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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 “quieting the ego” or, more specifically, curtailing self-enhancement. However, this ego-quieting effect contradicts an apparent psychological universal, the self-centrality principle. According to this principle, practicing any skill renders it self-central, and self-centrality breeds self-enhancement. We examined those opposing predictions in the first tests of mind-body practices’ self-enhancement effects. Experiment 1 followed 93 yoga students over 15 weeks, assessing self-centrality and self-enhancement after yoga practice (yoga condition, *n* = 246) and without practice (control condition, *n* = 231). Experiment 2 followed 162 meditators over 4 weeks (meditation condition: *n* = 246; control condition: *n* = 245). Self-enhancement 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 mediated mind-body practices’ well-being benefits. Evidently, neither yoga nor meditation quiet the ego; instead, they boost self-enhancement.

KEYWORDS: Self-Centrality, Self-Enhancement, Yoga, Meditation, Mindfulness

 Mind-Body Practices and the Self:

Yoga and Meditation do not Quiet the Ego, but Instead Boost Self-Enhancement

 Mind-body practices (yoga, meditation) have become highly popular in Western culture and are a veritable 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 (i.e., accurate, rather than exaggerated, self-views; Leary & Guadagno, 2011).

 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, p. 230) 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 and take on them a simulacrum of divine forms in order to capture the soul of the seeker.” Similarly, the Dalai Lama (2009, p. 3) 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.”

 According to yoga philosophy and Buddhism alike, mind-body practices (yoga, mediation) are a most effective antidote to an exalted self (Leary & Guadagno, 2011). Mind-body practices purportedly help to “quiet the ego” and thus reduce, or even eliminate, self-enhancement (Carlson, 2013). Of note, mind-body practices do not ward off self-enhancement directly. Instead, they target the root cause of self-enhancement: 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 (Leary & Diebels, 2017). In summary, the *ego-quieting hypothesis* predicts that mind-body practices (yoga, meditation) curtail self-centrality, which―in turn―lessens or annuls self-enhancement.

 The ego-quieting hypothesis is integral to yoga philosophy, Buddhism, and the mind-body literature in psychological science (Leary & Guadagno, 2011). However, the ego-quieting hypothesis stands in opposition to an apparent psychological universal, the “self-centrality breeds self-enhancement principle” or―for short―“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. 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 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* studies on mind-body practices and self-enhancement we conducted, as well as *all* conditions and measures that were part of our experiments. Experiment 1 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 for yoga’s well-being benefits. Experiment 2 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 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 (Carlson, 2013). 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 versus control. For each participant, the study lasted up to 15 weeks. We had access to 8 yoga schools in Germany and invited all students to take part in the yoga condition (weeks 1, 5, 9, 13) and the control condition (weeks 3, 7, 11, 15). Such alteration of conditions in within-subjects designs minimizes potential order- and practice-effects. Likewise, temporal separation of assessments by two weeks minimizes carry-over effects and consistent responding. We did not demand yoga students to 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 (age: *M* = 40.32 years, *SD* = 10.30; sex: 79.35% women, 20.65% men; yoga experience: *M* = 4.80 years, *SD* = 5.78). On average, each participant completed 5.13 assessments, resulting in a grand-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 minutes. 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 last 24 hours. 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.1 Online Supplement S2 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≤ɑs≤.93, $\overbar{ɑ}$ = .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≤ɑs≤.90, $\overbar{ɑ}$ = .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, in press). Due to time-constraints, we administered a 4-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≤ɑs≤.78, $\overbar{ɑ}$ = .71).

 **Self-enhancement III: Self-esteem.** Self-esteem is a widely used indicator of self-enhancement (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*≈.90) with Rosenberg’s (1965) Self-Esteem Scale.

**Statistical Modeling**

 **Multi-level analyses.** Our design yielded nested data (assessments nested in participants). Hence, we ran random-intercept models, using *R*’s *lme4* package (Bates, Maechler, Bolker, & Walker, 2015). 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 Online Supplement S3, which includes all *R* syntax (including a web-link to access the data).

 **Bayes factors.** Our lme4 analyses compare each of the two hypotheses (ego-quieting, SCP-universal) against the null-hypothesis. It would be closer to our theoretical objective, however, to compare directly the ego-quieting hypothesis against the SCP-universal hypothesis, without evoking comparisons with the null-hypothesis (Meehl, 1967). Bayes factors allow such direct comparison. Therefore, we additionally report Bayes factors calculated with *R*’s *BayesFactor* package (Morey & Rouder, 2015). Parallel to our lme4 models, we fitted random-intercept models (iterations = 3e5). Following recommendations by Rouder, Morey, Speckman, and Province (2012), those models were based on multivariate generalizations of Cauchy priors on standardized effects. We computed the posterior model probabilities of those models (iterations = 3e5) and compared the number of posterior samples in support of the SCP-universal hypothesis with the number of posterior samples in support of the ego-quieting hypothesis (encompassing Bayes factor method; Hoijtink, 2012) (for details, see Online Supplement S3). 1<BF+-<3 connotes evidence “barely worth mentioning” for H+ over H-, 3<BF+-<10 connotes “substantial” evidence, 10<BF+-<30 “strong” evidence, 30<BF+-<100 “very strong” evidence, and BF+->100 connotes “extreme” evidence (Jeffreys, 1961).

**Results**

**Self-Centrality**

 The ego-quieting hypothesis predicts lower self-centrality in the yoga condition (vs. control), whereas the SCP-universal hypothesis predicts higher self-centrality in the yoga condition (vs. control). Supporting the SCP-universal hypothesis, we found higher self-centrality in the yoga than control condition, *B* = .28, 95% CI [.18, .39], *SE* = .05, *t* = 5.35, and Bayesian analyses favored the SCP-universal over the ego-quieting hypothesis by factor BF+->300,000―“extreme” evidence for the SCP-universal hypothesis (Jeffreys, 1961). Figure 1 displays the result.

**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―better-than-average, .53―communal narcissism, .46―self-esteem).

 The ego-quieting hypothesis predicts lower self-enhancement, whereas the SCP-universal hypothesis predicts greater self-enhancement, in the yoga (than control) condition. Supporting the SCP-universal hypothesis, we found greater self-enhancement in the yoga than control condition, *B* = .30, 95% CI [.18, .42], *SE* = .06, *t* = 4.87, and Bayesian analyses favored the SCP-universal over the ego-quieting hypothesis by factor BF+- = 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 replicated for all measures (better-than-average, communal narcissism, self-esteem). Online Supplement S4 includes those results. Figure 1 displays the results of the self-enhancement g-factor and also of each self-enhancement measure seperately.2

**Figure 1.** The effect of yoga (vs. control) on self-centrality and self-enhancement (including 95% confidence intervals).

higher in the

yoga condition

higher in the

control condition

.00

.10

.20

.30

.40

.50

-.50

-.40

-.30

-.20

-.10

**self-centrality**

*B*

**BF+- > 300,000**

BF+- = 27,271

**self-enhancement g-factor**

better-than-average

**BF+- = 299,999**

BF+- = 234

BF+- = 13,635

communal narcissism

self-esteem

**Self-Centrality as Process for the Self-Enhancement Effect**

 According to the SCP-universal hypothesis, the just-described self-enhancement effect is driven by yoga’s higher self-centrality in the yoga condition. We probed for multi-level 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* = .17, 95% CI [.10, .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* = .11, 95% CI [.05, .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, in press).

**Discussion**

 This experiment offered the first empirical test of mind-body practices’ ego-quieting effect. 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 (Figure 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 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 approach” for quieting the ego (Leary & Diebels, 2017, p. 53). 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 (Carlson, 2013). 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, then, had prior mind-body experience, assuring that they executed properly 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, participants were *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 4 assessments. We excluded an assessment, if the participant did not follow our meditation-instructions―that is, if (s)he ended our 15-minutes audio-guided meditation (details below) more than 1 minute early or if (s)he delayed participation after mediation for more than 5 minutes. We did not demand participants to 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 (age: *M* = 40.81 years, *SD* = 15.22; sex: 86.34% women, 13.66% men). 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 grand-total of 491 assessments (meditation condition: *n* = 246, control condition: *n* = 245).

**Conditions**

 **Meditation.** We administered an audio-guided metta meditation (Condon, Desbordes, Miller, & DeSteno, 2013), which stressed the importance of mindfulness and a life-orientation towards other people. The narrator guided participants through the complete metta meditation. Thus, from a Buddhist perspective, our mediation 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 online: [http://www.psy.de/mindbody/metta.mp3](http://www.psy.de/metta.mp3). Meditation lasted for 15 minutes, 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 measures3, and measures of hedonic and eudemonic well-being. Participants responded to all items by checking the appropriate point on a 567-pixels 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. Online Supplement S7 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 bias?” (1 = *not at all central to me*, 81 = *very central to me*; .87≤ɑs≤.91, $\overbar{ɑ}$ = .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 bias” (1 = *very much below average*, 81 = *very much above average*; 91≤ɑs≤.95, $\overbar{ɑ}$ = .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≤ɑs≤.95, $\overbar{ɑ}$ = .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≤ɑs≤.95, $\overbar{ɑ}$ = .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≤ɑs≤.95, $\overbar{ɑ}$ = .93). We assessed the cognitive component with the 5-item Satisfaction with Life Scale (Diener et al., 1985). A sample item is: “The conditions of my life are excellent” (.87≤ɑs≤.90, $\overbar{ɑ}$ = .88). The very high correlation between the affective and cognitive components (.68≤*r*s≤.74, $\overbar{r}$ = .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, self-acceptance. We assessed each component with two items from Ryff and Keyes’s (1995) eudemonic well-being measure. A sample item is: “For me, life has been a continuous process of learning, changing, and growth” (.82≤ɑs≤.84, $\overbar{ɑ}$ = .83).

**Statistical Modeling**

 Our modeling approach was identical to the approach described in Experiment 1’s Method section. For details, see Online Supplement S8, which includes all *R* syntax (and a web-link to access the data).

**Results**

**Self-Centrality**

 Supporting the SCP-universal hypothesis, we found higher self-centrality in the meditation than control condition, *B* = .13, 95% CI [.03, .23], *SE* = .05, *t* = 2.59. Bayesian analyses favored the SCP-universal over the ego-quieting hypothesis by factor BF+- = 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―better-than-average, .49―communal narcissism, .30―self-esteem). Supporting the SCP-universal hypothesis, we found greater self-enhancement in the meditation than control condition, *B* = .13, 95% CI [.04, .22], *SE* = .05, *t* = 2.82. Bayesian analyses favored the SCP-universal hypothesis over the ego-quieting hypothesis by factor BF+- = 347―once more, “extreme” evidence for the SCP-universal hypothesis. Additionally, the meditation effect on the self-enhancement g-factor replicated for each of the three self-enhancement measures as the sole criterion (see Online Supplement S9). Figure 2 displays the results of the self-enhancement g-factor and also of each self-enhancement measure seperately.4

**Figure 2.** The effect of meditation (vs. control) on self-centrality, self-enhancement, and well-being (including 95% confidence intervals).

higher in the

meditation condition

higher in the

control condition

.00

.10

.20

.30

.40

.50

-.50

-.40

-.30

-.20

-.10

**self-centrality**

*B*

**BF+- = 170**

**self-enhancement g-factor**

**BF+- = 347**

**hedonic well-being**

**BF+- = 30**

**BF+- = 80**

**eudemonic well-being**

better-than-average

communal narcissism

BF+- = 233

BF+- = 6

BF+- = 50

self-esteem

**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* = .01, 95% CI [.00003, .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 well-being, hedonic and eudemonic. Before doing so, we tested for an effect of meditation on higher well-being. Meditation marginally increased hedonic well-being, *B* = .06, 90% CI [.007, .12], *SE* = .03, *t* = 1.88, and significantly increased eudemonic well-being, *B* = .08, 95% CI [.01, .15], *SE* = .04, *t* = 2.28. Mediation analyses followed. Self-enhancement mediated the effect of meditation on hedonic well-being, *B* = .02, 95% CI [.005, .04], 32% mediated. Self-enhancement also mediated the effect of meditation on eudemonic well-being, *B* = .02, 95% CI [.005, .04], 24% mediated. Finally, in order 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* = .02, 95% CI [.003, .03], 21% mediated. Overall, the results buttress Experiment 1’s finding that self-enhancement provides a potent explanation for mind-body practices’ well-being benefits.

**Discussion**

This experiment offered the first empirical test of meditation’s ego-quieting effect. The experiment tested competitively 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 (Figure 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 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 (Leary & Guadagno, 2011). Curtailed self-enhancement, in turn, has been described as a key process explaining the well-being benefits of mind-body practices (Leary & Diebels, 2017).

 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. 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, 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 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. Future 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, like the vast majority of previous studies on mind-body practices’ well-being benefits, we sampled Western participants. 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 (Online Supplements S5 and S10). 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, 1992; Collins, 1992). That element, and its presumed implications, require serious rethinking. Moreover, ego-quieting is often called upon to explain mind-body practices’ well-being benefits (Leary & Diebels, 2017). 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., in press). In conclusion, despite claims to the contrary, mind-body practices do not undermine the universality of self-enhancement in self-central domains. The self-centrality principle appears to be an inextricable part of human nature (Gebauer, Sedikides, & Schrade, 2017; Sedikides et al., 2015).

**NOTES**

1 We assessed one additional construct―agentic narcissism. Agentic narcissism reflects agentic self-enhancement (e.g., exaggerated self-perceptions of assertiveness, intelligence, and leadership; Gebauer et al., 2012). The SCP-universal hypothesis predicts that mind-body practices only engender self-enhancement 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. Online Supplement S1 describes a test of this auxiliary prediction. In brief, the results further supported the SCP-universal hypothesis over the ego-quieting hypothesis.

2 Do our results differ between yoga beginners and yoga experts? We examined this question in Online Supplement S5. In brief, self-enhancement effects were equally strong for yoga beginners and experts.

3 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 describe their results in Online Supplement S6. 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 non-validated ones) the main-text results replicated: Supporting the SCP-universal hypothesis, we found greater self-enhancement in the meditation than control condition, *B* = .12, 95% CI [.04, .21], *SE* = .05, *t* = 2.77. Bayesian analyses favored the SCP-universal hypothesis over the ego-quieting hypothesis by factor BF+- = 287―“extreme” evidence for the SCP-universal hypothesis.

4 Do our results differ between meditation beginners and meditation experts? We examined this question in Online Supplement S10. In brief, self-enhancement effects were equally strong for mediation beginners and experts.

**REFERENCES**

Alicke, M. D., & Govorun, O. (2005). The better-than-average effect. In M. D. Alicke, D. A. Dunning, & J. I. Krueger (Eds.), *The self in social judgement* (pp. 85-106). Philadelphia, PA: Psychology Press.

Aurobindo, S. (1996). *The synthesis of yoga.* Pondicherry, India: Sri Aurobindo Ashram Press.

Bates, D., Maechler, M., Bolker, B., Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software, 67,* 1-48.

Baumeister, R. F. (1998). The self. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (4th ed., pp. 680-740). Boston, MA: McGraw-Hill.

Blanck P., Perleth S., Heidenreich T., Kröger P., Ditzen B., Bents H., & Mander J. (2018). Effects of mindfulness exercises as stand-alone intervention on symptoms of anxiety and depression: Systematic review and meta-analysis. *Behavior Research & Therapy*. Advance online publication. doi:10.1016/j.brat.2017.12.002

Brown, J. D. (2010). Across the (not so) Great Divide: Cultural similarities in self-evaluative
 processes. *Social and Personality Psychology Compass, 4*, 318-330.

Brown, J. D. (2012). Understanding the “Better than Average” effect: Motives (still) matter. *Personality and Social Psychology Bulletin, 38,* 209-219.

Carlson, E. N. (2013). Overcoming the barriers to self-knowledge: Mindfulness as a path to seeing yourself as you really are. *Perspectives on Psychological Science*, *8*, 173-186.

Collins, S. (1992). *Selfless persons: Imagery and thought in Theravāda Buddhism*. Cambridge, UK: Cambridge University Press.

Condon, P., Desbordes, G., Miller, W. B., & DeSteno, D. (2013). Meditation increases compassionate responses to suffering. *Psychological Science, 24,* 2125-2127.

Cramer, H., Ward, L., Steel, A., Lauche, R., Dobos, G., & Zhang, Y. (2016). Prevalence, patterns, and predictors of yoga use: Results of a U.S. nationally representative survey. *American Journal of Preventive Medicine, 50,* 230-235.

Dalai Lama (2009). *Becoming enlightened*. London, UK: Rider.

Dalai Lama, & Berzin, A. (1997). *The Gelug/Kagyu tradition of Mahamudra.* New York. NY: Snow Lion Publications.

Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*, 71-75.

Dufner, M., Gebauer, J. E., Sedikides, C., & Denissen, J. J. A. (in press). Self-enhancement and psycholgical adjustment: A meta-analytic review. *Personality and Social Psychology Review*.

Gebauer, J. E., Sedikides, C., Schönbrodt, F. D., Bleidorn, W., Rentfrow, P. J., Potter, J., & Gosling, S. D. (2017). The religiosity as social value hypothesis: A multi-method replication and extension across 65 countries and three levels of spatial aggregation. *Journal of Personality and Social Psychology, 113,* e18-e39.

Gebauer, J. E., Sedikides, C., & Schrade, A. (2017). Christian self-enhancement. *Journal of Personality and Social Psychology, 113,* 786-809.

Gebauer, J. E., Sedikides, C., Verplanken, B., & Maio, G. R. (2012). Communal narcissism. *Journal of Personality and Social Psychology, 103,* 854-878.

Hoijtink, H. (2012). *Informative hypotheses: Theory and practice for behavioral and social scientists.* Boca Raton, FL: CRC Press.

James, W. (1907). *The principles of psychology* (Vol. 1). New York, NY: Holt.

Jeffreys, H. (1961). *Theory of probability* (3rd ed.). Oxford, UK: Oxford University Press.

Judge, T. A., Erez, A., Bono, J. E., & Thoresen, C. J. (2002). Are measures of self-esteem, neuroticism, locus of control, and generalized self-efficacy indicators of a common core construct? *Journal of Personality and Social Psychology, 83,* 693-710.

Karremans, J. C., Schellekens, M. P. J., & Kappen, G. (2017). Bridging the sciences of mindfulness and romantic relationships: A theoretical model and research agenda. *Personality and Social Psychology Review, 21,* 29-49.

Leary, M. R., & Diebels, K. J. (2017). The hypo-egoic impact of mindfulness on self, identity, and the processing of self-relevant information. In J. C. Karremans & E. K. Papies (Eds.), *Mindfulness in social psychology* (pp. 50-64). New York, NY: Routledge.

Leary, M. R., & Guadagno, J. (2011). The role of hypo-egoic self-processes in optimal functioning and subjective well-being. In K. M. Sheldon, T. B. Kashdan, & M. F. Steger (Eds.), *Designing positive psychology: Taking stock and moving forward* (pp. 135-146). New York, NY: Oxford.

Meehl, P. (1967). Theory-testing in psychology and physics: A methodological paradox. *Philosophy of Science, 34*, 103-115.

Morey, R. D., & Rouder, J. N. (2015). BayesFactor 0.9.12-2. Comprehensive R Archive Network. Retrieved from http://cran.r-project.org/web/packages/BayesFactor/index.html

Nehrlich, A. D., Gebauer, J. E., Sedikides, C., & Schoel, C. (in press). Agentic narcissism, communal narcissism, and prosociality. *Journal of Personality and Social Psychology*.

Robins, R. W., Hendin, H. M., & Trzesniewski, K. H. (2001). Measuring global self-esteem: Construct validation of a single-item measure and the Rosenberg Self-Esteem Scale. *Personality and Social Psychology Bulletin, 27,* 151-161.

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.

Rouder, J. N., Morey, R. D., Speckman, P. L., & Province, J. M. (2012). Default Bayes factors for ANOVA designs. *Journal of Mathematical Psychology*, *56*, 356-374.

Ryan, R. M., & Rigby, C. S. (2015). Did the Buddha have a self? No-self, self and mindfulness in Buddhist thought and western psychologies. In K. W. Brown, R. M. Ryan, & J. D. Creswell (Eds.), *Handbook of mindfulness* (pp. 245-265). New York, NY: Guilford.

Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology, 69,* 719-727.

Sedikides, C., Gaertner, L., & Cai, H. (2015). On the panculturality of self-enhancement and self-protection motivation: The case for the universality of self-esteem. In A. J. Elliot (Ed.), *Advances in Motivation Science* (Vol. 2, pp. 185-241). San Diego, CA: Academic Press.

Sedikides, C., & Gregg, A. P. (2008). Self-enhancement: Food for thought. *Perspectives on Psychological Science, 3,* 102-116.

Sedlmeier, P., Eberth, J., Schwarz, M., Zimmermann, D., Haarig, F., Jaeger, S., & Kunze, S. (2012). The psychological effects of meditation: A meta-analysis. *Psychological Bulletin, 138,* 1139-1171.

Spearman, C. (1904). “General intelligence” objectively determined and measured. *American Journal of Psychology, 15*, 201-293.

Tingley, D., Yamamoto, T., Hirose, K., Keele, L., & Imai, K. (2014). Mediation: R package for causal mediation analysis. *Journal of Statistical Software*, *59*.

Van Dam, N. T., van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., ... & Fox, K. C. (2018). Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspectives on Psychological Science*, *13*, 36-61.

Walsh, R., & Shapiro, S. (2006). The meeting of meditative disciplines and Western psychology: A mutually enriching dialogue. *American Psychologist, 61,* 227-239.