

# Mind-Body Practices and the Self: Yoga and Meditation Do Not Quiet the Ego but Instead Boost Self-Enhancement



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## Abstract

Mind-body practices enjoy immense public and scientific interest. Yoga and meditation are highly popular. Purportedly, they foster well-being by curtailing self-enhancement bias. However, this “ego-quieting” effect contradicts an apparent psychological universal, the self-centrality principle. According to this principle, practicing any skill renders that skill self-central, and self-centrality breeds self-enhancement bias. We examined those opposing predictions in the first tests of mind-body practices’ self-enhancement effects. In Experiment 1, we followed 93 yoga students over 15 weeks, assessing self-centrality and self-enhancement bias after yoga practice (yoga condition,  $n = 246$ ) and without practice (control condition,  $n = 231$ ). In Experiment 2, we followed 162 meditators over 4 weeks (meditation condition:  $n = 246$ ; control condition:  $n = 245$ ). Self-enhancement bias was higher in the yoga (Experiment 1) and meditation (Experiment 2) conditions, and those effects were mediated by greater self-centrality. Additionally, greater self-enhancement bias mediated mind-body practices’ well-being benefits. Evidently, neither yoga nor meditation fully quiet the ego; to the contrary, they boost self-enhancement.

## Keywords

self-centrality, self-enhancement, yoga, meditation, mindfulness, open data

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Mind-body practices (yoga, meditation) have become highly popular in Western culture and are a frequent topic of inquiry in psychological science (Van Dam et al., 2018). The public and scientific interest is mainly due to mind-body practices’ well-being benefits (Sedlmeier et al., 2012). Yet the psychological processes underlying those benefits remain largely unknown (Walsh & Shapiro, 2006). We present the first empirical tests of a focal process that is presumed to drive mind-body practices’ well-being benefits: curtailed, or even eliminated, self-enhancement bias (i.e., accurate, rather than exaggerated, self-views; Levine, 2009).

In yoga philosophy and in Buddhism, the chief source of ill-being is the self, or ego, with its natural inclination

for exaltation. The yoga philosopher Sri Aurobindo (1996) offered a relevant, vivid description:

At every moment he [the yoga practitioner or “seeker”] must proceed with a vigilant eye upon the deceits of the ego . . . who ever represent themselves as the one source of light and truth

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and take on them a simulacrum of divine forms in order to capture the soul of the seeker. (p. 230)

Similarly, the Dalai Lama (2009) wrote,

Buddha concluded that when we assert that the self exists independently, our innate sense of self-centeredness increases and solidifies. As a result, the lust, anger, pride, jealousy, and doubt that stem from being self-centered grow stronger and more ingrained. (p. 3)

According to yoga philosophy and Buddhism alike, mind-body practices (yoga, meditation) are a most effective antidote to an exalted self (Levine, 2009). Mind-body practices purportedly help to “quiet the ego” and thus reduce, or even eliminate, self-enhancement bias (Wayment, Bauer, & Sylaska, 2015; see also Carlson, 2013; Leary, 2004).<sup>1</sup> Of note, mind-body practices do not ward off self-enhancement directly. Instead, they target the root cause of that bias: people’s natural inclination to attach importance to their own attributes and actions (Ryan & Rigby, 2015). In psychological terms, mind-body practices decrease, or eradicate, the self-centrality of people’s attributes and actions (Gebauer, Sedikides, & Schrade, 2017). As a consequence of reduced self-centrality, mind-body practitioners will self-enhance less or not at all. In summary, the ego-quieting hypothesis predicts that mind-body practices (yoga, meditation) curtail self-centrality, including the self-centrality of mind-body practices. Curtailed self-centrality, in turn, lessens or annuls self-enhancement bias, including an overly positive perception of one’s mind-body skills.

The ego-quieting hypothesis is integral to yoga philosophy, Buddhism, and the mind-body literature in psychological science (Levine, 2009). However, the ego-quieting hypothesis stands in opposition to an apparent psychological universal, the principle that self-centrality breeds self-enhancement, or *self-centrality principle* (SCP; Gebauer, Sedikides, & Schrade, 2017). William James (1907) was the first to describe the SCP. According to him, practicing a skill increases its centrality in the self-system, and self-centrality breeds self-enhancement bias. The SCP has received ample empirical support outside the mind-body domain (Brown, 2010). Crucially, the SCP is thought to be universal (Sedikides, Gaertner, & Cai, 2015) and, thus, should also apply to mind-body practices. In summary, the SCP-universal hypothesis predicts that mind-body practices increase their self-centrality, which in turn intensifies self-enhancement bias in mind-body relevant domains.

We describe two high-powered experiments that competitively test the ego-quieting hypothesis against the SCP-universal hypothesis. We report all of the experiments on mind-body practices and self-enhancement that

we conducted, as well as all conditions and measures that were part of our experiments. In Experiment 1, we used a within-subjects design and followed 93 yoga students for up to 15 weeks. We repeatedly assessed yoga’s self-centrality and self-enhancement directly after yoga and with no prior yoga. Additionally, we measured well-being to examine the role of self-enhancement bias for yoga’s well-being benefits. In Experiment 2, we also used a within-subjects design but followed 162 meditation practitioners for up to 4 weeks. We repeatedly assessed meditation’s self-centrality and self-enhancement directly after meditation and in the absence of prior meditation. Again, we measured well-being to examine the role of self-enhancement bias for meditation’s well-being benefits.

Whichever hypothesis (ego quieting vs. SCP universal) is favored empirically, the results will be telling on at least three counts. First, they will inform the validity of mind-body practices’ apparent ego-quieting effect—a widely endorsed idea in yoga philosophy (Aurobindo, 1996), Buddhism (Collins, 1992), and psychological science (Levine, 2009). Second, the results will illuminate mechanisms underlying mind-body practices’ well-being benefits—a much-needed endeavor (Walsh & Shapiro, 2006). Finally, the results will provide a rigorous test of the SCP’s presumed universality (Sedikides et al., 2015).

## Experiment 1: Yoga

Yoga is the most popular mind-body practice in Western societies (Cramer et al., 2016). Ever since Patañjali’s original formulation of yoga philosophy (~100 CE), yoga has been ascribed a potent ego-quieting effect (Aurobindo, 1996). For those reasons, our first experiment examined mind-body practices’ effect on self-enhancement in the domain of yoga (i.e., classical hatha yoga).

## Method

**Design and participants.** We tested participants in the natural environment in which they practiced hatha yoga. We used a within-subjects design with two conditions: yoga and control. For each participant, the study lasted up to 15 weeks. We had access to eight yoga schools in Germany and invited all students to take part in the yoga condition (Weeks 1, 5, 9, and 13) and the control condition (Weeks 3, 7, 11, and 15). Such alteration of conditions in within-subjects designs minimizes potential order effects and practice effects. Likewise, temporal separation of assessments by 2 weeks minimizes carryover effects and consistent responding. We did not demand that yoga students complete all assessments, but our within-subjects design required them to take part in at least one assessment per condition.

Ninety-three participants met this criterion (79.35% women, 20.65% men; age:  $M = 40.32$  years,  $SD = 10.30$ ; yoga experience:  $M = 4.80$  years,  $SD = 5.78$ ). On average, each participant completed 5.13 assessments, resulting in a total of 477 assessments (yoga condition:  $n = 246$ ; control condition:  $n = 231$ ). We excluded data from 23 additional assessments, because we could not specify the independent variable: Participants did not indicate whether they completed the assessment in the yoga or control condition.

### **Conditions.**

**Yoga.** The yoga classes differed somewhat between and within schools across time. For example, the yoga postures were not always the same. However, hatha yoga's core elements were invariably practiced: postures (asanas), breathing exercises (pranayamas), meditation (dhyana), and relaxation (savasana). Each class lasted 90 min. Participants completed the dependent measures directly after class.

**Control.** Participants completed the dependent measures directly before yoga class at the school (or, in rare cases, at home). We instructed them to take part in the control condition only, if they had not practiced yoga within the past 24 hr. Otherwise, they would need to delay participation until they met this criterion.

**Dependent measures.** Participants completed our measures in the following order: self-centrality, better than average, self-esteem, communal narcissism.<sup>2</sup> Section S2 in the Supplemental Material available online contains a complete list of items for each measure.

**Self-centrality.** Four items assessed the degree to which participants perceived yoga as self-central (Brown, 2012). A sample item is, "Focusing mindfully on the exercises across the whole yoga class is . . ." (1 = *not at all central to me*, 11 = *central to me*). Internal consistencies were adequate at each assessment ( $.62 \leq \alpha \leq .93$ ,  $\bar{\alpha} = .81$ ).

**Self-enhancement I: better than average.** This task is the most widely used self-enhancement measure (Alicke & Govorun, 2005). In our version, four items assessed the degree to which participants perceived themselves as better than the average yoga student in their yoga class. Our comparison group (fellow yoga students in the yoga class) was a conservative choice; that group is narrow, clearly defined, and highly familiar. The content of the four items was identical to that of the above-described self-centrality items (e.g., "In comparison to the average participant of my yoga class, my ability to focus mindfully on the exercises across the whole yoga class is . . ."). The rating scale ranged from 1 (*well below average*) via 6

(*average*) to 11 (*well above average*; Brown, 2012;  $.82 \leq \alpha \leq .90$ ,  $\bar{\alpha} = .85$ ).

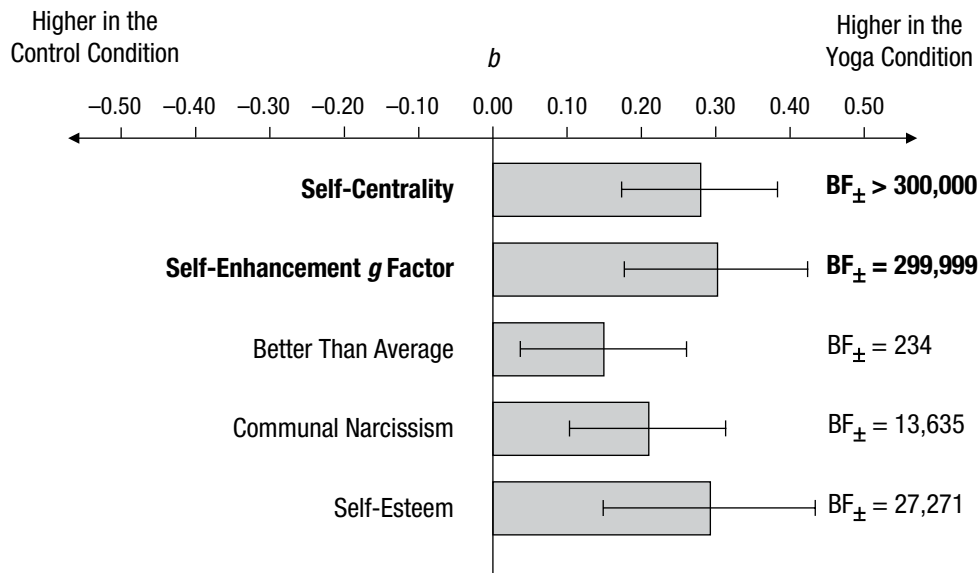
**Self-enhancement II: communal narcissism.** The Communal Narcissism Inventory (Gebauer, Sedikides, Verplanken, & Maio, 2012) assesses narcissistic, self-enhancing tendencies in communal—and, thus, mind-body-relevant—domains (Nehrlich, Gebauer, Sedikides, & Schoel, 2018). Because of time constraints, we administered a four-item short form and used items with a reasonable item-total correlation, adequate content breadth, and high face validity. A sample item is, "I will be well known for the good deeds I will have done" (1 = *does not apply at all*, 7 = *applies completely*;  $.61 \leq \alpha \leq .78$ ,  $\bar{\alpha} = .71$ ).

**Self-enhancement III: self-esteem.** Self-esteem is a widely used indicator of self-enhancement bias (Sedikides & Gregg, 2008). We administered a state variant of the Single-Item Self-Esteem Scale (Robins, Hendin, & Trzesniewski, 2001): "At the moment, I have high self-esteem" (1 = *does not apply at all*, 7 = *applies completely*). The measure has high test-retest reliability and a very high true score correlation ( $r \approx .90$ ) with Rosenberg's (1965) Self-Esteem Scale.

### **Statistical modeling.**

**Multilevel analyses.** Our design yielded nested data (assessments nested in participants). Hence, we ran random-intercept models, using the *lme4* package (Bates, Maechler, Bolker, & Walker, 2015) in the R programming environment (R Core Team, 2008). We dummy-coded the condition variable (1 = yoga, 0 = control) and centered all continuous within-subjects predictors (if present in the model) around their participant mean. For details, see Section S3 in the Supplemental Material, which includes all R syntax (including a web link to access the data).

**Bayes factors (BFs).** Our *lme4* analyses compared each of the two hypotheses (ego quieting, SCP universal) against the null hypothesis. It would be closer to our theoretical objective, however, to directly compare the ego-quieting hypothesis with the SCP-universal hypothesis, without evoking comparisons with the null hypothesis (Meehl, 1967). BFs allow such direct comparison. Therefore, we additionally report BFs calculated with the *BayesFactor* package in R (Morey & Rouder, 2015). We fitted random-intercept models (iterations =  $3e^5$ ), parallel to our *lme4* models. Following recommendations by Rouder, Morey, Speckman, and Province (2012), we based those models on multivariate generalizations of Cauchy priors on standardized effects. We computed the posterior model probabilities of those models (iterations =  $3e^5$ ) and compared the number of posterior samples in support of the SCP-universal hypothesis with the number



**Fig. 1.** Results from Experiment 1: the effect of yoga (vs. control) on self-centrality and self-enhancement. Error bars represent 95% confidence intervals. Boldface indicates the main results, which are described in the text. Results not in boldface are described in the Supplemental Material available online. BF = Bayes factor.

of posterior samples in support of the ego-quieting hypothesis (encompassing BF method; Hoijtink, 2012; for details, see Section S3):  $1 < BF_{\pm} < 3$  connotes evidence “barely worth mentioning” for  $H_+$  over  $H_-$ ,  $3 < BF_{\pm} < 10$  connotes “substantial” evidence,  $10 < BF_{\pm} < 30$  “strong” evidence,  $30 < BF_{\pm} < 100$  “very strong” evidence, and  $BF_{\pm} > 100$  connotes “extreme” evidence (Jeffreys, 1961).

## Results

**Self-centrality.** The ego-quieting hypothesis predicted lower self-centrality in the yoga condition (vs. control), whereas the SCP-universal hypothesis predicted higher self-centrality in the yoga condition (vs. control). We found higher self-centrality in the yoga condition than in the control condition,  $b = 0.28$ , 95% confidence interval (CI) = [0.18, 0.39],  $SE = 0.05$ ,  $t = 5.35$ , supporting the SCP-universal hypothesis, and Bayesian analyses favored the SCP-universal hypothesis over the ego-quieting hypothesis by a  $BF_{\pm}$  greater than 300,000—extreme evidence for the SCP-universal hypothesis (Jeffreys, 1961). Figure 1 displays the results.

**Self-enhancement.** Our self-enhancement measures (better than average, communal narcissism, self-esteem) are well validated. Nonetheless, every measure has its idiosyncratic weaknesses, and our measures are no exception. To eliminate those weaknesses, we operationalized self-enhancement as the  $g$  factor (i.e., common variance; Spearman, 1904) of the three self-enhancement measures. All measures loaded adequately on that  $g$  factor (standardized factor loadings: .49 for better than

average, .53 for communal narcissism, .46 for self-esteem).

The ego-quieting hypothesis predicted lower self-enhancement, whereas the SCP-universal hypothesis predicted greater self-enhancement, in the yoga (vs. control) condition. We found greater self-enhancement in the yoga condition than in the control condition,  $b = 0.30$ , 95% CI = [0.18, 0.42],  $SE = 0.06$ ,  $t = 4.87$ , supporting the SCP-universal hypothesis, and Bayesian analyses favored the SCP-universal hypothesis over the ego-quieting hypothesis by factor  $BF_{\pm} = 299,999$ —extreme evidence for the SCP-universal hypothesis. Additionally, we examined the effect of yoga on each self-enhancement measure separately. The effect on the self-enhancement  $g$  factor was replicated for all measures (better than average, communal narcissism, self-esteem). Section S4 in the Supplemental Material includes those results. Figure 1 displays the results of the self-enhancement  $g$  factor and also of each self-enhancement measure separately.<sup>3</sup>

### **Self-centrality as process for the self-enhancement effect.**

According to the SCP-universal hypothesis, the previously described self-enhancement effect was driven by yoga’s higher self-centrality in the yoga condition. We probed for multilevel mediation (Tingley, Yamamoto, Hirose, Keele, & Imai, 2014), testing for an indirect path from yoga (vs. control) to amplified self-enhancement ( $g$  factor) via increased self-centrality. We found strong evidence for such an indirect path,  $b = 0.17$ , 95% CI = [0.10, 0.24], 55% mediated, suggesting that self-centrality is a key process driving the effects of yoga practice on greater self-enhancement.

**Self-enhancement as process for the well-being effect.**

In the literature, self-esteem has a dual function. It is often treated as a self-enhancement indicator (Baumeister, 1998; Sedikides & Gregg, 2008) but also as a well-being indicator (Gebauer, Sedikides, Schönbrodt, et al., 2017; Judge, Erez, Bono, & Thoresen, 2002). Thus, our study offers some opportunity to test for an indirect path from yoga (vs. control) to well-being (here, self-esteem) via increased self-enhancement ( $g$  factor of better than average and communal narcissism). We obtained such an indirect effect,  $b = 0.11$ , 95% CI = [0.05, 0.17], 37% mediated. This result suggests that increased self-enhancement provides a potent explanation for much of the well-being benefits reported in the mind-body literature. Relatedly, our finding that augmented self-enhancement can help to explain yoga's well-being benefits is consistent with much research on the well-being benefits of self-enhancement outside of the mind-body domain (Dufner, Gebauer, Sedikides, & Denissen, 2018).

**Discussion**

This experiment offered the first empirical test of mind-body practices' effect on self-enhancement bias. The experiment provided a head-to-head comparison of two prominent—but antithetical—hypotheses: ego quieting and SCP universal. The evidence clearly favored the SCP-universal hypothesis. After yoga practice, yoga's self-centrality was exacerbated—not diminished—and self-enhancement in yoga-relevant domains was strengthened—not curtailed (see Fig. 1). Furthermore, higher self-centrality mediated the effect of yoga on augmented self-enhancement. Additionally, augmented self-enhancement mediated the effect of yoga practice on higher well-being. The latter finding suggests that augmented self-enhancement plays a key role in yoga's well-being benefits. Experiment 1 examined the role of self-enhancement bias in one particularly popular mind-body domain—yoga. Experiment 2 sought to replicate Experiment 1's findings in another important mind-body domain—meditation.

**Experiment 2: Meditation**

Meditation is a “hot topic in psychology” (Karremans, Schellekens, & Kappen, 2017, p. 29) and a “most tried-and-true method of quieting the self” (Leary, 2004, p. 47). The Buddha viewed meditation as a key device for eradicating exaggerated self-perceptions, and this view has been endorsed by Buddhist teachers (Collins, 1992) and psychologists (Levine, 2009). Thus, Experiment 2 examined mind-body practices' apparent ego-quieting effect in the domain of meditation. Additionally, this experiment improved on Experiment 1 on two

counts: It used an even more rigorous experimental design and measured well-being broadly (hedonic and eudemonic well-being).

**Method**

**Design and participants.** We recruited German participants (the study language was German) via yoga and meditation schools and via yoga and meditation groups on Facebook. All participants, therefore, had prior mind-body experience, which helped to ensure that they properly executed our meditation manipulation. Participants completed the experiment online, typically in the privacy of their homes. We used a within-subjects design with two conditions: meditation versus control. At Week 1, each participant was randomly assigned to a condition. In the following 3 weeks, we alternated condition order for each participant. Thus, for each participant, the study lasted up to 4 weeks and contained up to four assessments. We excluded an assessment if the participant did not follow our meditation instructions—that is, if he or she ended our 15-min audio-guided meditation (details below) more than 1 min early or delayed participation after meditation for more than 5 min. We did not demand that participants complete all assessments, but our within-subjects design required them to complete at least one valid assessment per condition.

One hundred sixty-two participants met our inclusion criteria (86.34% women, 13.66% men; age:  $M = 40.81$  years,  $SD = 15.22$ ). Participants had an average of 4.44 years of meditation experience ( $SD = 8.07$ ). On average, each participant completed 3.03 assessments, resulting in a total of 491 assessments (meditation condition:  $n = 246$ ; control condition:  $n = 245$ ).

**Conditions.**

**Meditation.** We administered an audio-guided *metta* (i.e., loving-kindness) meditation (Condon, Desbordes, Miller, & DeSteno, 2013), which stressed the importance of mindfulness and a life orientation toward other people. The narrator guided participants through the complete *metta* meditation. Thus, from a Buddhist perspective, this meditation should have ego-quieting effects even for participants who have little prior experience with *metta* meditation (Collins, 1992). An English version of the meditation is available from the first author on request. The meditation lasted for 15 min, a typical duration for meditation (Blanck et al., 2018). Participants completed the dependent measures directly after meditation.

**Control.** Participants completed the dependent measures without prior meditation. Still, meditation was a major incentive for our participants to complete each assessment, and so we administered the meditation following collection of the dependent measures.

**Dependent measures.** We administered adapted versions of Experiment 1's measures<sup>4</sup> as well as measures of hedonic and eudemonic well-being. Participants responded to all items by checking the appropriate point on a 567-pixel-long response line. Unless otherwise noted, the response lines ranged from 1 (*absolutely wrong*) to 81 (*absolutely right*). Response lines reduce memory for responses at earlier assessments, thus minimizing carry-over effects and consistent responding. Section S7 in the Supplemental Material lists all measures' items (and two additional measures pertaining to an unrelated project).

**Self-centrality.** Ten items assessed the degree to which participants perceived meditation-relevant domains (mindfulness, communal life orientation) as self-central. A sample item is, "How central is it for you to be free from envy?" (1 = *not at all central to me*, 81 = *very central to me*;  $.87 \leq \alpha \leq .91$ ,  $\bar{\alpha} = .90$ ).

**Self-enhancement I: better than average.** We instructed participants to "compare yourself with this study's average participant of your own age and gender" on 10 items. The item content was identical to that of the self-centrality items. A sample item is, "In comparison to the average participant of this study, I am free from envy" (1 = *very much below average*, 81 = *very much above average*;  $.91 \leq \alpha \leq .95$ ,  $\bar{\alpha} = .93$ ).

**Self-enhancement II: communal narcissism.** The 16-item Communal Narcissism Inventory (Gebauer et al., 2012) assesses narcissistic tendencies in the communal—and, thus, meditation-relevant—domain ( $.92 \leq \alpha \leq .95$ ,  $\bar{\alpha} = .94$ ).

**Self-enhancement III: self-esteem.** The 10-item Self-Esteem Scale (Rosenberg, 1965) is the most widely used measure of self-esteem and a frequent index of self-enhancement ( $.92 \leq \alpha \leq .95$ ,  $\bar{\alpha} = .94$ ).

**Well-being I: hedonic well-being.** Hedonic well-being consists of affective and cognitive components (Diener, Emmons, Larsen, & Griffin, 1985). We assessed the affective component with nine items. A sample item is, "I am happy" ( $.91 \leq \alpha \leq .95$ ,  $\bar{\alpha} = .93$ ). We assessed the cognitive component with the five-item Satisfaction With Life Scale (Diener et al., 1985). A sample item is, "The conditions of my life are excellent" ( $.87 \leq \alpha \leq .90$ ,  $\bar{\alpha} = .88$ ). The very high correlation between the affective and cognitive components ( $.68 \leq r \leq .74$ ,  $\bar{r} = .72$ ) justified it to average them into one hedonic well-being index.

**Well-being II: eudemonic well-being.** Eudemonic well-being comprises six components (Ryff & Keyes, 1995): autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-

acceptance. We assessed each component with two items from Ryff and Keyes's (1995) eudemonic well-being measure. A sample item is, "In many ways, I feel disappointed about my achievements in life" (reverse-coded;  $.82 \leq \alpha \leq .84$ ,  $\bar{\alpha} = .83$ ).

**Statistical modeling.** Our modeling approach was identical to the approach described in Experiment 1's Method section. For details, see Section S8 in the Supplemental Material, which includes all R syntax (and a web link to access the data).

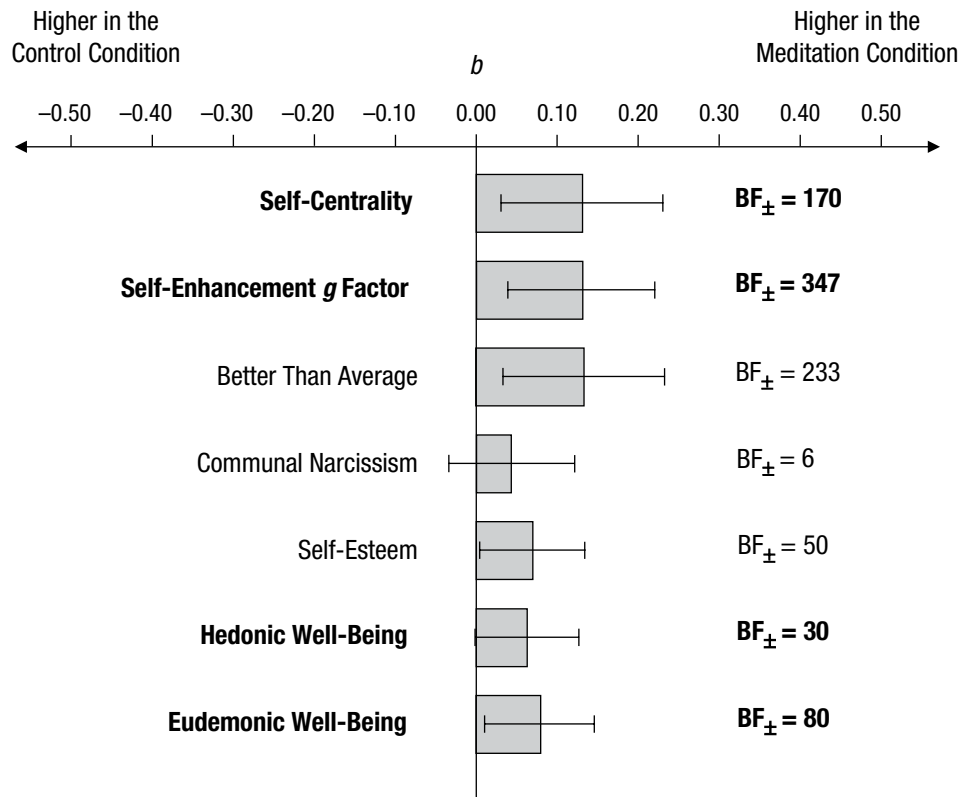
## Results

**Self-centrality.** We found higher self-centrality in the meditation condition than in the control condition,  $b = 0.13$ , 95% CI = [0.03, 0.23],  $SE = 0.05$ ,  $t = 2.59$ , supporting the SCP-universal hypothesis. Bayesian analyses favored the SCP-universal hypothesis over the ego-quieting hypothesis by a  $BF_{\pm}$  of 170, offering extreme evidence for the SCP-universal hypothesis.

**Self-enhancement.** We operationalized self-enhancement as the  $g$  factor of our three self-enhancement measures (standardized loadings on that  $g$  factor were acceptable; .87 for better than average, .49 for communal narcissism, .30 for self-esteem). We found greater self-enhancement in the meditation condition than in the control condition,  $b = 0.13$ , 95% CI = [0.04, 0.22],  $SE = 0.05$ ,  $t = 2.82$ , supporting the SCP-universal hypothesis. Bayesian analyses favored the SCP-universal hypothesis over the ego-quieting hypothesis by a  $BF_{\pm}$  of 347—once more, extreme evidence for the SCP-universal hypothesis. Additionally, the meditation effect on the self-enhancement  $g$  factor was replicated for each of the three self-enhancement measures as the sole criterion (see Section S9 in the Supplemental Material). Figure 2 displays the results of the self-enhancement  $g$  factor and also of each self-enhancement measure separately.<sup>5</sup>

**Self-centrality as process for the self-enhancement effect.** We next tested for an indirect path from meditation (vs. control) to augmented self-enhancement ( $g$  factor) via increased self-centrality. We found such an indirect path, albeit the evidence was weaker than in Experiment 1,  $b = 0.01$ , 95% CI = [0.00003, 0.04], 10% mediated. Still, that indirect path suggests that self-centrality is a process underlying the effects of meditation on greater self-enhancement.

**Self-enhancement as process for the well-being effect.** Can self-enhancement partly explain meditation's well-being benefits? We examined whether self-enhancement ( $g$  factor) mediated the effect of meditation on hedonic and eudemonic well-being. Before doing so,



**Fig. 2.** Results from Experiment 2: the effect of meditation (vs. control) on self-centrality, self-enhancement, and well-being. Error bars represent 95% confidence intervals. Boldface indicates the main results, which are described in the text. Results not in boldface are described in the Supplemental Material available online. BF = Bayes factor.

we tested for an effect of meditation on higher well-being. Meditation marginally increased hedonic well-being,  $b = 0.06$ , 90% CI = [0.007, 0.12],  $SE = 0.03$ ,  $t = 1.88$ , and significantly increased eudemonic well-being,  $b = 0.08$ , 95% CI = [0.01, 0.15],  $SE = 0.04$ ,  $t = 2.28$ . Mediation analyses followed. Self-enhancement mediated the effect of meditation on hedonic well-being,  $b = 0.02$ , 95% CI = [0.005, 0.04], 32% mediated. Self-enhancement also mediated the effect of meditation on eudemonic well-being,  $b = 0.02$ , 95% CI = [0.005, 0.04], 24% mediated. Finally, to replicate most directly Experiment 1's results, we tested whether the effect of meditation on self-esteem was mediated by self-enhancement ( $g$  factor of better-than-average judgments and communal narcissism). Indeed, self-enhancement mediated the effect of meditation on self-esteem,  $b = 0.02$ , 95% CI = [0.003, 0.03], 21% mediated. Overall, the results buttress Experiment 1's finding that self-enhancement bias provides a potent explanation for mind-body practices' well-being benefits.

## Discussion

This experiment offered the first empirical test of meditation's effect on self-enhancement bias. The experiment competitively tested the ego-quieting and

SCP-universal hypotheses and favored the latter. After meditation, self-centrality in meditation-relevant domains was exacerbated—not diminished—and self-enhancement in meditation-relevant domains was augmented—not curtailed (see Fig. 2). Furthermore, higher self-centrality mediated the effect of meditation on augmented self-enhancement. Additionally, augmented self-enhancement mediated the effect of meditation on higher well-being, hedonic and eudemonic. The latter finding again suggests that augmented self-enhancement bias is involved in mind-body practices' well-being benefits.

## General Discussion

Mind-body practices enjoy immense interest in the general public and many areas of psychology, including cognitive, social, and clinical (Van Dam et al., 2018). A foundational assumption of yoga philosophy (Aurobindo, 1996) and Buddhism (Collins, 1992) is that mind-body practices quiet the ego and, thus, curtail or eliminate self-enhancement. Curtailed self-enhancement, in turn, has been described as a key process explaining the well-being benefits of mind-body practices (Levine, 2009).

However, the presumed effect of mind-body practices on curtailed self-enhancement has remained untested. This is unfortunate because there is a viable alternative to that ego-quieting hypothesis—the SCP-universal hypothesis (Gebauer, Sedikides, & Schrade, 2017). The SCP-universal hypothesis is a building block of the self-enhancement literature (Sedikides et al., 2015). It predicts that practicing any skill—and, thus, also mind-body practices—increases that skill's self-centrality, which in turn breeds self-enhancement bias regarding that skill. The SCP-universal hypothesis is well supported outside the mind-body domain (Brown, 2010).

In this article, we provided the first empirical investigation on mind-body practices' effects on self-enhancement bias, competitively testing the ego-quieting hypothesis against the SCP-universal hypothesis. We conducted two (and only two) experiments using high-powered within-subjects designs. The results favored the SCP-universal hypothesis over the ego-quieting hypothesis. In Experiment 1, yoga practice increased the self-centrality of yoga-relevant domains. Yoga practice also augmented self-enhancement in yoga-relevant domains. In Experiment 2, meditation increased the self-centrality of meditation-relevant domains. Meditation also augmented self-enhancement in meditation-relevant domains. In both experiments, greater self-enhancement bias explained (i.e., mediated) mind-body practices' well-being benefits.

We note a few caveats. First, we examined mind-body effects on state self-enhancement immediately after the mind-body practice. According to yoga philosophy and Buddhism, mind-body practices' ego-quieting effects should be strongest during practice and immediately thereafter (Aurobindo, 1996; Dalai Lama & Berzin, 1997). Thus, our experimental design maximized the chances to find support for the ego-quieting hypothesis, stacking the deck against the SCP-universal hypothesis. Nonetheless, we found consistent support for the SCP-universal hypothesis, rendering that support particularly persuasive. Those merits of our experimental design notwithstanding, the design is mute to potential long-term effects on trait self-enhancement. Further research is needed to examine such long-term effects. Second, Experiment 1 was a quasi-experiment, and, therefore, third variables could have influenced its results. This possibility is unlikely, however, because we alternated condition order of this within-subjects experiment (yoga, control, yoga, etc.). Finally, we sampled Western participants, as did the vast majority of previous studies on mind-body practices' well-being benefits. Hence, our results, albeit highly relevant to that literature, invite the question of whether they are applicable to special groups (e.g.,

grand masters, Buddhist monks). Note that we found greater self-enhancement in the yoga (Experiment 1) and meditation (Experiment 2) conditions even among very advanced mind-body practitioners (see Sections S5 and S10 in the Supplemental Material). This finding suggests that the results likely generalize to those special groups.

Our findings have broad theoretical significance. Ego quieting is a central element of yoga philosophy and Buddhism alike (Aurobindo, 1996; Collins, 1992). That element, and its presumed implications, requires serious rethinking. Moreover, ego quieting is often called on to explain mind-body practices' well-being benefits (Levine, 2009). In contrast, we observed that mind-body practices boost self-enhancement, and this boost, in turn, elevates well-being. The latter finding is consistent with the literature on the well-being benefits of self-enhancement outside the yoga domain (Dufner et al., 2018). In conclusion, despite claims to the contrary, mind-body practices do not undermine the universality of self-enhancement in self-central domains. The SCP appears to be an inextricable part of human nature (Gebauer, Sedikides, & Schrade, 2017; Sedikides et al., 2015).

#### Action Editor

Bill von Hippel served as action editor for this article.

#### Author Contributions

J. E. Gebauer developed the study concept and design. Testing and data collection were performed by A. D. Nehrlich, A. Hackenschmidt, D. Schick, C. A. Stegmaier, and C. C. Windfelder. J. E. Gebauer and A. D. Nehrlich analyzed and interpreted the data. J. E. Gebauer drafted the manuscript, and D. Stahlberg, C. Sedikides, and J. Mander provided critical revisions. All the authors approved the final manuscript for submission.

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#### Declaration of Conflicting Interests

The author(s) declared that there were no conflicts of interest with respect to the authorship or the publication of this article.

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#### Supplemental Material

Additional supporting information can be found at <http://journals.sagepub.com/doi/suppl/10.1177/0956797618764621>



## Open Practices



All data have been made publicly available via the Mannheim Research Data Repository and can be accessed at <https://madata.bib.uni-mannheim.de/266/>. Materials for these experiments have not been made publicly available, and the design and analysis plans for the experiments were not preregistered. The complete Open Practices Disclosure for this article can be found at <http://journals.sagepub.com/doi/suppl/10.1177/0956797618764621>. This article has received the badge for Open Data. More information about the Open Practices badges can be found at <http://www.psychologicalscience.org/publications/badges>.

## Notes

1. To be sure, a quiet ego includes more than accurate (vs. inflated) self-views. For example, people with a quiet ego are also said to be less judgmental of the self and others and more compassionate toward the self and others. However, reduced—or even eliminated—self-enhancement is one key element of a quiet ego. As Wayment et al. (2004) put it, “One problem of the noisy ego is an excessive tendency to seek positive self-evaluation, that is, toward unwarranted self-enhancement” (p. 1001). In fact, such unwarranted self-enhancement (*asmitā* in yoga philosophy; *asmimāna* in Buddhist philosophy) is often considered the root cause of other problems associated with a noisy ego. In Patañjali’s yoga philosophy, for example, *asmitā* results in devaluing other people and lowering compassion for them (Schonfeld, 2014). In early Buddhist philosophy, *asmimāna* is even considered “the root of all moral evil” (Pérez-Remón, 1980, p. 85).

2. We assessed one additional construct—agentic narcissism. Agentic narcissism reflects agentic self-enhancement (e.g., exaggerated self-perceptions of assertiveness, intelligence, and leadership; Gebauer, Sedikides, Verplanken, & Maio, 2012). The SCP-universal hypothesis predicts that mind-body practices engender self-enhancement only in mind-body relevant domains. Agency does not belong to those domains. Thus, the SCP-universal hypothesis predicts a null effect of yoga (vs. control) on agentic narcissism. In contrast, the ego-quieting hypothesis predicts a negative effect of yoga on any form of self-enhancement, including agentic narcissism. Section S1 in the Supplemental Material available online describes a test of this auxiliary prediction. In brief, the results further supported the SCP-universal hypothesis over the ego-quieting hypothesis.

3. Did our results differ between yoga beginners and yoga experts? We examined this question in Section S5 in the Supplemental Material. In brief, self-enhancement effects were equally strong for yoga beginners and experts.

4. For exploratory purposes, we included two additional self-enhancement measures, both of which were constructed for this study. Given that the reliability of those measures was low and their validity unclear, we described their results in Section S6 in the Supplemental Material. In brief, their results were less consistent than those of our validated measures. Irrespectively, when computing the self-enhancement *g* factor on the basis of all self-enhancement measures (the three validated ones from the main text and the two nonvalidated ones), the results in the

main text were replicated: We found greater self-enhancement in the meditation condition than in the control condition,  $b = 0.12$ , 95% CI = [0.04, 0.21],  $SE = 0.05$ ,  $t = 2.77$ , supporting the SCP-universal hypothesis. Bayesian analyses favored the SCP-universal hypothesis over the ego-quieting hypothesis by a  $BF_{\pm}$  of 287—extreme evidence for the SCP-universal hypothesis.

5. Did our results differ between meditation beginners and meditation experts? We examined this question in Section S10 in the Supplemental Material. In brief, self-enhancement effects were equally strong for meditation beginners and experts.

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