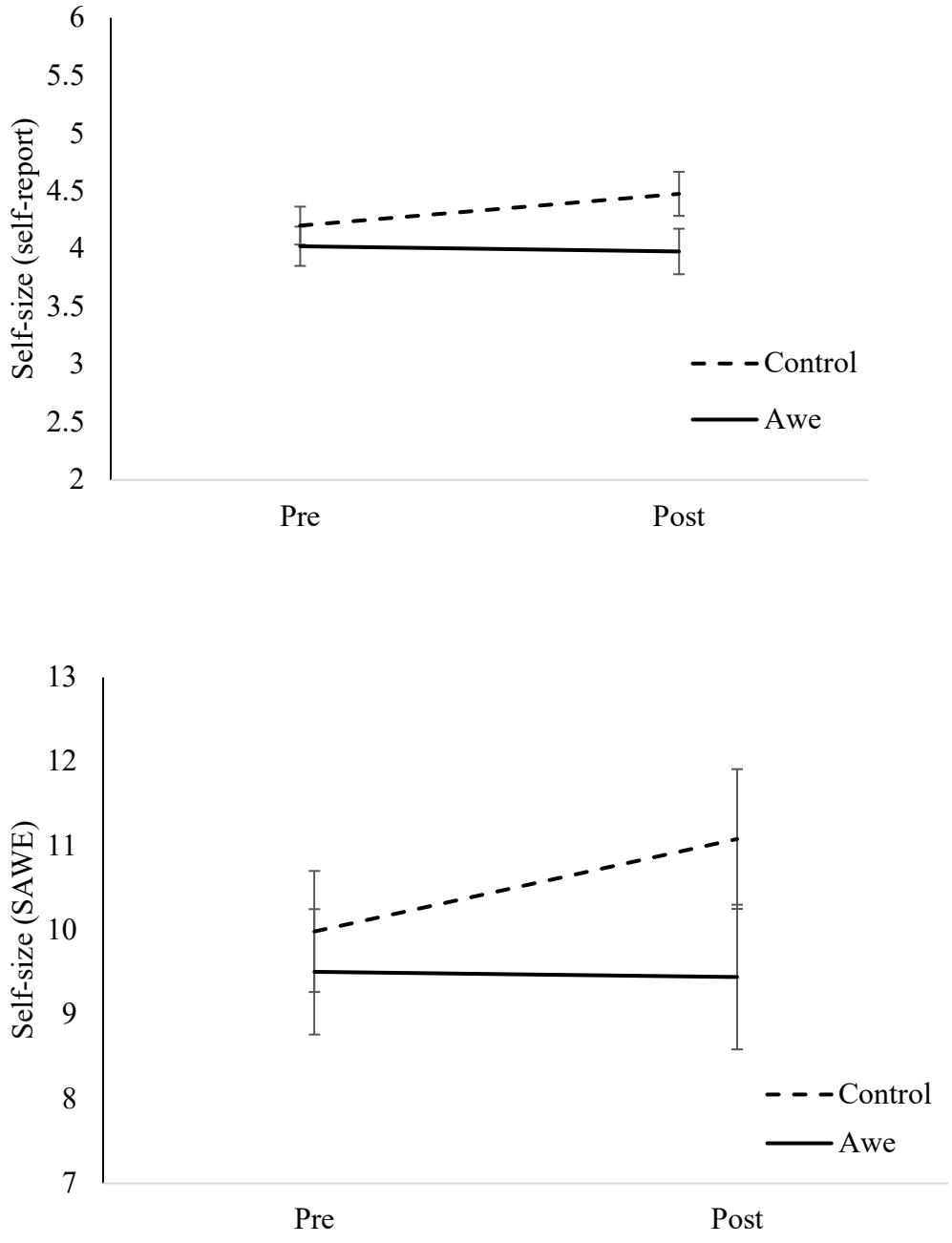
Note. Error bars are *95% Confidence Intervals*. The scale ranged from 1 to 7.

Figure 4. Condition X Time Interaction on Perceptions of the World, Study 1



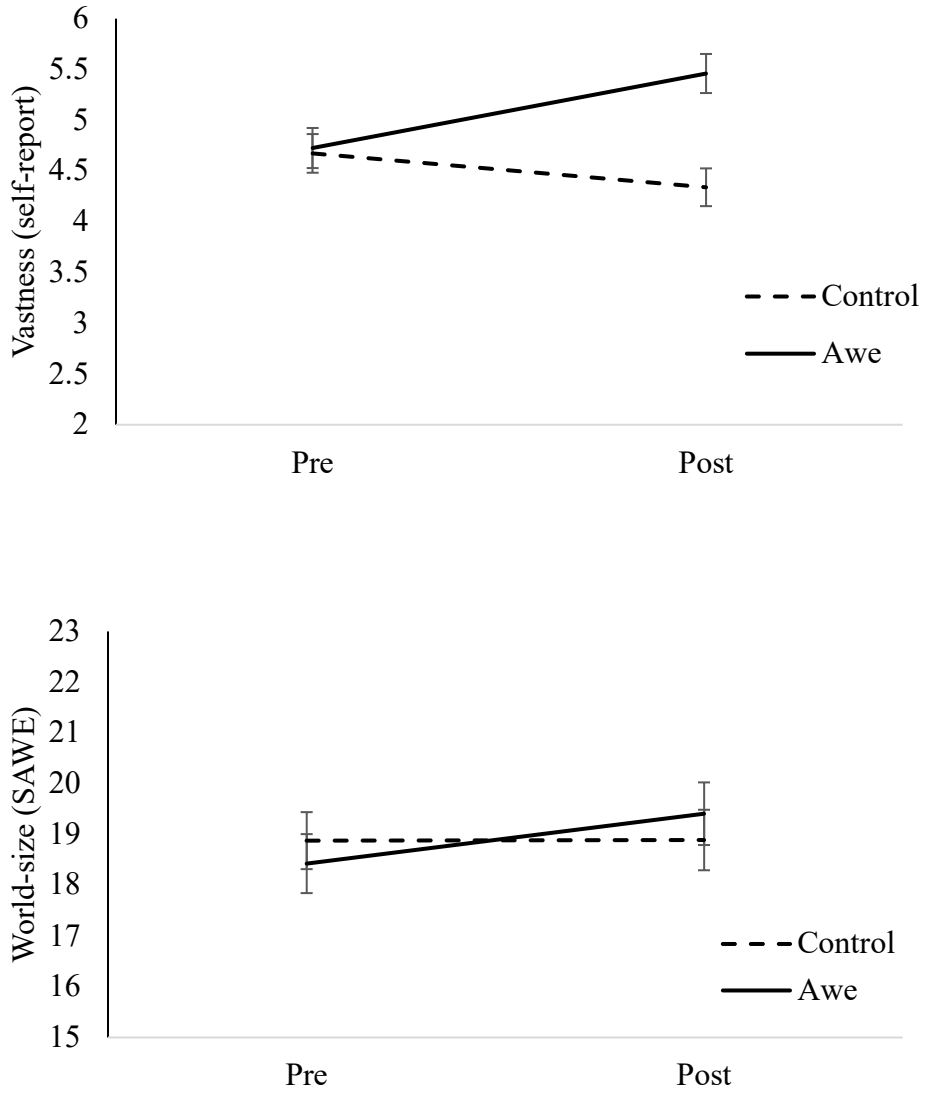
Note. Error bars are *95% Confidence Intervals*. The vastness scale ranged from 1 to 7; SAWE world-size ranged from 1 to 25.

Figure 5. Condition X Time Interaction on Perceptions of the Self, Study 2



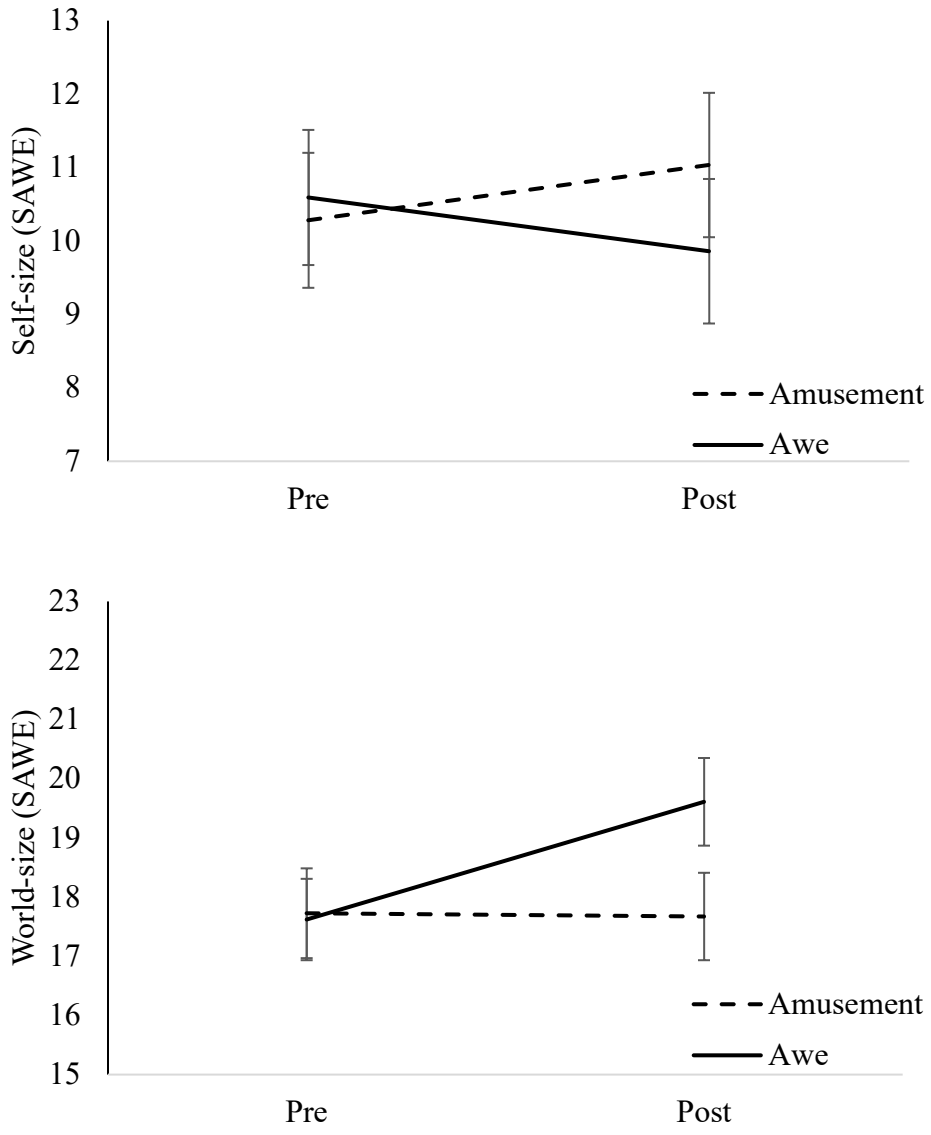
Note. Error bars are *95% Confidence Intervals*. The self-size (self-report) scale ranged from 1 to 7; the self-size (SAWE) ranged from 1 to 25.

Figure 6. Condition X Time Interaction on Perceptions of the World, Study 2



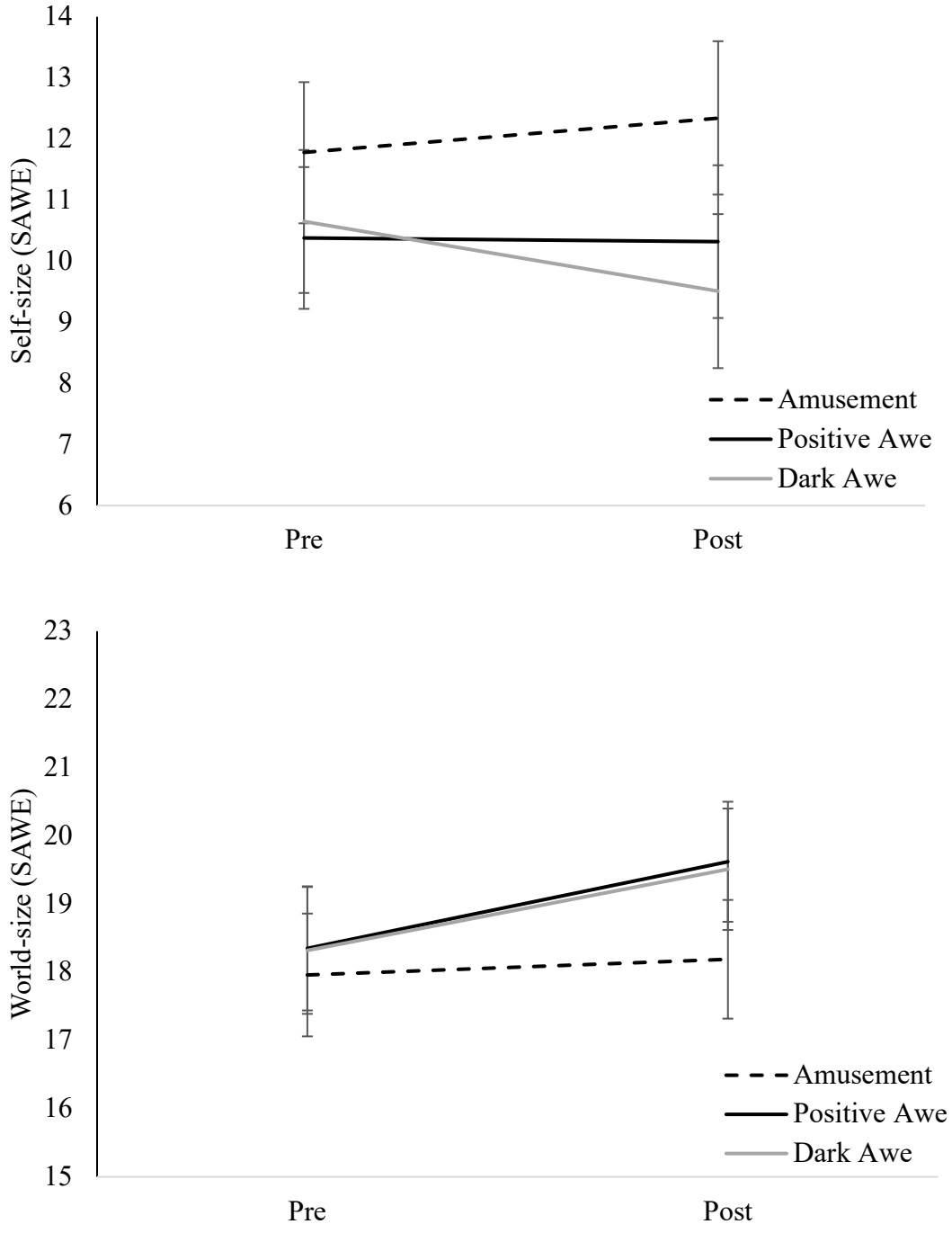
Note. Error bars are *95% Confidence Intervals*. The vastness scale ranged from 1 to 7; SAWE world-size scale ranged from 1 to 25.

Figure 7. Condition X Time Interaction on SAWE, Study 3



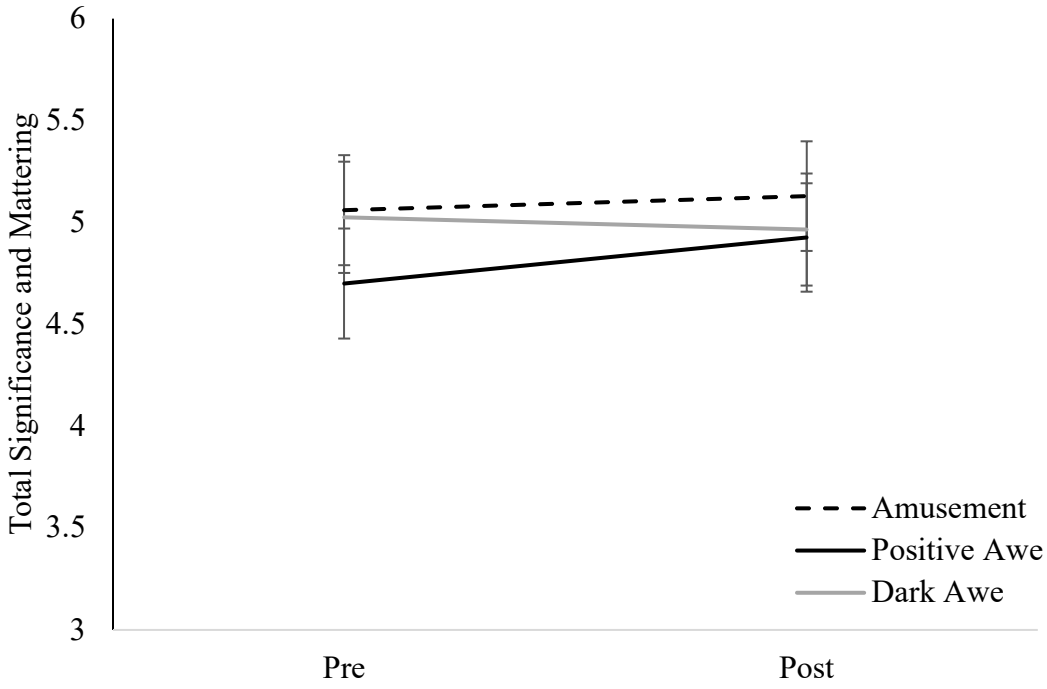
*Note***.** Error bars are *95% Confidence Intervals*. SAWE scales ranged from 1 to 25.

Figure 8. ***Condition X Time Interaction on Word-size and Self-size, Study 4***



Note. Error bars are *95% Confidence Intervals*. SAWE scales ranged from 1 to 25.

Figure 9. Condition X Time Interaction on Significance and Mattering, Study 4



*Note***.** Error bars are *95% Confidence Intervals*. Scales ranged from 1 to 7.