Psychonomic Bulletin & Review (2023) 30:341–349
https://doi.org/10.3758/s13423-022-02111-2

BRIEF REPORT

Knock yourself out: Brief mindfulness-based meditation eliminates self-prioritization

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Accepted: 19 April 2022 / Published online: 25 July 2022

Abstract

Recent research has asserted that self-prioritization is an inescapable facet of mental life, but is this viewpoint correct? Acknowledging the flexibility of social-cognitive functioning, here we considered the extent to which mindfulness-based meditation—an intervention known to reduce egocentric responding—attenuates self-bias. Across two experiments (Expt. 1, $N = 160$; Expt. 2, $N = 160$), using an object-classification task, participants reported the ownership of previously assigned items (i.e., owned-by-self vs. owned-by-friend) following a 5-minute period of mindfulness-based meditation compared with control meditation (Expt. 1) or no meditation (Expt. 2). The results revealed that mindfulness meditation abolished the emergence of the self-ownership effect during decision-making. An additional computational (i.e., drift diffusion model) analysis indicated that mindfulness meditation eliminated a prestimulus bias toward self-relevant (vs. friend-relevant) responses, increased response caution, and facilitated the rate at which evidence was accumulated from friend-related (vs. self-related) objects. Collectively, these findings elucidate the stimulus and response-related operations through which brief mindfulness-based meditation tempers self-prioritization.

Keywords Self-prioritization · Ownership effect · Mindfulness-based meditation · Drift diffusion model

Decades of research have identified a purportedly basic feature of social cognition—information processing and decision-making are biased in decidedly self-serving and self-prioritizing ways (Conway, 2005; Mezulis et al., 2004; Sedikides & Alicke, 2012; Sui & Humphreys, 2015; Symons & Johnson, 1997). For example, whether comprising familiar (e.g., faces, names) or arbitrary (e.g., shapes, colours, sounds) stimuli, material related to the self is easier to detect, classify, and remember that comparable items pertaining to other people (Alexopoulos et al., 2012; Bargh & Pratto, 1986; Constable et al., 2019; Cunningham et al., 2008; Falbén et al., 2020; Golubickis et al., 2018; Gray et al., 2004; Rogers et al., 1977; Shapiro et al., 1997; Sui et al., 2012). Indeed, based on these findings, it has been argued that, underpinned by the enhanced processing of self-relevant inputs, self-prioritization is an inescapable facet of mental life (Sui & Humphreys, 2015, 2017). But, at least for stimuli with no prior self-association (i.e., arbitrary items), is this in fact the case?

Using both shape-label matching and object-ownership tasks—the dominant paradigms in research in this area (Golubickis et al., 2018; Sui et al., 2012)—recent findings have suggested that self-prioritization is by no means a mandatory information-processing outcome (e.g., Caughey et al., 2021; Constable et al., 2019; Falbén et al., 2019; Falbén et al., 2020; Siebold et al., 2015; Stein et al., 2016; Svensson et al., 2022; Wade & Vickery, 2018; Woźniak & Knoblich, 2022). Take, for instance, the self-ownership effect whereby arbitrary objects assigned to the self are classified more rapidly and accurately than comparable items possessed by others (Constable et al., 2019; Golubickis et al., 2018; Golubickis et al., 2019; Lockwood et al., 2018). As it turns out, this effect only emerges when the self-relevance

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of the to-be-judged items is an explicit component of the prevailing task set. Judging stimuli along non-self-related dimensions eliminates self-prioritization, a reflection of the diminished potency of self-object associations in working memory under these conditions (Caughey et al., 2021; Constable et al., 2019; for related research, see also Falbén et al., 2019; Stein et al., 2016; Woźniak & Knoblich, 2022).

Beyond alteration of the judgmental context, other factors also likely moderate the emergence and magnitude of the self-ownership effect (and indeed other manifestations of self-bias). Moreover, it may be possible to weaken self-prioritization even under conditions in which personal relevance is the dimension along which stimuli must be judged (Caughey et al., 2021; Falbén et al., 2019; Woźniak & Knoblich, 2022). Adopting a computational approach, previous work has demonstrated that the self-ownership effect resides in the application of an egocentric decision-making strategy (Epley et al., 2004; Epley & Gilovich, 2004; Falbén et al., 2020; Golubickis et al., 2018; Golubickis et al., 2019; Lockwood et al., 2018). Specifically, through variation in the evidential requirements of response selection (i.e., less evidence is required to select self-relevant compared with other-relevant responses), even before a to-be-judged object appears on the screen, participants are biased toward a self-relevant (vs. other-relevant) outcome (i.e., self-relevance modulates response selection rather than stimulus processing). What, of course, this suggests is that anything that serves to reduce egocentrism, even temporarily, should also attenuate the response bias that underpins self-prioritization. Brief mindfulness-based meditation, we suspect, may exert just such an influence.

Emphasizing the nonjudgmental appraisal of present-moment thinking (Bishop et al., 2004; Brown & Ryan, 2003; Kabat-Zinn, 2003), mindfulness-based meditation wields substantial impact on cognition and behaviour, even among individuals with no prior meditative experience (Hölzel et al., 2011). Indeed, even brief (e.g., 5–10 min) experimentally induced periods of mindfulness have been shown to affect a range of psychological processes, including (but not limited to) emotional appraisal, action control, mindreading, and social perception (e.g., Erisman & Roemer, 2010; Golubickis et al., 2016; Papies et al., 2012; Papies et al., 2015; Tan et al., 2014). Crucially, one way or another, many of the benefits of mindfulness originate in changes to the character of self-construal, notably a detachment or decentering of the self that acts to diminish the potency of self-referential processing, hence minimize self–other differentiation (Carmody et al., 2009; Farb et al., 2007; Hölzel et al., 2011; Shapiro et al., 2006; Vago & David, 2012). For example, Golubickis et al. (2016) reported that brief mindfulness-based meditation fostered the adoption of a third-person (vs. first-person) vantage point during visual imagery, thereby lessening people's self-centric estimates of personal salience in a potentially embarrassing situation (i.e., the spotlight effect; Gilovich et al., 2000; Macrae et al., 2016). Similarly, by reducing reliance on an egocentric decision-making strategy during an object-ownership task (Golubickis et al., 2018; Golubickis et al., 2019), we expect a transitory period of mindfulness-based meditation to diminish self-prioritization.

Despite burgeoning interest in the benefits of mindfulness both inside and outside the laboratory, quite how this practice impacts thinking and doing remains largely unspecified (Hölzel et al., 2011; Malinowski, 2013). To date, only a modest literature has explored the cognitive and neuropsychological processes through which mindfulness exerts influence, with emphasis falling primarily on the manner in which meditative experiences modulate attentional and motivational control (e.g., Lutz et al., 2008; Papies et al., 2015; Shapiro et al., 2006; Tang et al., 2007; Teper & Inzlicht, 2013). Given, therefore, continued uncertainty about the critical pathways through which meditative episodes impact cognition, here we adopted a computational modeling approach—specifically a drift diffusion model (DDM) analysis (Ratcliff et al., 2016)—to explicate the mechanism (or mechanisms) through which mindfulness-based meditation modulates decisional processing (van Vugt et al., 2019; van Vugt & Jha, 2011; van Vugt & van den Hurk, 2017).

Computational accounts of decisional processing, such as the DDM, are valuable as they yield important mechanistic insights into the stimulus and response-related operations that underpin task performance (Ratcliff et al., 2016; Wagenmakers, 2009). In binary decision-making tasks (e.g., is an object owned-by-self or owned-by-friend?), information is continually garnered from a stimulus until sufficient evidence has been acquired to select a response. In this way, performance can be facilitated through differences in the efficiency of stimulus processing (i.e., rate of information uptake; *stimulus* bias) and/or the evidential requirements of response selection (i.e., *response* bias). Critically, a DDM analysis has the capacity to isolate these independent sources of bias, thus inform understanding of the processes that underpin decision-making (White & Poldrack, 2014). If, as expected, brief mindfulness-based meditation attenuates (or eliminates) self-prioritization, then this should be realized through a reduction (or abolishment) of the prior bias toward self-owned (vs. other-owned) responses that underpins the self-ownership effect (Falbén et al., 2020; Golubickis et al., 2018; Golubickis et al., 2019; Golubickis et al., 2021).

Experiment 1

Method

Participants and design

One hundred and sixty undergraduates (132 females, 24 males, four others; M_{age} = 21.63 years, SD = 5.67), with normal or corrected-to-normal visual acuity, took part in the research. Informed consent was obtained from participants prior to the commencement of the experiment and the protocol was reviewed and approved by the Ethics Committee at the School of Psychology, University of Plymouth. The experiment had a 2 (meditation: mindfulness or control) × 2 (owner: self or friend) mixed design, with repeated measures on the second factor. To detect a significant interaction, a sample of one hundred and sixty participants afforded 97% power for a medium effect size (i.e., d = .50; PANGEA, Version .0.2).

Stimulus materials and procedure

The experiment was conducted online using Inquisit software. Participants, upon accessing the experiment through a web link, were randomly assigned to either the mindfulness or control condition. Participants who underwent the mindfulness intervention were instructed to close their eyes, relax, and listen via headphones to a pre-recorded audio for 5 minutes until a bell chimed to signal the end of the activity (see Supplementary Material). Based on an established protocol (Tan & Martin, 2013, 2015), participants were instructed to pay particular attention to the sensation of their breathing during the 5-minute period (Golubickis et al., 2016; Tan et al., 2014). They were also told it is quite natural for the mind to wander. However, they were requested to observe these episodes as fleeting experiences and to return attention to their breathing each time a distracting thought, emotion, or memory occurred (Smith & Novak, 2003). Previous research has confirmed the efficacy of this brief intervention in increasing levels of mindful-attention and awareness (Tan et al., 2014). Participants in the control condition heard audio instructions that were identical in length and style (see Supplementary Material). Contrasting the mindfulness treatment, however, these individuals were told to attend to each thought, emotion, and memory that occurred and to be totally immersed in the experience (Papies et al., 2012).

Following the 5-minute intervention, participants were informed they would next perform an object-classification task featuring two categories of items—pencils and pens (Golubickis et al., 2018). Prior to the start of the task, they were told the computer would randomly assign one category of objects to be owned by them (i.e., self-owned) and the other category to be owned by their best friend (i.e., friend-owned). At this point, participants were requested to bring their best friend to mind and to enter their name in a window on the screen. They then pressed the spacebar on the keyboard and text appeared indicating who had been assigned the pencils and pens, respectively (e.g., you = pens; friend = pencils). Assignment of the objects to self and friend was counterbalanced across the sample. Participants were then told they would be presented with images of individual pencils and pens on the screen and their task was to report, via a relevant button press as quickly and accurately as possible, whether the item belonged to them or their friend. Responses were given using two keys on the keyboard (i.e., N and M). Key-response mappings were counterbalanced across participants.

Each trial began with the presentation of a central fixation cross for 1,000 ms, followed by a picture of a pencil or a pen for 100 ms. Once the object was presented, the screen turned blank until participants decided about the ownership of the item (i.e., self-owned or friend-owned). Following each response, the fixation cross re-appeared and the next trial began. The stimuli comprised images of 20 objects (10 pens and 10 pencils) 140 by 140 pixels in size, grayscale, and matched for luminance (Golubickis et al., 2018). Participants performed 10 practice trials, followed by two blocks of 100 trials in which all stimuli occurred equally often in a random order. There were 200 trials in total, 100 trials per condition (i.e., self-owned vs. friend owned). Upon completion of the task, participants were debriefed and thanked.

Results and discussion

Sixteen (13 females, three males) participants failed to follow the experimental instructions (i.e., responded with random button presses, yielding chance performance), thus were excluded from the analysis. Responses faster than 200 ms and slower than 2,000 ms were also excluded, which eliminated less than 1% of the total number of trials. Participants' response accuracies and mean reaction times (RTs) were submitted to a 2 (meditation: mindfulness or control) × 2 (owner: self or friend) mixed-model analysis of variance (ANOVA) with repeated measures on the second factor.

Analysis of response accuracies revealed a main effect of owner, $F(1, 142) = 5.31$, $p = .023$, $\eta_p^2 = .04$, and a significant Meditation × Owner interaction, $F(1, 142) = 8.39$, $p = .004$, $\eta_p^2 = .06$ (see Fig. 1). Follow-up analysis yielded a significant simple main effect of Owner in the control condition, $F(1, 142) = 10.75$, $p > .001$, $\eta_p^2 = .14$, indicating that responses were more accurate to self-owned compared with friend-owned items. No such significant difference was

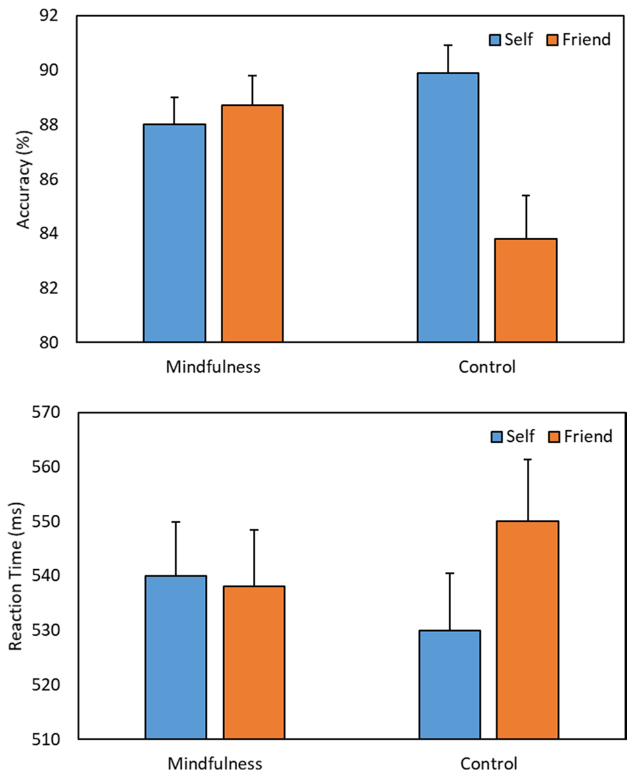

Fig. 1 Mean accuracy and correct response time (ms) as a function of Meditation and Owner. Error bars represent +1 *SEM* (Experiment 1)

observed in the mindfulness condition, $F(1, 142) = 0.22$, $p = .639$.

Analysis of participants' mean correct RTs revealed only a significant Meditation × Owner interaction, $F(1, 142) = 5.34$, $p = .022$, $\eta_p^2 = .04$ (see Fig. 1). Follow-up analysis yielded a significant simple main effect of owner in the control condition, $F(1, 142) = 7.77$, $p = .006$, $\eta_p^2 = .10$, such that responses were faster to self-owned compared with friend-owned items. No such significant difference emerged in the mindfulness condition, $F(1, 142) = 0.13$, $p = .723$. A mixed-model ANOVA on participants' mean error RTs revealed no significant effects.

The results of Experiment 1 demonstrated that self-bias can be eliminated following a brief period of mindfulness-based meditation. Specifically, whereas self-prioritization was evident among participants in the control condition, those who undertook mindfulness meditation failed to generate a self-ownership effect. A potential difficulty with the current experiment, however, was that, prior to the object-classification task, participants in the control condition were instructed to focus on their ongoing mental contents. As such, rather than mindfulness-based meditation eliminating self-bias, it is possible that self-directed attention in the control condition may have amplified self-prioritization (Blagov & Singer, 2004; Kuhn & McPartland, 1954). To address this issue, we therefore conducted an additional preregistered experiment in which the effects of brief mindfulness-based meditation were contrasted with a control activity in which attention was not directed toward the self. We expected to replicate the effects observed in Experiment 1.

Experiment 2

Method

Participants and design

One hundred and sixty undergraduates (119 females, 38 males, three others; $M_{age} = 21.83$ years, $SD = 3.74$), with normal or corrected-to-normal visual acuity, took part in the research. Informed consent was obtained from participants prior to the commencement of the experiment and the protocol was reviewed and approved by the Ethics Committee at the School of Psychology, University of Plymouth. The experiment had a 2 (meditation: mindfulness or control) × 2 (owner: self or friend) mixed design, with repeated measures on the second factor. Based on Experiment 1, to detect a significant interaction, a sample of 132 participants afforded 80% power for an effect size of $d = .4$ (PANGEA, Version .0.2). Additional participants (~20%) were recruited to allow for online testing drop-out.

Stimulus materials and procedure

The study was conducted online using Inquisit software. Contrasting Experiment 1, prior to the object-classification task, participants in the control condition performed a 5-minute Chinese puzzle task in which they had to construct shapes using polygons (i.e., Tangram). In all other respects, the methodology was identical to Experiment 1.

Results and discussion

Twenty (15 females, five males) participants failed to follow the experimental instructions (i.e., responded with random button presses, yielding chance performance), thus were excluded from the analysis. Responses faster than 200 ms and slower than 2,000 ms were also excluded, which eliminated less than 1% of the total number of trials. Participants' response accuracies and mean reaction times (RTs) were submitted to a 2 (meditation: mindfulness or control) × 2 (owner: self or friend) mixed-model ANOVA with repeated measures on the second factor.

Analysis of response accuracies revealed a main effect of owner, $F(1, 138) = 3.97$, $p = .048$, $\eta_p^2 = .03$, and a significant Meditation × Owner interaction, $F(1, 138) = 4.42$, $p = .037$, $\eta_p^2 = .03$ (see Fig. 2). Follow-up analysis yielded a

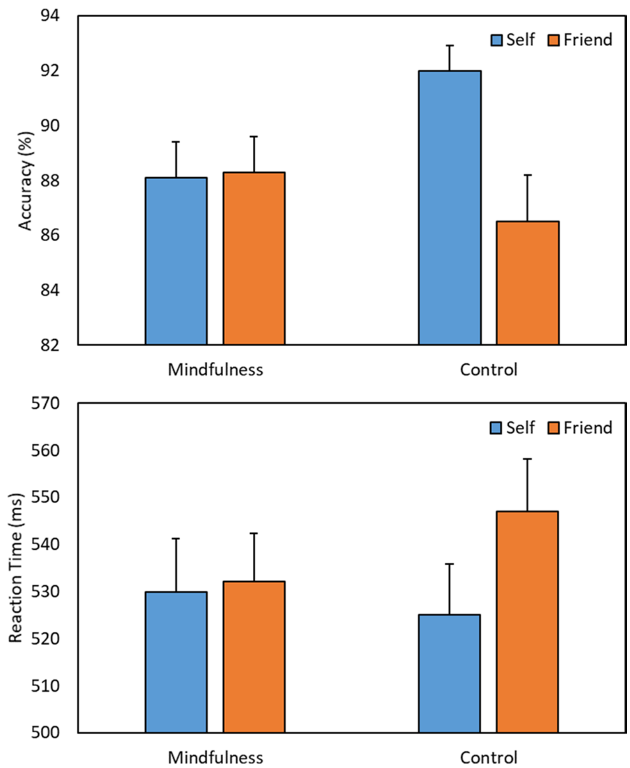

Fig. 2 Mean accuracy and correct response time (ms) as a function of Meditation and Owner. Error bars represent +1 *SEM* (Experiment 1)

significant simple main effect of owner in the control condition, $F(1, 138) = 8.01$, $p = .005$, $\eta_p^2 = .10$, indicating that responses were more accurate to self-owned compared with friend-owned items. No such significant difference was observed in the mindfulness condition, $F(1, 138) = 0.01$, $p = .937$.

Analysis of participants' mean correct RTs revealed a main effect of owner, $F(1, 138) = 7.17$, $p = .008$, $\eta_p^2 = .05$, and a significant Meditation × Owner interaction, $F(1, 138) = 4.76$, $p = .031$, $\eta_p^2 = .03$ (see Fig. 2). Follow-up analysis yielded a significant simple main effect of owner in the control condition, $F(1, 138) = 13.50$, $p < .001$, $\eta_p^2 = .16$, such that responses were faster to self-owned compared with friend-owned items. No such significant difference emerged in the mindfulness condition, $F(1, 138) = 0.11$, $p = .742$. A mixed-model ANOVA on participants' mean error RTs revealed only a significant main effect of owner, $F(1, 130) = 10.15$, $p = .002$, $\eta_p^2 = .07$, such that errors were faster to friend-owned ($M = 530$ ms; $SD = 159$ ms) compared with self-owned items ($M = 575$ ms, $SD = 193$ ms).

These findings replicated the effects observed in Experiment 1. As previously, but with a modified control condition, brief mindfulness-based meditation eliminated self-prioritization.

Modeling analysis

To identify the processes underpinning task performance, as the results of Experiments 1 and 2 were equivalent, the data sets were combined and submitted to a hierarchical drift diffusion model (HDDM) analysis (see Supplementary Material for a description of drift diffusion modeling and details of the current analysis). Models were response coded, such that the upper threshold corresponded to an owned-by-self response and the lower threshold to an owned-by-friend response (Golubickis et al., 2018). Four models were estimated for comparison to examine the potential effects of mindfulness-based meditation on task performance. Model 1 considered whether performance was underpinned solely by processing differences between self- and friend-owned items, with meditation exerting no effect (i.e., control model). Model 2 explored the possibility that mindfulness meditation influenced response caution (van Vugt & Jha, 2011; van Vugt & van den Hurk, 2017). Model 3 examined the prediction that mindfulness-based meditation would reduce the a priori bias toward self-owned (vs. friend-owned) responses (Golubickis et al., 2016; Golubickis et al., 2018). The final full model (i.e., Model 4) tested all the prior effects plus the possibility that task performance was underpinned by differences in the efficiency of stimulus processing as a function of experimental condition (i.e., mindfulness vs. control).

Inspection of the posterior distributions for the best fitting model indicated that task performance was underpinned by both response (z) and stimulus (v) biases as well as differences in response caution (a; see Fig. 3). First, there was extremely strong evidence that the starting point of evidence accumulation was larger in the control compared with the mindfulness condition (*M*s: .53 vs. .51, p_{Bayes}[control > mindfulness] < .001, BF > 1,000), indicating that mindfulness increased the evidential requirements of self-relevant responses.[1] Second, there was extremely strong evidence that boundary separation (a) was larger in the mindfulness (vs. control) condition (*M*s: 1.50 vs. 1.45, p_{Bayes}[control < mindfulness] < .001, BF > 1,000), revealing that mindfulness-based meditation increased response caution. Finally, evidence for a difference in drift rates (v) was also observed. Specifically, decisional evidence was accumulated more rapidly in the mindfulness compared with the control condition (*M*s: 1.89 vs. 1.57, p_{Bayes}[control < mindfulness] < .001, BF > 1,000). In addition, there was extremely strong evidence that drift rate (v) was larger for self-owned (vs.

[1] Bayesian p values quantify the degree to which the difference in the posterior distribution is consistent with the hypothesis. For example, a Bayesian p of .05 indicates that 95% of the posterior distribution supports the hypothesis.

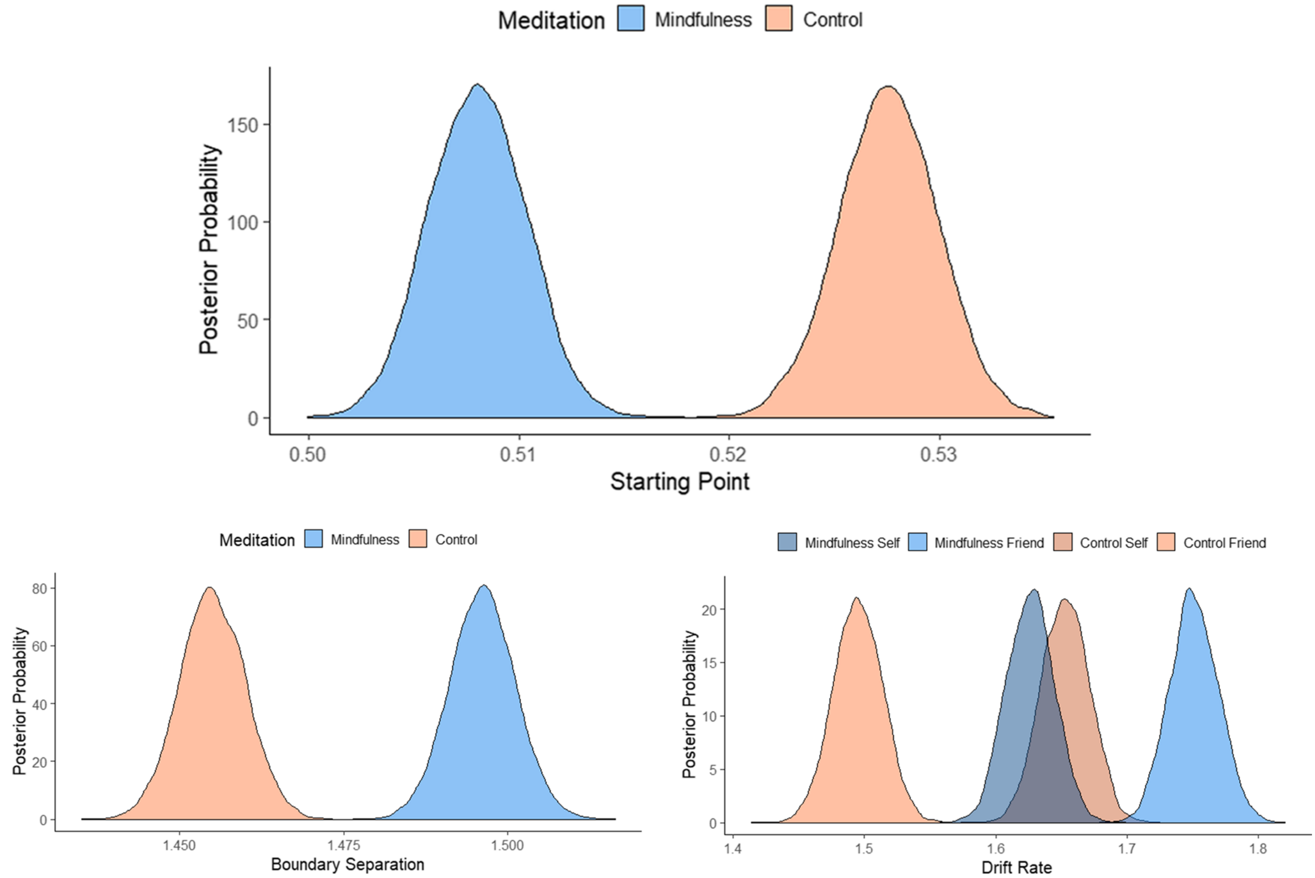

Fig. 3 Mean posterior distributions of starting point (z), and boundary separation (a) as a function of Meditation and drift rate (v) as a function of Mindfulness and Owner

friend-owned) objects in the control condition (Ms: 1.65 vs. 1.75, $p_{Bayes}[self_{control} > friend_{control}] < .001$, BF > 1,000), an effect that was reversed in the mindfulness condition (Ms: 1.63 vs. 1.75, $p_{Bayes}[self_{mindfulness} < friend_{mindfulness}] < .001$, BF > 1,000).

General discussion

Across two experiments, the current results confirmed that self-bias can be abolished following a brief period of mindfulness-based meditation. Furthermore, computational modeling (i.e., DDM analysis) identified the stimulus- and response-related operations through which mindfulness meditation moderated task performance. Of theoretical significance, contrasting participants in the control condition, brief mindfulness-based meditation attenuated the prior (i.e., prestimulus) bias toward self-owned (vs. friend-owned) responses that underpins the self-ownership effect (Golubickis et al., 2018; Golubickis et al., 2019). Put simply, mindfulness meditation abolished egocentric responding (Golubickis et al., 2016).

Interestingly, the DDM analysis yielded further insights into the cognitive pathways through which mindfulness influenced task performance. Replicating previous research, mindfulness meditation increased boundary separation (i.e., a), such that additional evidence was required before a response was selected (van Vugt & van den Hurk, 2017). This indicates that mindfulness-based meditation increased response caution during decisional processing. Differences in the efficiency of stimulus processing (i.e., drift rate, v) were also observed. Specifically, whereas the rate of information uptake was faster for self-owned compared with friend-owned objects among participants in the control condition (i.e., self > friend), this effect was reversed (i.e., self < friend) for those that performed mindfulness meditation. Thus, following a brief period of mindfulness-based meditation, a combination of response and stimulus-related effects contributed to the elimination of the self-ownership effect. These findings affirm the value of computational modeling in explicating the pathways through which mindfulness meditation impacts cognition (van Vugt et al., 2019; van Vugt & Jha, 2011).

In considering how exactly mindfulness meditation works, attention is posited to play a central role (Bishop et al., 2004; Brown & Ryan, 2003; Carmody, 2009; Hölzel et al., 2011; Malinowski, 2013; Sumantry & Stewart, 2021). For example, recent meta-analytic work has revealed that core components of attention, notably alerting, inhibition, and updating, are enhanced following mindfulness meditation (Miyake et al., 2000; Posner & Petersen, 1990; Sumantry & Stewart, 2021). One intriguing possibility is that, through attentional training grounded in the nonjudgmental appraisal of moment-to-moment mental contents (Bishop et al., 2004; Brown & Ryan, 2003; Kabat-Zinn, 2003), mindfulness cultivates a level of meta-awareness in which identification with the self is reduced (i.e., nonself) and all experiences are treated equally (Bernstein et al., 2019; Dunne et al., 2019; Schooler, 2002). In other words, sensations, thoughts, and feelings are handled as if one were a dispassionate (i.e., nonevaluative) external observer (Golubickis et al., 2016; Kerr et al., 2011; Shapiro et al., 2006), a state of mind that would naturally lessen egocentrism and the emergence of self-bias. The findings reported here lend support to this viewpoint.

To expand the scope of the current inquiry, consideration should be given to the longevity of the debiasing effect that brief mindfulness-based meditation exerts on self-prioritization. The observed elimination of self-bias is unquestionably temporary, just how transitory however remains to be seen. In exploring this issue further, attention should be directed both to the dosage of mindfulness meditation (i.e., time spent meditating) that is experienced and the temporal interval before self-prioritization is probed, as these factors in tandem likely influence the eradication and reemergence of self-bias (Papies et al., 2012; Papies et al., 2015). Additionally, individual differences in meditative expertise warrant empirical consideration. Compared with novice practitioners, experienced meditators display improved attentional functioning, reduced emotional reactivity, and heightened cognitive flexibility (Goleman & Davidson, 2017; Jha et al., 2007; Lutz et al., 2004; Moore & Malinowski, 2009). As such, extensive meditative practice may have notable implications for the generation of egocentric decisional biases. For example, it is possible that, via self-detachment, experienced meditators may fail to generate self-prioritization effects, an outcome that would challenge dominant theoretical accounts of self-function (Humphreys & Sui, 2016; Sui & Humphreys, 2015). In combination with computational modeling, future research should explore this matter using samples that vary in meditative experience across tasks that tap different manifestations of self-bias (Constable et al., 2019; Cunningham et al., 2008; Golubickis et al., 2021; Schäfer et al., 2015; Schäfer et al., 2016; Sui et al., 2012).

Notwithstanding the assertion that self-prioritization is a ubiquitous facet of mental life (Humphreys & Sui, 2016; Sui & Humphreys, 2015, 2017), the current findings furnish further evidence for the malleability of this allegedly inescapable effect (Caughey et al., 2021; Constable et al., 2019; Falbén et al., 2019; Falbén et al., 2020; Siebold et al., 2015; Stein et al., 2016; Svensson et al., 2022; Wade & Vickery, 2018; Woźniak & Knoblich, 2022). Following a brief period of mindfulness-based meditation, at least in the context of an object-ownership task, it is possible to knock yourself out.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.3758/s13423-022-02111-2.

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Open practices statement Data are available at the OSF at the following link (https://osf.io/w7zvj/). Experiment 2 was preregistered (https://aspredicted.org/up4gm.pdf).